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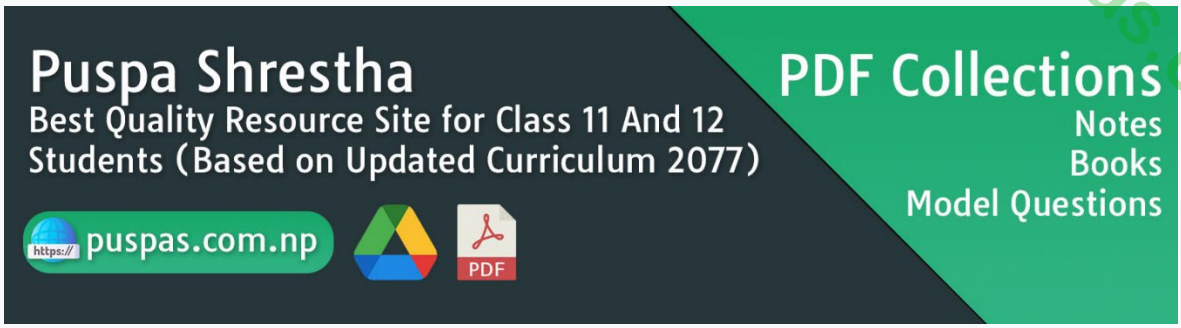

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[Grade XII- Science]

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CONTENTS

1. COMPULSORY ENGLISH

New Syllabus *1*
Model Questions *1*
Topic Based Questions *3*
A. Unseen Passages 3

Meanings into Words

B. The Grammar 18
Unit 1: Experience 18
Unit 2: Appearance 19
Unit 3: Relating Past Events 21
Unit 4: Attitudes and Reactions 23
Unit 5: Duration 25
Unit 6: Reporting 27
Unit 7: Deductions and Explanation 28
Unit 8: Advantages and Disadvantages 30
Unit 9: Clarifying 32
Unit 10: Wishes and Regrets 34
Unit 11: Events in Sequence 35
Unit 12: Comparison 37
Unit 13: Processes 39
Unit 14: Prediction 39
Unit 15: News (Hearsay) 40
Unit 16: Revision 42
C. Compositions / Free Writing 44
Unit 1: Letter Writing 44
1. Application Letters 44
2. Personal Letters 44
3. Letters to the Editor 45
4. Official Letters 45
Unit 2: Paragraph Writing 45
Unit 3: Essay writing 47
Unit 4: Newspaper/ Magazine Article/ Story Writing 48
Unit 5: Book/ Film Review 48

The Heritage of Words

Unit 1: Love and Reminiscence 49
Unit 2: Ecology and change 50
Unit 3: Humour and Satire 51
Unit 4: God and Man 52
Unit 5: Human Rights 53
Unit 6: Women and Children 54
Unit 7: Crime and Confession 55
Unit 8: Playing With the Texts 56
Yearwise Questions *58*

2. COMPULSORY NEPALI

नयां पाठ्यक्रम- २०६७ 70
नमुना प्रश्नपत्र- २०६८ 73
शीर्षकमा आधारित प्रश्नहरू 76

खण्ड (क) व्याकरण

एकाइ १: वर्ण र अक्षरको संरचनाको पहिचान 76
एकाइ २: वर्णविन्यास चिह्न परिचय 77
एकाइ ३: शब्दवर्ग (पदवर्ग) 78
एकाइ ४: शब्दस्रोत 79
एकाइ ५: शब्दनिर्माण (व्युत्पन्न) 80
एकाइ ६: शब्द रूपायन 84
एकाइ ७: वाक्य तत्त्व 86
एकाइ ८: वाक्यान्तरण 88

खण्ड (ख) बोध र अभिव्यक्ति

एकाइ १: बोध र शब्दभण्डार तथा बुँदाटिपोट र सङ्क्षेपीकरण ... 91
क. बोध र शब्दभण्डार 91
ख. बुँदाटिपोट र सङ्क्षेपीकरण 97
एकाइ २: अनुच्छेदलेखन, पत्र रचना र व्यावहारिक लेखन 100
एकाइ ३: प्रतिवेदनलेखन, टिप्पणीलेखन र निवन्धलेखन 102
क. प्रतिवेदनलेखन 102
ख. टिप्पणीलेखन 102
ग. निवन्धलेखन 103
एकाइ ४: कृतिसमीक्षा/साहित्यिक रचनाको पठनबोध 104
साहित्यिक रचनाको पठनबोध 104
क. नाटक तथा एकाङ्की 104
ख. उपन्यास 105
साहित्यिक रचनाको पठनबोध 107
क. कविता 107
ख. कथा 110
ग. निवन्ध 113
साहित्यिक रचनाको पठनबोध: सङ्क्षिप्त उत्तरात्मक (भाव, विचार, परिवेश, चरित्र र सन्देश लेखन) (कथा, कविता, निवन्ध, नाटक/ एकाङ्की, उपन्यास): [पाठक प्रतिक्रिया] 116
परीक्षा प्रश्नपत्र *117*

3. PHYSICS

New Syllabus *134*
New Model Questions - 2066 ..... *137*
Chapter Based Questions *138*
Unit-1 Waves and Optics 138
A. Waves 138
1. Wave motion 138
2. Mechanical waves 139
3. Wave in pipes and strings 140
4. Acoustic phenomena 143
B. Physical Optics 145
1. Nature and propagation of Light 145
2. Interference 147
3. Diffraction 148
4. Polarization 150
Unit-2 Electricity and Magnetism 150
A. Current Electricity 150
1. D.C. Circuit 150
2. Electrical circuits 154
3. Thermoelectric Effect 156
4. Chemical Effect of Current 157
B. Magnetic Field of current 158
1. Magnetic Effect of Current 158
2. Magnetic Properties of Materials 161
3. Electromagnetic Induction 162
4. Alternating Currents 165
Unit-3 Modern Physics 168
1. Electrons and Photons 168
2. Solids and Semiconductor devices 172
3. Quantization of energy 174
4. Nuclear physics 178
5. Radioactivity 180
6. Nuclear energy and other sources of energy 182
7. Particle physics and cosmology 183
Yearwise Questions *184*

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4. CHEMISTRY

New Syllabus *185*
Model Question - 2056 (Old Course) *191*
Chapter based Questions *192*
General & Physical Chemistry (Section A)
Unit 1: Chemical Bonding and Shape of Molecules 192
Unit 2: Volumetric Analysis 193
Unit 3: Ionic Equilibrium 197
Unit 4: Electrochemistry 200
Unit 5: Energetics of Chemical Reactions 204
Unit 6: Chemical Thermodynamics 206
Unit 7: Chemical Kinetics 208
Organic Chemistry (Section B)
Unit 8: Aromatic Hydrocarbon 213
Unit 9: Haloalkanes and Haloarenes 214
9.1. Haloalkanes 214
9.2. Haloarenes 216
Unit 10: Alcohols and Phenols 217
10.1. Alcohols 217
10.2. Phenols 219
Unit 11: Ethers 220
11.1 Aliphatic Ethers 220
11.2 Aromatic Ether 222
Unit 12: Aldehydes and Ketones 222
12.1 Aliphatic Aldehydes and Ketones 222
12.2 Aromatic Aldelydes and Ketones 225
Unit 13: Carboxylic Acids 225
13.1 Aliphatic Carboxylic Acids 225
13.2 Derivatives of Carboxylic Acid 227
13.3 Aromatic Carboxylic Acids 228
Unit 14: Nitrocompounds 228
14.1 Aliphalic Nitrocompounds (Nitroalkane) 228
14.2 Aromatic Nitrocompounds 228
Unit 15: Amino Compounds (Amines and Aniline) 230
15.1 Aliphatic Amines 230
15.2 Aromatic Amine (Aniline) 231
Unit 16: Molecules of Life 232
Unit 17: Chemistry in Service to Mankind 234
Unit 18: Heavy Metals 236
18.1. Copper 236
18.2. Zinc 237
18.3. Mercury 238
18.4. Iron 239
18.5. Silver 240
Yearwise Questions *241*

5. BIOLOGY

New Syllabus *243*
Model Question Paper *245*
Chapter Based Questions *246*
Section A (Botany)
Unit 1: Anatomy and Physiology of Organisms 246
A. Anatomy of Organisms 246
B. Physiology of Organisms 247
Unit 2: Genetics 250
Unit 3: Developmental Biology 253
Unit 4: Application of Biology 255
Section B (Zoology)
Unit 1: Animal tissues 257
Unit 2: Developmental Biology 257
Unit 3: Human Biology and Health 258
A. Anatomy and Physiology 258
B. Human Population 263
C. Disease 264
Unit 4: Application of Biology 266
Yearwise Questions *268*

6. MATHEMATICS

New Syllabus *269*
Model Questions *271*
Chapter Based Questions *275*
1. Permutation and Combination 275
A. Permutation 275
B. Combination 276
2. Binomial Theorem 278
A. Binomial Theorem 278
B. Exponential and Logarithmic Series 280
3. Elementary Group Theory 282
4. Conic Sections 284
A. Parabola 284
B. Ellipse 286
C. Hyperbola 288
5. Co-ordinates in Space 290
A. Co-ordinates in Space 290
B. Plane 293
6. Vectors and its Applications 294
A. Elements of Vectors and its Applications 294
B. Product of Vectors 296
7. Derivative and its Application 300
A. Derivatives 300
I. Derivative by First Principle or Definition 300
II. Derivative using Formula 301
B. Application of Derivatives 303
I. Differentials, Target and Normal 303
II. L Hospital's Rule 304
III. Rolle's Theorem and Mean Value Theorem 304
8. Antiderivatives 305
9. Differential Equations and their Applications 310
10. Dispersion, Correlation and Regression 313
A. Dispersion 313
B. Skewness 316
C. Correlation 317
D. Regression 318
11. Probability 319
A. Probability (Simple Cases) 319
B. Binomial Distribution 322
12. Statics 324
13. Statics (Continued) 329
14. Dynamics 333
A. Motion in a Straight Line 333
B. Motion under Gravity 334
C. Motion Down an Inclined Plane 336
15. Dynamics (Continued) 337
A. Newton's Law of Motion, Impulse 337
B. Projectiles 338
C. Work, Energy and Power 341
16. Linear Programming 343
A. Graphical Method 343
B. Simplex Method 344
17. Computational Method 346
A. Number System 346
B. Bisection Method 347
C. Newton Raphson's Method 348
18. Computational Method (Continued) 349
A. Gauss Elimination Method 349
B. Gauss-Seidel Method 350
C. Matrix Inversion Method 351
19. Numerical Integration 351
A. Trapezoidal Rules 351
B. Simpson's Rule 353
Yearwise Questions *354*

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Compulsory English

NEW SYLLABUS

Level: Class XII

Full Marks: 100
Pass Marks: 35

Course Contents

The contents of this paper can be divided into two components.

1. Core English
2. Extensive Reading and Writing

The text for language skills has the following units.

• experience • appearance • relating past events • attitudes and reactions • duration • reporting • deductions and explanations • advantages and disadvantages • clarifying • wishes and regrets • events in sequence • comparison • processes • prediction • news

The texts for extensive reading are as follows.

Poems

1. William Stafford, "Travelling through the Dark".
2. W.B. Yeats, "The Lamentation of the Old Pensioner".
3. William Shakespeare, "Full Fathom Five Thy Father Lies".
4. Ray Young Bear, "Grandmother".
5. G.M. Hopkins, "God's Grandeur".

Essays

6. Moti Nissani, "Two Long-term Problems: Too Many People, Too Few Trees".
7. Marsha Traugot, "The Children Who Wait".
8. Martin Luther King, "I Have a Dream".
9. Ilene Kantrov, "Women's Business".
10. Lilla, M and Barry, C. Bishop, "Hurried Trip to Avoid a Bad Star".
11. Germanine Greer, "A Child is Born".

Stories

12. Edgar Allen Poe, "The Tell-Tale Heart".
13. Dylan Thomas, "A Story".
14. James Joyce, "The Boarding House".
15. G. Garcia Marquez, "The Last Voyage of the Ghost Ship".
16. Anton Chekhov, "About Love".
17. Brothers Grimm, "Hansel and Gretel" and its Variations.

Play

1. W.B. Yeats, "Purgatory".

MODEL QUESTIONS

Time: 3 hrs.

Full Marks: 100
Pass Marks: 35

Attempt All Questions.

1. **Read the following passage and answer the questions given below.** **[5×3=15]**

If there were no mountains or oceans; and if the winds circled the earth with perfect regularity then the amount of heat and length of the farmer's growing season would progress uniformly from north to south. Instead, there are all kinds of unexpected differences in climate, as temperature maps of the United States show. For instance, all along the western coast, the temperature changes little between winter and summer. In some places, the average difference between July and January is a little as 10 degrees centigrade. The climate along the northern part of this coast is similar to that of England. But in the north central part of the country, summer and winter are worlds apart. There the average difference between July and January is 36 degrees centigrade and more violent extremes are common. The coldest days of a typical January may be 40 degrees centigrade, and the hottest July day may be 45 degrees. This is the sort of climate that is also found in central Asia, far from the moderating influence of the oceans. In the eastern part of the United States, the difference between summer and winter is also very distinct, but not nearly so extreme. Near the southwestern corner of the country, the climate is mild and spring like in winter, but in summer the temperature may reach equatorial intensity. In Alaska, almost continuous daylight in summer makes the short growing season an intense one. The variations in temperature within the United States have had a marked effect on the country's economy and living standards.

Questions:

a. What are the causes of unexpected differences in climate?
b. In which part of the United States are summer and winter worlds apart?
c. What is the temperature of the coldest days of a typical January in the north?
d. What is the effect of continuous daylight in summer on the growing season in Alaska?
e. Which sectors are affected by the variations in temperature in the United Sates?

2. Answer any FIVE questions. [5×3= 15]

a. Why does the poet show his anger against time? *(The Lamentation of the Old Pensioner)*
b. How were the boy's uncle and aunt? *(A Story)*
c. Why did the old man kill the boy? *(Purgatory)*
d. What does the traveler feel when he touches the dead doe? *(Traveling through the Dark)*
e. Why was the father not quite willing to accept his wife's proposal to leave the children in the forest? *(Hansel and Gretel)*
f. What differences does the writer show between a traditional society and a modern society in matters of childbearing? *(A Child is Born)*

3. Answer any ONE of the following. [10]

a. Describe the problems of overpopulation and deforestation that Moti Nissani has dealt with. (Two Long term Problems)
b. Write an essay on women's position in Nepal. *(A Child is Born)*

4. Change the voice of following sentences. [4]

a. I have written a poem. [Passive]
b. Pop singers are always surrounded by teenagers. [Active]
c. A ball hit me as I was walking along the street. [Passive]
d. The building was completely damaged by fire. [Active]

Ans: (a) A poem has been written by me. (b) Teenagers always surround pop singers. (c) I was hit by a ball as I was walking along the street. (d) Fire completely damaged the building.

5. Put the verbs in brackets in correct grammatical form. [4]

a. This is the first time I (watch) a movie in the cinema hall.
b. I bought the book which I not (find) for years.
c. I wish they (live) near.
d. As soon as the telephone (ring) he answered.

Ans: (a) This is the first time I have ever watched a movie in the cinema hall. (b) I bought the book which I had not found for years. (c) I wish they would live near. (d) As soon as the telephone had rung he answered.

6. Complete the sentences by joining the following words using, When..... [4]

a. turn off/lights -change / bulb-
b. eat/meal -pay/bill-
c. arrive/border - show/ passport
d. meet/stranger - shake/ hands

Ans: (a) When you turn off the light, you change the bulb. (b) When you eat the meal, you pay bill. (c) When you arrive the border, you show passport. (d) When you meet the stranger, you shake hands.

7. Rewrite the following sentences using the word 'seem'.[5]

a. His front garden always looks a bit neglected.
b. You only see his children during the school holidays.
c. He usually carries a walking stick when he goes out.
d. There are African masks on the wall of his sitting room.
e. He never stops to chat with you if you have got dog with you.

Ans: (a) He doesn't seem to be very keen on gardening. (b) His children seem to be at boarding school. (c) He seems to have injured his leg. (d) He seems to have lived in Africa at some time in his life. (e) He seems to be afraid of dogs.

8. Report the following remarks using a suitable verb from the box. [4]

agreed, refused, threatened, advised, tried to persuade

Example: 'Very well, then we'll give him his deposit back.' They agreed to give him his deposit back.

a. 'If you don't pay up, we'll take legal action.'
b. 'No, I have absolutely no intention of sending you the money.'
c. 'Please, you must help me! I don't know what to do.'
d. 'I think you ought to get in touch with 'Safeguard.'

Ans: (a) They threatened to take legal action. (b) They refused to send me the money. (c) He tried to persuade me to help him. (d) He advised me to get in touch with safeguard.

9. Imagine you are in the situations below.

a. Write a wish for each of the following situations. [3]
(i) You are sick (ii) You need a job (iii) It's raining.

Ans: (i) I wish someone would bring medicine for me. (ii) I wish I could get a job. (iii) I wish it wasn't raining.

b. Express regrets for the following situations. [2]
(i) You forgot your friend's birthday.
(ii) You could not keep your promise.

Ans: (i) I should have asked his best friend. (i) I wish I had kept my promise.

10. Write a description of your classroom in about 50 words.[10]

11. Change the following sentences as shown in the example. [5]

Example: *Someone is singing in the bath. It's getting on Han's nerves.*
Answer: *If there's one thing that gets on my nerves, it's people who sing in the bath.*

a. Someone has taken seat. It's making her angry.
b. Someone has taken Ram's pen without permission. He is angry.
c. It's after midnight, and the people next door are playing loud music. Ram objects to it.
d. Someone's just spat in the street. Ram is offended.
e. Ram's just seen someone with purple and green hair. He can't stand this.

Ans: (a) If there is one thing that makes me angry, it's people who take other's seat. (b) If there is one thing that makes me angry, it's people who take other's pen without permission. (c) If there is one thing that annoys me it's people who play loud music after midnight. (d) If there is one thing that offends me, it's people who spit in the street. (e) If there is one thing I can't stand, it's people who colour their hair.

12. Write in about 120 words about the remarkable experiences that you have had during you school life. Include the following things. [10]
(People/friends you met, events or activities you took part in, achievements you made, impressions you left behind.)

13. Look at this letter to a local newspaper and answer the questions. [10]

Dear Sir,

If the traffic congestion gets any worse, there is likely to be a permanent traffic jam in the town centre during working hours, which will make it impossible for shops and business to operate efficiently.

The proposed scheme for banning cars from the centre is, however, unlikely to solve this problem. This ban will only cause more congestion in the suburbs, and in any case there are many people who genuinely need to take their cars to work.

A much better solution would be to double the number of train services into the centre and two halve the far. This would encourage people to stay off the roads, and would

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avoid the bad feeling that the present scheme seems likely to cause among the business community.

Yours Faithfully,
Sarada Shrestha
Baghbazar.

Why does the writer think:

a. something should be done about traffic congestion?
b. the business houses will suffer?
c. the proposed scheme will not work?
d. his own solution is better?
e. the use of will is proper in paragraphs 1 and 2.

14. Read the price chart given below, compare the prices and write four sentences using "as much as, as expensive as, the price of, and twice". [4]

Price Chart (in Rs. per kg)

Mutton	Chicken	Potato	Onion
Rs. 220	Rs.110	Rs. 15 (Red)/ Rs. 10 (White)	Rs. 15

Ans: (a) The mutton is twice as expensive as chicken. (b) The onion is about as expensive as red potato. (c) Chicken is half the price of mutton. (d) Mutton costs twice as much as chicken.

TOPIC BASED QUESTIONS

A. UNSEEN PASSAGES

1. 2077 Set D Q.No. 1 **Read the following passage and answer the questions that follow.** **[2×2=4]**

Someone once put forward an attractive though unlikely theory. Throughout the earth's revolution around the Sun, there is one point of space always hidden from our eyes. This point is the opposite part of the Earth's orbit which is always hidden by the Sun. Could there be another planet there, essentially similar to our own but always invisible?

If a space probe today sent back evidence that such a world existed, it would cause not much more sensation than Sir William Herscheel's discovery of a new planet, Uranus, in 1781. Herscheel was an extraordinary man- no other astronomer has ever covered so vast a field of work- and his career deserves study. He was born in Hanover in Germany, left German army in 1757 and arrived in England the same year with no money.

Serious observation began in 1774. He set himself the astonishing task of 'reviewing the heavens' in other words pointing his telescope to every accessible part of the sky and recording what he saw. The first review was made in 1775, the second and most momentous in 1780-81. It was that he discovered Uranus. Afterwards, supported by the royal grant in recognition of his work, he was able to devote himself entirely to astronomy. His final achievements spread from the Sun and Moon to remote galaxies.

Questions:

a. What was the attractive theory about?
b. What do you mean by 'reviewing the heavens'?

2. 2076 GIE Q.No. 1 **Read the following passage and answer the questions that follow.** **[5×3=15]**

Voting serves as the most visible and obvious form that can be recognized as an element within the system of democracy. It is also one of the significant foundation stones of democracy. The ability to conduct free and fair elections is at the core of what it means to call a society democratic.

The voter in a democracy may be driven by a greed or a selfish motive to vote for a specific person, party or another. But would defeat the very purpose of democracy. The voter should primarily be concerned with the good of the country only before he or she votes. In democracy the votes should be kept confidential so that the voter may vote fearlessly. No ruling party or candidate should be allowed to intimidate or scare the voters to raise a vote bank for themselves. Further the voting should be done peacefully. The violent incidents like booth capturing and throwing banquet are sufficient to put any democracy to shame. However, in order to be an honest member of a democracy, one should and must vote without any selfish motives.

A democracy does and must consist of political parties. A political party may be a ruling one or in the opposition. A political party that enjoys the majority may form the government either alone or in collaboration with other parties.

Questions:

a. What is the foundation stone of democracy according to the passage?
b. When does a society become democratic?
c. How is the purpose of democracy defeated?
d. Which five words in the passage mean a shame to democracy?
e. When does a political party become eligible to form the government?

3. 2076 Set B Q.No. 1 **Read the following passage and answer the questions that follow:** **[5×3=15]**

There is quite a debate on whether or not computers have positively affected education. Some proponents of computers in school argue the fact that computers are vast in the supply of resources as well as the fact that computers dominate society and will continue to do so. Opponents of computers in education take the position of experiencing things actually, and not just on a computer screen, a reality versus virtual reality argument. In addition, there is the aspect of time involved with using a computer as opposed to interaction with actual living things. Computers have in many ways enhanced education but it has also weakened other skills taught in school as well.

The first skill lost is obvious with the use of the word processing programmes today. Of course they are convenient for typing papers because of the neatness and uniformity they provide as opposed to hand writing. Computers also make it easy to correct mistakes without using white out or scratching out words. However, it is discouraging children to learn how to spell correctly, use correct grammar and in some word processing programmes use more vibrant and exciting words.

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Questions:

a. According to the speaker, how is computer discouraging children?
b. What do the opponents of computers claim?
c. What advantages do computer typing have over handwriting?
d. What do the proponents of computer argue?
e. Summarize the passage in one sentence.

4. **2076 Set C Q.No. 1 Read the following passage and answer the questions that follow:** **[5×3=15]**

Violence has become a way of life today. Terrorists kill people without any sense of remorse; communalists indulge in violence without any reason. Politicians boost up their image by patronizing violence, and workers and students resort to violence for getting their grievances redressed. Non - violence movement exemplified by Buddha has almost lost from the psyche of many people. In its place we have accepted naked and maimed beggar, child labour, burning of brides and countless deaths as a result of war or accident. The two new types of violence - terrorism and rioting - make the age - old caste - based notion of untouchability pale into in significance. All these have left people unmoved by human sufferings. Such a blunting of emotions itself manifests in a variety of psychological reactions.

Death is simply reported numerically - ten killed, three injured. These faceless nameless dead seem non - human. It fails to arouse any deep feeling of loss or pains.

Questions:

a. What are the two types of violence mentioned in the passage? How have they affected the system of the country?
b. How do the terrorists rationalize their activities?
c. What have people accepted in place of non - violent movement?
d. According to the author, what seems to be non-human?
e. Summarize the text in one sentence.

5. **2076 Partial D Q.No. 1 Read the following passage and answer the questions that follow:** **[5×3=15]**

Children are the pillars of a nation. They need to be nurtured well both physically and mentally from the very beginning of their life. Physically healthy and mentally sound children can be the driving force of economic growth in the future. It is the healthy and well educated young population that can lead the country towards prosperity. A healthy young population is an asset in itself provided that the state has a robust policy to engage it in education. The state, parents, communities and school/colleges must need to plan for the overall development of youths, either in education, or in health or in employment. The countries with high percentage of young population below 18 years of age need to invest more on education and skills. According to the Ministry of Health, Population and Environment, there are around 3.2 million youths aged between 15-19. This is the most delicate segment of population that still does not get proper attention for its overall growth without giving them undue stresses. We, the parents, teachers and the community as a whole, still tend to think corporal punishment is a way to discipline the children. However, the children Act, 2018 has criminalized corporal punishment of children in all forms. By enacting this law, Nepal has become the first country in South Asia and 54th in the world to do so. The Act has defined that a person below age of 18 is a child and s/he should not be subjected to corporal punishment - physical or mental torture or degrading treatment either at homes or any other places.

Questions:

a What type of children are the driving force of the nation?
b. What do you mean by corporal punishment?
c. Who are defined as criminals, according to the children Act 2018?
d. Which is the first South Asian Country to enact the law?
e. Give a suitable title to the passage.

6. **2076 Partial E Q.No. 1 Read the following passage and answer the questions that follow:** **[5×3=15]**

Venus is close to the sun than the earth is, and sunlight reaching Venus is twice as powerful as that reaching the earth. However, it has also been found that Venus, which is covered in thick cloud, reflects twice as much sunlight as the earth does. So, it is quite possible to imagine that Venus might not be too hot to support life, and even to picture it as the home of air haired Venusians chasing across the planet in flying saucers.

Unfortunately, this attractive idea does not stand up to close examination. Instead of spinning anti clockwise like most other planets, Venus revolves clockwise and it turns to slowly that the sun rises in the west and sets in the east 59 days later. This means that during the immensely long Venusians 'day' the temperature has time to reach 450 degree centigrade, easily hot enough to melt tin or lead. Moreover, the polar axis is almost vertical, so there are not seasons.

But the real shock comes when we consider the atmosphere. Normally you expect that the closer a planet is to the sun, the less atmosphere it will be able to retain. Venus, however, has an atmosphere about 100 times as dense as ours. The air is much too thick to run in, and a swimming stroke would help you walk in it. On the other hand, the atmosphere is so thick that you could fly through it without any problem. The winds are very slow - the Russian space craft 'Venera 10' measured on landing a maximum air flow of seven miles per hour-yet the atmosphere is so dense that a seven mile per hour wind would be strong enough to knock down a tall building.

Questions:

a. Why might we expect the surface of Venus to be fairly cool?
b. Why in fact, is the surface of Venus hot?
c. If we tried to walk on Venus, what problems would we face?
d. Why does sun rise in the west and set in the east in Venus?
e. How is Venusian atmosphere different from that of the earth?

7. **2075 GIE Q.No. 1 Read the following passage and answer the questions that follow.** **[15]**

Cognitive theory of education is one of the most widely supported and deeply thought-through educational theories

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used in developed countries of our day. The prospects of its usage haven't yet been fully researched, but the majority of specialists agree that its further implementation can yield great and fascinating results-both in education of children and adults. The basic principle of cognitive theory is that the effectiveness of education depends more on the intrinsic processes that occur in human mind and not on the external stimuli. Thus, if we understand the activity of human mind we can better understand how education happens and modify it in ways that can make improve the final result-by encouraging effective cognitive processes and discouraging ineffective ones. It is possible to make difference than by simple changes in educational theory is antagonistic towards the behaviourism, stating that the role of behavior in education is greatly over rated, and the importance lies not with outward behaviour and individual events, but with their patterns, memory and intrinsic cognitive processes. Memory is perceived as an active functioning process which means that all prior experience of this particular human beings plays an enormous role in his or her education. It doesn't mean that the theory fails to accept the importance of behaviour in educational process, it simply considers it to be a secondary factor, not a primary one.

Questions:

a. What are the prospects of cognitive theory?
b. How is the cognitive theory different from behaviorism?
c. How is the learning process easier in the cognitive theory of education?
d. How is the memory perceived in the theory?
e. Give a suitable title to the passage.

8. **2075 Set A Q.No. 1 Read the following passage and answer the questions that follow.** **[5×3=15]**

The condition of environment is a matter of great alarm and concern today. The environmental conditions have degenerated to such an extent that it has become a worldwide issue. Pollution at all levels, that is, air, water and soil knows no bounds. As if this is not enough, the whole ecological system has been disturbed because of man's urge to control nature. The extinction of a number of rare species, depletion of ozone and wide deforestation forcing the creatures of the wild to territories of men (and hence disturbing the balance of the ecological system) are only some examples.

There is a distinction between the environmental threats faced by the developed nations, such as the United States and Western European Countries, and the developing nations, such as India and Mexico. Whatever the nature of the crisis, most of the environmental problems faced by the developed nations are the result of the overconsumption whereas the problems faced by the under developed and developing countries are the result of underconsumption. It is usually said that the people in the poor nations fall ill because they are undernourished whereas the rich counterparts in the first world fall ill because they overeat. Same is the case with the environmental problems. The Americans and to a lesser extent, Western Europeans, Japanese and other residents of developed nations, are more likely to own one or more cars, purchase more food and clothes than subsistence levels require, and use considerable amounts of electricity. As a result, there is more pollution, creating environmental problems.

Questions:

a. According to the passage, what has become a worldwide issue today?
b. How has the ecological system been disturbed?
c. How are the environmental threats of the developed nations different from the developing nations?
d. What is the common concept about the poor health status of the poor nations?
e. Which sentence in the passage informs us that air, water and soil are polluted?

9. **2075 Set B Q.No. 1 Read the following passage and answer the questions that follow:** **[5×3=15]**

People who suffer from excessive drowsiness during the daytime may be victims of a condition known as 'narcolepsy'. Although most people may feel sleepy at unusual or embarrassing times, they may doze while eating, talking, taking a shower, or even driving a car.

Victims can be affected in one of the two ways. Most narcoleptics have several sleeping periods during each day with alert periods in between, but a minority feel drowsy almost all the time and are alert for only brief intervals. Many people with this condition also suffer from cataplexy-a form of muscular paralysis that can range from a mild weakness at the knees to complete immobility affecting the entire body. This condition lasts from a few seconds to several minutes and is often set off by intense emotions.

No reliable data exist showing how many people have narcolepsy. Unfortunately, there's also the little knowledge about the causes of this illness. Researchers suggest that the problem may stem from the immune system reacting abnormally to the brain's chemical processes. Further studies have shown a link between narcolepsy and a number of genes, although it is quite possible for an individual to have these genes and not develop the disease. Thus, an explanation based on genetics alone is not adequate.

There is currently no cure for narcolepsy, so sufferers of this condition can only have their symptoms treated through a combination of counselling and drugs. The available drugs can help control the worst of the symptoms, but their administration has unwanted side effects such as increased blood pressure and heart rate and, sometimes, even increased sleepiness. It is clear that improved medications need to be developed.

Questions:

a. What is narcolepsy?
b. How can victims be affected from this disease?
c. What are the causes of this disease?
d. How can one get treatment of this illness?
e. Suggest a suitable title for the passage.

10. **2075 Set C Q.No. 1 Read the following passage and answer the questions that follow.** **[5×3=15]**

Democratic societies from the earliest times have expected their governments to protect the weak against the strong. No era of good feeling can justify discharging the police force or giving up the idea of public control over concentrated private

wealth. On the other hand, it is obvious that a spirit of self denial and moderation on the part of those who hold economic power will greatly soften the demand for absolute equality. Men are more interested in freedom and security than in an equal distribution of wealth. The extent to which government must interfere with business, therefore, is not exactly measured by the extent to which economic power is concentrated into a few hands. The required degree of government interference depends mainly on whether economic powers and oppressively used, and on the necessity of keeping economic factors in a tolerable state of balance.

But with the necessity of meeting all these dangers and threats to liberty, the powers of governments are unavoidably increased, whichever political party may be in office. The growth of government is a necessary result of the growth of technology, and of the problems that go with the use of machines and science. Since the government in our nation, must take on more powers to meet its problems, there is no way to preserve freedom except by making democracy more powerful.

Questions:

a. What does 'era of good feeling' refer to?
b. Why is the growth of government necessitated in democratic societies?
c. Why should democracy be more powerful?
d. How is the growth of government related to the growth of technology?
e. Give the passage a suitable title.

11. **2075 Partial D Q.No. 1 Read the following passage and answer the questions that follow.** **[5×3=15]**

Education is a device for helping a man to grow to his full stature. It enables him to realize his nature both mentally and spiritually. It is to the child what perfect gardening is to the tree. A good gardener helps the plant to put forth that essential quality of its own that differentiates it from all other plants and makes it a thing of use and beauty. The good educator performs a similar office for the human being. But most of us cannot afford the services of a good educator with the result that we go through life with faculties underdeveloped and potentialities unrealized, merely because the community has been too mean to give us the necessary opportunities for mental growth. And so, to most of us, our habitation is a prison from which the spirit lacks the wings of knowledge to escape. To the man to trained faculties and developed tastes the world becomes larger and more exciting. He is able to see in it more beauty, more scope for his sympathy and understanding than he saw before. The training of education widens his sense of possibilities of what may be, and transform the world from a humdrum scene of workshop, factory and office to a universe of mystery and a treasure house of beauty. Where in is man's fullest development to be found? We shall find it in those in whom the characteristics of intelligence, virtue and good taste are most highly developed. This, then the function of that kind of attention which we call education for living, the education that develops in man the three attributes which are distinctive of our species. A man, I conceive, has a right to such development.

Questions:

a. How can education help a man to grow to his full stature?
b. How has the community been mean to most of us (human beings)?
c. How is this world and life a prison to us?
d. How can we make this world a treasure house of beauty?
e. What are the three characteristics which distinguish man from other species?

12. **2075 Partial E Q.No. 1 Read the following passage and answer the questions that follow.** **[5×3=15]**

I've always put my focus on discipline rather than academic achievement. I feel that when one is able to form one's character, then one is able to lead oneself towards the safe destination of life. In other words, when one is good, one does good. A person of good character is always guided by reason and vision. He or she never thinks bad to others and thus is always far from malicious nature and destructive force.

Similarly, discipline plays a pivotal role in student life. If a student is disciplined, he or she follows the code of conduct. He or she obeys the rules and regulations of the institution he or she belongs to. When a student is disciplined, he or she is always regular and punctual. The student pays due attention to the uniform, time and tasks to perform. Thus, a person possessing a good character will remain a good student and a good citizen ultimately. Since a student becomes good in manner or character, obviously, his academic performance will be marvelous.

Questions:

a. Why does the speaker put focus on discipline?
b. What are some features of a disciplined student?
c. What beds oneself towards safe destination of life?
d. Following code of conduct is important. Why?
e. Give a suitable title for the above passage.

13. **2074 Supp Q.No. 1 Read the following passage and answer the questions that follow.** **[15]**

With the spread of education and awareness about health hazards, more and more people are getting to know that 'smoking is injurious to health'. It was not a case till a generation back i.e., when our parents were young. During those times people could smoke almost anywhere, even in hospitals, nursing homes and doctor's clinics. But today we are more aware about how bad smoking is for our health. Smoking is restricted or banned in almost all public places and cigarette companies are no longer allowed to advertise on buses or trains, billboards, TV, and in many magazines. There is always a warning printed on the pack of cigarettes and even on tobacco products that precisely says that smoking is injurious to health. Thus a majority of the educated and even uneducated people know and understand now a days that smoking causes cancer, and heart disease; that it can shorten their life by 14 years or more; and that the habit can cost a smoker thousands of rupees per year. But being knowledgeable about these facts still doesn't help stop smoking or not picking up the habit in

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the first place itself for a great number of people even in the present time. Thus it is the addiction to smoking that is one of the root causes of the problem that draws millions of people towards death each year in the world.

Questions:

a. What are the effects and loss of smoking?
b. How are more and more people getting to know that 'smoking is injurious to health'?
c. What are the different places where people could smoke in the past?
d. Why are cigarette companies banned to advertise?
e. Write in brief what the passage is about.

14. 2074 Set A Q.No. 1 **Read the following passage and answer the questions that follow.** **[5×3=15]**

Most of the school children, adolescents and even adults commit suicide because of untreated depression. It is the most probable cause of suicide among teens and adults.

Successful attempts at suicides have increased by 300% over the past 30 years. Though as many as 8% of adolescents attempt suicide, girls make more attempts at suicide, but boys are successful at their attempts four to five times as often as girls.

As long as 30 years back, many psychologists and psychiatrists believed that children never suffered from depression. However, some believed that though the children could be depressed, their depression would be reflected as behavioural problems. Thus depression would be a masked one.

Today children experience and manifest depression in ways similar to adults, although with some symptoms unique to their developmental age. Even a newly born may be the subject to depression. Thus children may suffer depression at any age. In very young children, depression can manifest in a number of ways including failure to thrive, disrupted attachments to others, development delays, social withdrawal, separation anxiety, sleeping and eating problems, and dangerous behaviours.

Irrespective of age, depression affects an individual's physical, cognitive, emotional/affective, and motivational well being. Thus a child with depression between the ages of 6 and 12 may exhibit fatigue, difficulty with school work, apathy and/or a lack of motivation whereas an adolescent or teen may be oversleeping, Socially isolated, acting out in self destructive ways and/or have a sense of hopelessness.

Questions:

a. What are the effects of depression?
b. Why do most of the school children commit suicide?
c. What are the causes of depression in young children?
d. What is the percentage of adolescents who attempt suicide?
e. Summarise the passage in one sentence or two.

15. 2074 Set B Q.No. 1 **Read the following passage and answer the questions that follow.** **[5×3=15]**

Democratic elections are not merely symbolic. They are competitive, periodic, inclusive, definitive elections in which the chief decision-makers in a government are selected by citizens who enjoy broad freedom to criticise government, to publish their criticism and to present alternatives.

If we accept this definition, further dissection will give a complete meaning. It says that democratic elections are competitive. The opposition irrespective of the fact whether it consists of one party or many as well as all the candidates in an election must enjoy the freedom of speech, assembly and movements necessary to speak their mind. A true democracy allows criticisms of the government openly. Democracy also allows all the parties to bring alternative policies and candidates to the voters. Simply permitting all access to the ballot is not enough in a true democracy. A democracy in which all the parties are not allowed a fair use of media to generate awareness in the public regarding their view, agenda etc. certainly cannot be called a democracy in a true sense. Moreover, a country where the campaigning rallies of the candidates or the parties other than the ruling class are harassed and where newspapers indulge in yellow journalism victimizing a particular candidate or a party also cannot be called democratic. The party in power may enjoy the advantage of incumbency, but the rules and conduct of the election contest must be fair.

Questions:

a. What are the characteristics of democratic elections?
b. What does a true democracy allow?
c. Define the role of media in democracy.
d. When can the parties be democratic truly?
e. What do yellow journalism and incumbency mean?

16. 2074 Partial D Q.No. 1 **Read the following passage and answer the questions that follow.** **[5×3=15]**

Daniel Defoe was born in London in 1660. He was not very educated and spent many years of his young life studying religion and later travelling as a merchant. He travelled widely and built up a successful business. During this period, he married and started raising a family. However, around 1692, his business failed and he fell into debt. Since he had always been interested in politics, he tried to earn money by writing political articles for the newspapers. But his political writing, his first novel, written in 1719, when Defoe was nearly sixty years old, was to become one of the best- known adventure stories in the world. The novel was Robinson Crusoe-a story which thrills readers even today, more than two hundred years later.

Robinson Crusoe brought Defoe great success and helped him pay back part of his debts. He continued writing novels such as Moll Flanders, Colonel Jack, and two other Robinson Crusoe's stories, but none become as popular as the first one.

Questions:

a. How did Daniel defend his early life?
b. Why did Defoe give up writing political articles?
c. What was Defoe's best known novel?
d. What are the novels that Daniel wrote?
e. How did he clear his debts?

17. 2074 Partial E Q.No. 1 **Reading the following passage and answer the questions below.** **[5×3=15]**

Despite its rich potential for hydropower, there is not enough power available in Nepal. Limited large-scale hydro-projects are based on Snow-Fed rivers or natural ponds collecting rainwater. Load shedding is growing with expanding cities

and overambitious transmissions. Even in rainy seasons, our generators cannot produce enough to meet the demands. They are worse in dry winter when power is available for less one third of the day.

It's a real irony that Nepal with the potential of 83000 MW of hydroelectricity has regular and long-hour load shedding. This is the result of our irresponsible leadership which otherwise would have worked at least to meet the internal demand, if not for export. Now it is very urgent to make both short-term and long- term efforts for eliminating power cut schedule. Immediate demands can be fulfilled only by importing power from neighbours. So consumers must be made aware about the need of minimizing the power consumption and its vital methods. Production should be raised in every possible way. At the same time must also look further ahead. Utilizing foreign aid, sole large-scale projects should be started immediately. So that their needs will be fulfilled more easily. We should invite foreign investment in this sector, too and start small-scale with local efforts.

Questions

a. What do you mean by power cut?
b. How can we minimize load shedding? Write briefly.
c. Where are the large hydropower projects based on?
d. What do you mean by small scale hydro projects?
e. Give an appropriate title for the passage.

18. 2073 Supp Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

It is common knowledge that many of those who speak fluently and intelligibly often fail when it comes to writing for well–defined, job-related and academic purposes. School leavers are unable to write applications in response to job advertisement, and employers constantly complain about the poor writing skills of a majority of their younger employees.

Why is this so? Two known answers need attention. The first is, our failure as teachers to pay enough attention to the skills and abilities of writing. Second, which partly explains the first, there is a shared misunderstanding about the nature of writing, and what it takes to become a proficient writer.

There is a belief that writing is relatively easy because, unlike speakers, writers get time not only to shape ideas with care but to revise and rewrite what they write. Based on this belief what gets done in many language classrooms can be summed up as follows.

- The teacher sets a writing task.
- The pupils writer a composition and hand it in.
- The teacher corrects its grammar and spelling often using a lot of red ink.
- The pupils look to the teacher's corrections.
- They (may) hurriedly rewrite or make changes to satisfy the teachers.

What is wrong with this way of helping pupils become writers? The simple answer is that it amounts to teaching by testing. It does not show either planned teaching on the part of teachers or organized efforts at learning from learners.

(Source: ML Tickoo: Teaching and Learning English. 56–57)

Questions:

a. What is the passage about?
b. What do employers complain about their young employees?
c. Why are school graduates not able to write properly?
d. What do people normally think of writing and why?
e. What major things, does the writer think, are done on writing in many language classrooms?

19. 2073 Set C Q.No. 1 **Read the following passage and answer the questions that follow.** **[5×3=15]**

This is the era of science. There is hardly any domain where science and technology do not play significant role. Whether it is on the decence, in the matter of clothing or comfort, in the organization of leisure or past time, modern science and technology contribute to make man's life more comfortable, effective, fast and pleasant. Science has also entered into the world of art lately. It covers general truths or the operation of general laws, especially as obtained and tested through scientific methods. Culture in the act of developing the intellectual and moral faculties, especially by education. It brings enlightment and excellence of taste acquired by aesthetic training.

In this age of rocket and space research, science has made a remarkable contribution to the development of culture in every society and civilization. Although men of letters, who are generally taken to be the guardians of culture, tend to look with certain apprehension at the impact of science on cultural values. Modern thinking on the subject differs with this outlook and regards their fears as unfounded. Science and culture are moving closer gradually and is no wedge between these once conflicting disciplines. Science doesn't spell the ruin of culture; it promotes and harnesses it to modern requirement.

Questions:

a. Who are the guardians of culture, according to the author?
b. How has modern science contributed to bring change in man's life?
c. How does the speaker define the domain of science?
d. What is culture and what does it bring?
e. What is the remarkable contribution of science in culture? Does it promote or ruin?

20. 2073 Set D Q.No. 1 **Read the following passage and answer the questions that follow.** **[5×3=15]**

Wages are the reward paid to the workers for his/her labour. The term labour, as used in economics, has a broad meaning. It includes. It also includes the exertions of independent professional men and women like doctors, lawyers, musicians, painters and even scholars who render service for money. In fact, in economics, labour means all kind of work for which reward is paid. Any type of reward for human exertion. Whether paid by hour, day, month or year and paid in cash, kind or both is called wages. A wage may be defined as a sum of money paid under contract by an employer to a worker for services rendered.

Wages are given different names for example, salaries for the higher staff, pay to the lower staff like clerks and typists, wages for the workers, fees for the persons in independent professions like lawyers and doctors, commission for middle men, brokers, etc, and allowance, for special work or for

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special reasons, e.g. travelling allowance, dearness allowance, etc.

Questions:

a. What are the different types of wages paid to different people?
b. What does the word 'labour refer to in economics?
c. How is commission different from allowance?
d. What do labours get as a reward for their work?
e. Suggest a word or a phrase that would be an appropriate title for the passage.

21. **2073 Partial A Q.No. 1 Read the following passage and answer the questions that follow.** **[5×3=15]**

Demand increases or decreases with a fall or rise in prices. This quality of demand by virtue of which it changes is called elasticity of demand. Therefore, elasticity means sensitiveness or responsiveness of demand to the change in price.

This change, sensitiveness or responsiveness, may be small or great. Let's take the case of salt, even a considerable fall in its price may not induce much extension in its demand. On the other hand, a slight fall in the price of oranges may cause a considerable increase in their demand. That is why, the demand of salt is inelastic and the demand for oranges is elastic. The demand is elastic when with a small change in price, there is a great change in demand; it is inelastic or less elastic when even a great change in price induces only a slight change in demand.

Questions:

a. What is elasticity of demand?
b. When does the demand for things become elastic?
c. Why is the demand for salt inelastic?
d. Why is the demand for oranges elastic?
e. Suggest a word or a phrase which would be an appropriate title for the passage.

22. **2073 Partial W Q.No. 1 Read the following passage and answer the questions below.** **[5×3=15]**

In order to be healthy it is important to have a balanced diet- in other words, food that contains something from each of the three main groups of food. These groups are protein, carbohydrate and fat.

Proteins are very important for building our bodies; they help us to build new cells as old one dies. Meat and dairy products are major sources of protein, but not the only ones- we can also get proteins from fish, eggs and beans.

Carbohydrate and fat are important to enable us to store energy- they provide fuel for the body. Carbohydrates are found in sugar, and in cereals such as rice, maize and wheat. Fats are found in vegetable oil, in butter and in nuts.

Our body also needs minerals such as iron and calcium, and vitamins. Fish, vegetables and milk contain most of the minerals we need. Vitamins are found in fresh vegetables and fruits.

Questions:

a. What are the three main groups of food ideally needed for balanced diet?
b. Mention the major sources of minerals. Which food items do most of the minerals contains?
c. What are the sources of protein and how do they help in building human bodies?
d. How do carbohydrate and fat help the body? What are their major sources?
e. Suggest a suitable title to the passage.

23. **2072 Supp Q.No. 1 Read the following passage and answer the questions below.** **[5×3=15]**

The consumers that kill other animals for food are called predators. The word predator usually brings to mind pictures of lions and wolves, but such creatures as robins, frogs and humans are also predators. Some predators, carnivores such as lions, depend entirely on animals they kill while many others, such as foxes and humans, eat plant food too.

Some people think of predators as 'bad', though humans themselves are the greatest predators the world has known, sometimes, individual predators do prey upon farm animals and these individuals have to be controlled. Too often, however people try to wipe out entire populations of predators, with the mistaken idea that they are doing good.

People usually think that predators have an easy time of it, killing defenseless prey. But studies of predators and their prey show quite the contrary- the tiger has to work quite hard for its meals. The author estimates that, for every wild prey killed, the tiger makes twenty to thirty unsuccessful attempts.

Questions:

a. Define predators. Which animals are mostly known as predators?
b. Are human beings predators? Justify your answer.
c. Why does the author consider that the individual predators are to be controlled?
d. What mistake do people make when they try to wipe out the predators?
e. How many unsuccessful attempts does the tiger make for its meals?

24. **2072 Set C Q.No. 1 Read the following passage and answer the questions below.** **[5×3=15]**

Andrew Quinn, a systems manager at a toy company is starting to learn more about his fellow employees than he had ever wanted to know. He has found that one co-worker has a weakness for herbal remedies, another likes jokes about women drivers and another checks the lottery numbers each morning.

The manager knows these things because about a month ago, Mr. Quinn installed a new piece of software on the computer network that enables him to monitor not only every website that his employees browse, but every e-mail that they send or receive. With a few clicks, he can open a window on a computer screen and see the senders, recipients and subject headings of each message. These details help him figure out exactly what is straining his e-mail server.

In fact, Ritvik toys is one of hundreds of companies that are looking at workers' correspondence on a routine basis. And the number of companies regularly doing so is soaring. Managers give variety of reasonings for installing such software. Some lookout for oversize e-mail attachment that clog networks. Others seek to dissuade and discourage employees from using their systems for personal activities.

And others want to make sure that employees are not sending message that disturb or hurt others.

Questions:

a. What weaknesses did Andrew Quinn find about his co-workers?
b. How did they misuse their time?
c. How did Mr. Quinn monitor the activities of his co-workers?
d. How did the Managers of different companies explain the situation?
e. What should the office workers do during the office hours?

25. 2072 Set D Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

In ordinary speech, the word demand is used rather loosely, and it is often confused with desire. Desire is a wish to have something or to enjoy a service. But demand more than mere desire. It means that the person is willing and able to pay for the object he desires. A beggar's desire to travel from Kathmandu to Janakpur has no significance as he can't pay for it. On the other hand, a businessman's desire to go to Janakpur by air is a demand as he is able to pay for it and willing to do so. Demand, thus, means desire backed by willingness and ability to pay.

Both willingness and ability to pay are essential. If a man is willing to pay, but if he is unable to pay, his desire will not become a demand. In the same way, if he is able to pay, but is not willing to pay, his desire will not be changed into effective demand. In order to change desire into demand, it is essential that he should be both willing and able to pay.

Besides, demand also signifies a price and period of time in which demand is to be fulfilled. It is obvious that a person's demand for anything varies with the price at which it is offered. He buys more of it at a lower price, and less of it at a higher price. Similarly, his demand varies with the period of time.

Questions:

a. What is demand? How it is different from desire?
b. Why can't the desire of a beggar become a demand?
c. What is the relation of demand with the price?
d. When does a consumer buy things much and when does he buy less?
e. Write two words which are dominant in the passage.

26. 2072 Set E Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

These days, more and more people are making the choice to go to university. While some people are of the opinion that the only purpose of a university education is to improve job prospects, others think that society and the individual benefit in much broader ways. It is certainly true that one of the main aims of university is to secure a better job. The majority of people want to improve their future career prospects and attending university is one of the best ways to do this as it increases a person's marketable skills and attractiveness to potential employers. In addition, further education is very expensive for many people, so most would not consider it if it would not provide them with a more secure future and a higher standard of living. Thus job prospects are very important.

However, there are other benefits for individuals and society. Firstly, the independence of living away from home is a benefit because it helps the students develop better social skills and improve as a person. A case in point is that many students will have to leave their families, live in halls of residence and meet new friends. As a result, their maturity and confidence will grow enabling them to live more fulfilling lives. Secondly, society will gain from the contribution that the graduates can make to the economy. We are living in a very competitive world, so countries need educated people in order to compete and prosper.

Therefore, I believe that although a main aim of university education is to get the best job, there are clearly further benefits. If we continue to promote and encourage university attendance, it will lead to a better future for individuals and society.

Questions:

a. What is the purpose of going to university for some people?
b. List out the benefits of going to the university.
c. Why are job prospects very important? Give reasons.
d. Why living away from home is a benefit for an individual?
e. How is the society benefitted from the education of an individual?

27. 2072 Partial Set A Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

What exactly makes for the thought that the world of the future will be a woman's world? Biologically, there is something about women that makes them strong. If we look around us we see that women live longer than men, sometimes outliving their husbands by decades. In spite of men having bigger muscles, what is it about women which makes them live longer? One reason suggested is their ability to cope with stress better than men. Women cry and release stress; men are too proud to cry and end up with serious illness. Women are also tougher. For instance, most men would find it difficult to cope without a woman in their lives after the death of their wives and are likely to remarry; whereas, most women can bring up their families without a man in their lives. Hence we see that independence seems to be an in-built quality in women. Women's bodies are also more streamlined and they have higher metabolic rates. This suggests that they have more efficient systems. Women's skins are smoother and they have much less body hair. This suggests that they are more evolved than men. In fact, scientists have suggested that women are millions of years ahead of men in evolution.

Questions:

a. What specific ability of women posses to help them live longer?
b. What sort of natural power do women have to make them tougher than men?
c. What does the higher metabolic rate suggest about women?
d. According to the scientists, in what respect women are ahead of men?
e. Mention the weakness men have, in the context of the passage.

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28. 2072 Partial Set B Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

All the world is divided into three parts finger feeders, fork feeders and chopstick feeders. The topic of technology of eating is one that is rife with dispute over the utensils used to eat food. It is also a subject loaded with chauvinism. Supporters of one implement may often regard others as uncivilized or even barbaric.

According to Dr. Lynn White, fork feeders are most common in Europe and North America, Chopstick feeders in most Eastern Asia, and finger-feeders in much of Africa, the Middle East, Indonesia, and the Indian sub continent. Academics agree fork-users have historically been in the minority. As little as three centuries ago, most Western Europeans still used fingers regarding the fork as decadent or worse. French historians Fernard Braudel tells of one medieval preacher in Germany who condemned the fork as a diabolical luxury: God would not have given us fingers if he had wished us to use such an instrument.

Forks and chopsticks became popular because they made it easier to handle hot food. Before this, people generally scooped up hot meals on flat bread. According to Dr. K.C. Chang, the chairman of Harvard University's anthropology department, Chinese Cuisine was characterised by small portions which didn't require cutting by a knife and fork eaten from bowls. "There was a need for morsels to be carried from a bowl to the mouth, and chopsticks met that need", he said.

Questions:

a. What three different types of feeders the author has introduced in the passage?
b. In which part of the world these different types of feeders are common?
c. How do forks and chopsticks become popular among people?
d. What does the Harvard Scholar K.C. Chang claim?
e. Why does the French historian Braudel condemn the fork?

29. 2071 Supp Q.No. 1 **Read the following passage and answer the questions given below.** **[5×3=15]**

The invention of rockets is linked inextricably with the invention of 'black powder'. Most historians of technology credit the Chinese with its discovery. They base their belief on studies of Chinese writings or on the notebooks of early Europeans who settled in or made long visits to China to study its history and civilization. It is probable that, sometime in the tenth century, black powder was first compounded from its basic ingredients of saltpetre, charcoal and sulphur. But this does not mean that it was immediately used to propel rockets.

By the thirteenth century, powder-propelled fire arrows had become rather common. The Chinese relied on this type of technological development to produce incendiary projectiles of many sorts, explosive grenades and possibly cannons to repel their enemies. One such weapon was the 'basket of fire' or, as directly translated from Chinese, the 'arrows like flying leopards'. The 0.7 meter-long arrows, each with a long tube of gunpowder attached near the point of each arrow, could be fired from a long, octagonal-shaped basket at the same time and had a range of 400 paces. Another weapon was the 'arrow as a flying sabre', which could be fired from crossbows. The rocket, placed in a similar position to other rocket-propelled arrows, was designed to increase the range. A small iron weight was attached to the 1.5 m bamboo shaft, just below the feathers, to increase the arrow's stability by moving the centre of gravity to a position below the rocket. At a similar time, the Arabs had developed the 'egg which moves and burns'. This 'egg' was apparently full of gunpowder and stabilized by a 1.5m tail. It was fired using two rockets attached to either side of this tail.

It was not until the eighteenth century that Europe became seriously interested in the possibilities of using the rocket itself as a weapon or war and not just to propel other weapons. Prior to this, rockets were used only in pyrotechnic displays. In the early nineteenth century the British began to experiment with incendiary barrage rockets. The British rocket differed from the Indian version in that it was completely encased in a stout, iron cylinder, terminating in a conical head, measuring one meter in diameter and having a stick almost five meters long and constructed in such a way that it could be firmly attached to the body of the rocket.

Questions:

a. What was the black powder made up of?
b. What did the Chinese rely on?
c. How were the Chinese 'arrows like flying leopards'?
d. Why was a small iron weight attached to a 1.5 m bamboo shaft?
e. What do you think are the uses of rockets then and now? List them.

30. 2071 Set C Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

The teacher and the students are the active participants in the process of education. A good teacher is one who intermingles his own individuality with the individuality of the child. Without this the education given by the teacher will have no effect upon the students. In this way, education is nothing but a bi-polar process-through which the natural, spontaneous and progressive development of the child is purified, justified and modified.

According to Adams: "Education is a bi-polar process in which one personality acts on another to modify the development of other. The process is not only conscious but deliberate ... the means ... are two fold.

(a) ... educator's personality, (b) use of knowledge in various forms.

In the words of Ruskin: "You do not educate a man by telling him what he knows not, but by making what he was not". According to Aristotle: "Education is the creation of a sound mind in a sound body. He emphasies that if a person has a sound physique, his mind will automatically be sound. Without this the creation of a sound mind is not at all possible. Further, this particular creation is nothing but education itself.

Questions:

a. How does the author define the quality of a good teacher?

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b. Why does the writer believe that education is a bi-polar process?
c. How does Adams describe education?
d. What did Aristotle emphasize on?
e. Summarize the passage in one third of its length.

31. 2071 Set D Q.No. 1 **Read the following passage and answer the questions below.** [5×3=15]

A biology teacher was teaching his students how a caterpillar turns into a butterfly. He told the students that in the next couple of hours, the butterfly would struggle to come out of the cocoon, but no one should help the butterfly. Then he left.

The students were waiting and it happened. The butterfly struggled to get out of the cocoon and against the advice of the teacher, one of the students took pity on it and decided to help the butterfly out of the cocoon. He broke the cocoon to help the butterfly so it didn't have to struggle anymore. But, shortly afterwards, the butterfly died.

When the teacher returned, he was told what had happened. He explained to the student that it is law of nature that the struggle to come out of the cocoon actually helps develop and strengthen the butterfly's wings. By helping the butterfly, the boy had deprived the butterfly of its struggle and the butterfly died.

Questions:

a. What was the biology teacher teaching to his students?
b. What did the teacher tell the class before leaving?
c. What happened after one of the students disobey the teacher's advice?
d. What was the cause of butterfly death?
e. What lesson do you learn from this story?

32. 2071 Partial Set A Q.No. 1 **Read the following passage and answer the questions below.** [5×3=15]

Cheung Yan is one of the most successful businesswomen in the world. She made billions of dollars. How did she do it? Does she sell computers? Does she sell diamonds? Does she sell real estate? No. She sells trash. In facts, many people call her the Queen of Trash.

Cheung was born in China in 1957. Her family wasn't rich. When Cheung was a young woman, she worked as an accountant. She saved some money, and she moved to Hong Kong. There, she became interested in the paper trash business. She and two partners started a company with a small amount of money. The company collected paper trash and sold it to paper mills.

Then Cheung had an idea. China had a shortage of paper. Cheung knew just where to get paper for China. In 1990, she and her husband moved to Los Angeles. They found paper-tons of it. They drove their van to garbage dumps around Los Angeles. They collected the paper trash. Then they exported the trash to China. What did Chinese factories do with Cheung's paper trash? They recycled it and made cardboard, a thick, stiff paper. Then they made the Cardboard into packing boxes. They used the boxes to pack "Made in China" products, such as toys, electronics, and clothing. They sent these products to the United States and Europe.

In 1996, Cheung moved back to China. She started her own paper-making company called Nine Dragons paper. Today Cheung buys paper trash in the United States and Europe. She sends it to her factory in China. Then she makes it into materials for packaging. Big companies like Sony use her packaging. When people in the United States receive their "Made in China" products, they throw the packaging boxes away as trash. Cheung gets the boxes and recycles them again into packaging.

What kind of a person is Cheung? She's a little mysterious. She almost never gives interviews. Other businesspeople say she's good at making deals. She develops good strategies for her business. She works very hard, and she expects her employees to work hard, too.

The Queen of Trash is a hard working businesswoman. She started her own company and she made it grow. What will her future be? She hopes she will be successful for many years. Cheung knows one important thing. There will always be paper trash that she can recycle again and again.

Questions:

a. Why is Cheung Yan called the Queen of Trash?
b. How did she help to solve the paper shortage in China?
c. What was done with the paper trash by the mills?
d. What did she do after returning to China?
e. What makes her hopeful that she will be successful for many years?

33. 2071 Partial Set B Q.No. 1 **Read the following passage and answer the questions below.** [5×3=15]

I had given those boots up, when one evening they came. Opening the parcel, I set the four pairs out in a row. Then one by one. I tried them on. There was no doubt about it. In shape and fit, in finish and quality of leather, they were the best he had ever made. And in the mouth of one of the town walking boots I found his bill. The amount was the same as usual, but it gave me quite a shock. He had never before sent it till quarter-day. I flew downstairs, and wrote a cheque and posted it at once with my own hand. A week later, passing the little street, I thought I would go in and tell him how splendidly the new boots fitted. But when I came to where his shop had been, his name was gone. Still there, in the window, were the slim pumps, the patent leather cloth tops, the sooty riding-boots.

Questions:

a. What did the narrator get in the parcel?
b. Where did he get the bill?
c. Why was he shocked?
d. How did he send the money?
e. Did he meet the shoe-maker at the end?

34. 2070 Supp Set A Q.No. 1 **Read the following passage and answer the questions given below.** [5×3=15]

As Hitler was gaining power as leader of Germany, in Asia, Japan was growing increasingly powerful both economically and militarily. But Japan had two big problems: it had very little land and a lot of people to feed. The only way it could keep growing was to import food and raw materials to feed its people and supply its industry. Also, it was not treated as an equal by the other big industrial countries. This angered

Japan because it had been an ally of Great Britain, France, the United States, and Italy during the World War I.
Between the World War I and World War II the Japanese army grew more powerful and aggressive. Hideki Tojo was the Japanese Minister of war and one of the military leaders who believed that the only way Japan would be treated equally was if it took what it wanted and needed by force. In 1937, instead of signing a trade agreement with China, Japan chose to attack and keep the parts of China it had invaded.
America demanded that Japan halt its invasion of China and return the land it had conquered. Japan refused. So, the United States stopped all shipments of raw materials that Japan needed, including oil, iron ore and other metals, issuing a trade embargo against them.
On October 17, 1941, Tojo, who had become the Prime Minister of Japan told Emperor Hirohito that if Japan didn't immediately take strong action against the United States, he feared Japan would become a third class nation in two or three years.
On November 5, 1941, with the emperor's agreement, the Japanese government secretly made the decision to go to war. On December 7, 1941 Japanese airplanes launched a surprise attack on the U.S. military bases and port at Pearl Harbor. World War II in the pacific had begun.

Questions:

a. What two problems did Japan have when it was growing increasingly powerful?
b. Why was Japan irritated with its ally?
c. How was America expose its friendly gesture toward China and against Japan?
d. Mention the year when had World War II in the pacific begun?
e. Use any three underlined words from the passage to make meaningful sentence.

35. **2070 Supp Set B Q.No. 1 Read the following passage and answer the questions given below. [5×3=15]**

Porcupine is an animal that has long, soft hairs and strong, stiff quills on its back, sides and tail. The quills are long, sharp bristles of hairs that are fused. Porcupine defends itself by striking attackers with its quilled tails. The quills come out easily and stick into the attackers flesh. The new quills grow very soon. The tip of each quills is covered with a tiny back-ward pointing projections called barbs. The barbs hook into the flesh and quills are difficult to remove. The attackers may die from infections caused by germs on the quills, or from damage to vital organs. Quills may stick in an attacker's jaw causing the mouth open and starvation.
Most porcupines grow to about 70 centimeters long including the tail. They make their home in tunnels in the ground and do not climb trees. But there are a few porcupines that can climb trees. Several South-American porcupines can ever hang by their tails. The babies are born with soft quills which harder later. The flesh of porcupine is edible but most people do not like the taste.

Questions:

a. What are barbs?
b. How does a porcupine defend itself from its attackers?
c. How does porcupine cause starvation to its attackers?
d. Where do most porcupines live?
e. How does a porcupine damage the vital organs to its attackers?

36. **2070 Set C Q.No. 1 Read the following passage and answer the questions below. [5×3=15]**

It was becoming obvious to people who knew the facts that war between Japan and the United States was inevitable. President Roosevelt ordered his military commanders in the Pacific to go on the alert, who were responsible for U.S. forces in and around the big Navy base at Pearl Harbor. Adm. Kimmel and General Short believed that the biggest threats they faced were sabotage and submarine attack.
At 7.53 A.M. on Sunday, December 7, 1941, Lt.Commander Mituso Fuchida, in his lead Japanese bomber called out on his radio, "Tora! Tora! Tora!" (Tiger, tiger! Tiger!). It was the code word that signalled that the Imperial Japanese Navy had achieved maximum strategic surprise over U.S. Army and Navy forces based in and around Pearl Harbor. At 7:55 A.M. the Japanese war planes attacked.
By the time the attack had ended the Imperial Japanese Navy had accomplished its goal of crippling the U.S. Pacific fleet. Most of the fleet was at the bottom of the harbor, and most of the Army, Navy and Marine fighter planes and bombers were smoking ruins. Forty six minutes after the first bombs and torpedos had been dropped, the Japanese ambassadors delivered their country's declaration of war on the United states to U.S. Secretary of State Council Hull, who was outraged at Japan's treachery.
It was 'a date which will live infamy', Roosevelt remarked when he asked the Congress to declare war on Japan. "Remember Pearl Harbor!" became the war cry across the nation as young men enlisted in the Army, Navy, Air force and Marines by the hundreds of thousands.
When Japan's Axis allies, Hitler and Mussolini, honoured their treaty obligation and declared war on the United States four days later, the conflict had truly become a world war.

Questions:

a. What does the code word Tora! ..... mean?
b. What did the president Roosevelt order for?
c. When did the Japanese ambassadors deliver their country's declaration of war on the U.S. to the U.S. secretary?
d. What incited the American youths to join the defense forces?
e. Use any three underlined words from the passage to make meaningful sentence.

37. **2070 Set D Q.No 1 Read the following passage and answer the questions below. [5×3=15]**

In the minds of many people, there is no longer an issue. They argue that English has already become a world language, by virtue of the political and economic progress made by English-speaking nations in the past 200 years, and is likely to remain so, gradually consolidating its position.
An impressive variety of facts about usage support this view. According to conservative estimates, mother-tongue speaker have now reached around 300 million; a further 300 million use English as a second language; and a further 100 million

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use it fluently as a foreign language. This is an increase of around 40% since the 1950s. More radical estimates, which include speakers with a lower level language fluency and awareness, have suggested that the overall total is these days well in excess of 1,000 million. The variation results largely from a lack of precise data about English language use in such areas as the Indian sub-continent, where the historical impact of the language exercises a continuing influence on many of its 900 million people, and China, where there has been a burst of enthusiasm for English studies in recent years, with over 100 million people watching the BBC television English series follow me. Even if only 10% of these learners become fluent, the effect on totals is dramatic; the number of foreign learner is immediately doubled.

Questions:

a. Why is English becoming a world language?
b. What is the estimated growth of English language?
c. What is the influence of English in Indian-sub continent and China?
d. What situation can 'immediately double' the number of foreign learners of English?
e. Do you think the use of English is really increasing as the passage claims? Give reasons.

38. 2069 Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

A tsunami is a series of water waves caused by the displacement of a large volume of a body of water, typically an ocean or a large lake. Earthquakes, volcanic eruptions and other underwater explosions (including detonations of underwater nuclear devices), landslides, glacier calvings, meteorite impacts and other disturbances above or below water all have the potential to generate a tsunami.

Tsunami waves do not resemble normal sea waves, because their wavelength is far longer. Rather than appearing as a breaking wave, a tsunami may instead initially resemble a rapidly rising tide, and for this reason they are often referred to as tidal waves. Tsunamis generally consist of a series of waves with periods ranging from minutes to hours, arriving in so-called "wave train". Wave heights of tens of meters can be generated by large events. Although the impact of tsunamis is limited to coastal areas, their destructive power can be enormous and they can affect entire ocean basins; the 2004 Indian Ocean tsunami was among the deadliest natural disasters in human history with over 230,000 people killed in 14 countries bordering the Indian Ocean.

The Greek historian Thucydides suggested in 426 B.C. that tsunamis were related to submarine earthquakes, but the understanding of a tsunami's nature remained slim until the 20th century and much remains unknown. Major areas of current research include trying to determine why some large earthquakes do not generate tsunamis while other smaller ones do; trying to accurately forecast the passage of tsunamis across the Oceans; and also to forecast how tsunami waves would interact with specific shorelines.

Questions:

a. What do you mean by a tsunami?
b. What are the potential factors to generate a tsunami?
c. In what ways are tsunami waves different from normal sea waves?
d. Why is the 2004 Indian Ocean tsunami known as one of the deadliest natural disasters in human history?
e. List the major areas of current research on 'tsunami'.

39. 2069 Partial Q.No. 1 **Read the following passage and answer the questions given below.** **[5×3=15]**

Benjamin Franklin was born on January 17, 1706. His schooling ended when he was ten. At twelve, he became an apprentice to his brother James, a painter, who taught Ben the painting trade. Franklin was a prodigious inventor. Among many of his creations were the lightning rod, glass armonica, stove, bifocal glasses and the flexible urinary catheter. He became involved in politics and was selected as a councilman. In June 1749 he became a Justice of the peace for Philadelphia.

Franklin died on April 17, 1790, at the age of 84. He is now considered as one of the founding fathers of the United States of America. He is very popular in the U.S.A. Since 1928 his photograph has adorned American $ 100 bills which are sometimes referred to in stang as "Franklins."

Questions

a. What was Ben taught by his brother?
b. What were Benjamin's inventions?
c. When did he become a justice of the peace?
d. What has US$ 100 adorned?
e. After being involved in politics, what did he become?

40. 2068 Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

Traditional agricultural methods have changed little since ancient times. Nepalese peasant utilize small parcels of land, which are passed down from generation to generation through in heritance, to feed their families. They primarily grow staple foods such as rice, wheat and corn and root crops, most of which is used for human subsistence or livestock. Commercial and industrial crops include sugarcane, jute (a fiber) and tobacco. Livestock products include water buffalo meat and milk. Most of the country's agriculture is in the warm, moist, lowland plains of the Terai region. Agriculture in local villages in a family activity in which children help their parents at all stages from tilling the fields and planting to harvesting. In a good year, when surpluses are available, peasants exchange grain for other goods that are manufactured by their neighbours. Sometimes they travel to a local market, where they can acquire clothes, tools and other materials in exchange for their own products. In this cultural environment, bartering is the key to everyday survival.

Today, Nepal like many other less developed countries, is undergoing gradual change. The influence of globalization is increasing and its impact is being felt on even the smallest and most remote countries. Times have long passed when a place could remain isolated from others. In this context, the Nepalese economy, as minor as it is, will eventually enter the market system. Step by step, traditional economies will be replaced by a commercially oriented market economy, even in the most remote villages. This trend is already visible in the shrinking influence of agriculture in the country's gross

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domestic product. A country such as Nepal cannot rely on its own commercial agriculture to provide the nation's needs. Self sufficiency is costly to achieve and technologically difficult do develop in a poor country. As a result, Nepal is dependent on imports for much of its food, particularly, that consumed in urban centres. Such as economic policy, however, creates several problems.

Questions:

a. What are the staple foods grown by Nepalese farmers?
b. What are commercial and industrial crops?
c. Why is agriculture a family activity in Nepal?
d. What, according to this passage, creates several economic problems in Nepal?
e. Why is self-sufficiency costly in Nepal?

41. **2067 Q.No. 1 Read the following passage and answer the questions below.** **[5 ×3 = 15]**

Mahabir Pun of Nepal is among the seven individuals who received the 2007 Ramon Magsaysay Award by the Board of Trustees of the Ramon Magsaysay Award Foundation (RMAF). Pun has won the award for community leadership for 'his innovative application of wireless computer technology in Nepal, bringing progress to remote mountain areas by connecting his village to the global village. "Pun, 52, is a resident of the western district of Myagdi.

Pun is the fourth Nepali national to win the converted award also known by some as the Nobel Prize of Asia. Dr. Sanduk Ruit, head of the Tilganga Eye Center in Nepal had received the Ramon Magsaysay Award in 2006 for "placing Nepal at the forefont of developing safe, effective and economic procedures for cataract surgery, enabling the needlessly blind in even the poorest countries to see again."

Nepal's renowned journalist, Bharat Dutta Koirala, received the award in 2002 for his outstanding contribution to the development of journalism in Nepal. Late Mahesh Chandra Regmi was the first Nepali to receive the award for journalism, and creative communication arts in 1977.

Nangi Village, where Mahabir Pun was born, rests high in the Himalayan foothills of western Nepal. Here and in surrounding Myagdi district live the Pun Magar, whose men have soldiered for generations across the globe as Gurkhas. Yet, their worldly careers have done little to change their sleepy homeland, so far from the traffic patterns that knit together the rest of the world. Indeed, Nangi is seven hour's hard climb from the nearest road. No telephone lines have ever reached it. Despite this, these days the people of Nangi are definitely connected to the world outside. Wireless Internet technology has made this possible. Mahabir Pun made it happen.

Question:

a. Why was Mahabir Pun recognized with the Ramon magsaysay Award?
b. What is the contribution of Dr. Sanduk Ruit?
c. When and why did Bharat Dutta Koirala received the award?
d. Where does Nangi Village lie?
e. What are the Pun Magars famous for?

42. **2066 Q.No. 1 Read the following passage and answer the questions below.** **[5×3=15]**

Coronary heart disease is the most common cause of death in the developed countries. With the rise in general living standards, containments of infectious diseases, good hygiene, and better nutritions, less people are dying. However factors such as stress, obesity, sedentary life style associated with affluence and mechanization have given way to hypertension, diabetes, and coronary heart diseases. The heart is a muscular fist-sized organ which pulsates 60 - 80 times per minute pumping 3600 gallon of blood a day to keep the body alive. For doing this, the heart muscles require enormous amounts of energy. The heart muscles derive energy from oxygen dissolved in the blood, which flows through the coronary arteries. Every day the heart and its circulatory system battle to maintain an uninhibited supply of blood along the arteries. The blockage is mainly due to cholesterol, a fatty substance present in eggs, liver, kidney, and sea foods like prawns, and also produced in the body by the liver from saturated fats present in the food. A certain amount of cholesterol is needed to make the cell wall work, to produce steroid hormones and vitamin D.

Proper lifestyle must be adopted to reverse the risk of heart attacks. Eating enough fruits and vegetables, cutting down on alcohol and salt, increasing the intake of fatty acids like olive oil, and rapeseed oil, avoiding saturated fats like butter, hard cheese, ghee, can make a huge difference.

Questions:

a. Why are lesser number of people dying in the modern world?
b. What are the different diseases associated with affluence and mechanization?
c. What does high cholesterol in blood indicate?
d. What measures should we adopt to minimize heart attacks?
e. Summarize the passage in about 50 words.

43. **2066 (Partial) Q.No. 1 Read the following passage and answer the questions below.** **[5x3=15]**

Fish is among the diverse group of animals that live and breathe in water. All fishes are vertebrates (animals with backbones) with gills for breathing. Most fish have fins for swimming, scales for protection, and a streamlined body for moving easily through the water.

The skeleton of the fish has the same general structural components as other vertebrates: a skull, spinal column, limbs, and a tail. Fish limbs have developed into fins, which are adapted for swimming and for providing stability while swimming.

Fishes live in nearly every underwater habitat, from near-freezing Arctic waters to hot desert springs; from mud in dried-up tropical ponds to the deepest ocean abyss. Special antifreeze chemicals in the blood of Antarctic ice fish enable them to survive in water below 0°C (32°F). Desert pupfish found in hot springs of western North America live in temperatures higher than 40°C (100°F).

Stonefish with venom powerful enough to kill humans, are the deadliest fish in the sea. With approximately 25,000 recognized species, fishes make up the most diverse

vertebrate group, comprising about half of all known vertebrate species. New fishes continue to be discovered and named at the rate of 200 to 300 species per year. With this vast number of different fishes comes a diversity of sizes and shapes, from huge whale sharks that reach 12 m (40 ft) in length to the smallest vertebrate, a tiny goby, measuring only 1 cm (0.4 in) long.

Both the digestive and circulatory systems in most fishes are rather simple. Although a few species can breathe atmospheric air, most fish breathe by means of gills. The swim (or gas) bladder allows fish to maintain a constant buoyancy regardless of the changing water pressure at varying depths.

Questions

a. What are the characteristics of fish?
b. Which fish is regarded to be the deadliest? Why?
c. What characteristics of the fish makes them survive even in the changing pressure of water?
d. How do some fish survive even in ice water? Which fish survives even in the hottest water?
e. How many species of fish have already been identified and in what rate are they being identified in a year?

44. 2065 Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

Daniel Defoe was born in London in 1660. He was not very educated and spent many years of his young life studying religion and later travelling as a merchant. He travelled widely and built up a successful business. During this period, he married and started raising a family. However, around 1692, his business failed and he fell into debt. Since he had always been interested in politics, he tried to earn money by writing political articles for the newspapers. But his political writing brought only troubles and increasing debts, and so Defoe turned to fiction writing. His first novel, written in 1719, when Defoe was nearly sixty years old, was to become one of the best-known adventure stories in the world. The novel was Robinson Crusoe- a story which thrills readers even today, more than two hundred and fifty years later.

Robinson Crusoe brought Defoe great success and helped him pay back part of his debts. He continued writing novels such as Moll Flanders, Colonel Jack, and two other Robinson Crusoe's stories, but none became as popular as the first one.

Questions:

a. How did Daniel spend his early life?
b. Why did Defoe give up writing political articles?
c. What was Defoe's best known novel?
d. What are the novels that Daniel wrote?
e. How did he clear his debts?

45. 2064 Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

We were summoned to his room at the end of the day. Under normal conditions, he would welcome us with a smile, crack a joke or two, talk of nothing in particular for a couple of minutes and state the actual business. But today we found him dry and sullen. He motioned us to our seats and said, "Could you imagine a worse shock for me? I came across a student of the English Honours who did not know till this day that 'honours' had to be spelt with a 'u'. He finished his sentence with a sharp, grim laugh. We looked at each other at a loss to know what to reply. Our assistant Professor Gajapathy, scowled at us as if it were us who had induced the boy to drop the 'u'. Brown cleared his throat as a signal for further speech, and we watched his lips. He began to lecture on the importance of the English Language, and the need for preserving its purity. Brown's thirty years in India had not been ill spent if they had opened the eyes of Indians to the need for speaking and writing correct English!

Questions:

a. What did Brown use to do in normal conditions?
b. Why was Brown in a worse shock that very days?
c. What did Gajapathy's scowling indicate?
d. On what issue did Brown begin to lecture before his college staff?
e. Summarize the passage in about 40 words.

46. 2063 Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

In 1964 an American journalist called Norman Cousins developed a serious problem with his back. It turned out that he had an illness called ankylosing spondylitis, which was extremely painful and, according to doctors, incurable. He was admitted to hospital, unable to move and was prescribed a course of strong painkilling drugs. Cousins knew that negative emotions could make you ill, and began to wonder whether positive emotions and particularly laughter-might make you better.

He stopped taking the drugs, and moved out of the hospital into a hotel room, which was not only a more cheerful place to be but was also cheaper. There he hired a lot of Marx Brothers and candid camera films, and started to watch them. He found that every time he laughed, the laughter acted as anesthetic and gave him relief from pain. And the effect lasted some time: 10 minutes' laughter could give him around two hours free from pain. More important, he found that he was slowly getting better, and eventually recovered completely from illness. For many years, the medical profession refused to take cousins' claims seriously, but now things are changing and some American hospitals have set up 'laughter rooms', where patients can watch videos, listen to cassettes and read joke books, instead of sitting around feeling depressed.

Questions:

a. Why was cousins admitted to hospital?
b. Why did he move out of the hospital?
c. What effects of the laughter did cousins have?
d. How did the hospitals react to the claims made by cousins initially?
e. Summarize the passage in 30 words.

47. 2062 Q.No. 1 **Read the following passage and answer the questions below.** **[5×3=15]**

When the next Olympic Games begin, satellites will carry TV pictures of the opening ceremony two millions of people thousands of miles away. From their armchairs these people will be able to see their country's athletics competing in events and may be winning a bronze, silver or even gold medal.

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When we consider the size, the spectacle and the commercialism of the modern Olympic Games, it is difficult to remember that they stated in Olympia in Greece in 776 BC with only one race for which the prize for the winner was an olive garland.

The idea of an international Olympic Games was conceived by a French man and appropriately the first Olympic Games opened in Athens in 1896. Nowadays, major cities compete not only to host the Olympic Games, but for the vast amount of profit a host country can make.

Questions:

a. How will the pictures of the opening ceremony reach millions of people?
b. What can people watch on the TV about their country's athletics?
c. Where, when and how did the Olympic Games start?
d. Give two reasons for major cities competing to host the Olympic Games?
e. Summarize the passage in 30 words.

48. **2061 Q.No. 1 Read the following passage and answer the questions given below.** **[5×3=15]**

School and college should train you in the two great basic tools of the mind: the use of words and the use of numbers. School or college can give you a start toward the special skills that you may need in a trade, business or profession. But remember: as soon as you enter an occupation, you will be strongly tempted to fall into the routine of it, to become just a part of that occupation, which is just one part of the nation. In college from books, from teachers, from fellow students- you can get a view of the whole of your nation, how it started, how it grew, what it is, what it means. Each day will add breadth to your view and a sharper comprehension of your own role.

To develop fully your own character your must know your country's character. A plant partakes of the character of the soil in which it grows. You are a plan that is conscious, that thinks. You must study you soil-which is your country- in order that you may be able to draw its strength up into your own strength.

It will pay you to do so. You will understand your own problems better and solve them more easily if you have studied your nation's problems and done something toward their solution. You have to look out for yourself and your country. Self-interest and patriotism, rightly considered, are not contradictory ideas. They are partners.

Questions:

a. In what ways can school and college train you in your career?
b. Explain the meaning of 'Your country's character'.
c. How is your character related to your country's character?
d. How are self-interest and patriotism partners?
e. What conclusion do you draw about the importance of education from the given passage?

49. **2060 Q.No. 1 Read the following passage and answer the questions given below.** **[5×3=15]**

The development of the space shuttle has dramatically reduced the cost of sending loads into space. The shuttle takes off from Earth like a rocket, and lands again like an aircraft. It can transport not only its own crew, but also passengers, and has a huge cargo-hold which is capable of carrying large satellites or a space laboratory.

Before the space shuttle was created it was necessary to plan trips into space several years in advance. However, for the rest of the century it should be possible to make space flights every week or so. Any scientist or engineer needing travel onto orbit will simply take the next shuttle flight, stay as long a necessary and then return at his or her convenience.

It is difficult to imagine the immense opportunities created by the shuttle. One of the great advantages of having a reusable space vehicle is that it can take one load after another into orbit. Very large space stations could not be launched in their complete form directly from earth, but they could be built piece by piece in space. The space shuttle is likely to be used as a general 'workhorse' for the rest of the century, and the building of such stations in orbit should become commonplace.

Once these huge orbiting space stations are completed, they are likely to become the platforms form which hundreds of robot space ships could be launched cheaply and easily to explore the solar system and to start mining operation on the Moon. The technology needed for this is already developed and available. And because of commercial and military pressures to developed space technology, it is likely that governments will be increasingly willing to start extensive programmes of space engineering, exploration and research.

Questions:

a. What is space shuttle and how does it work?
b. How has the shuttle made space travel easy?
c. What are the main advantages of reusable space shuttle?
d. How can the space platforms be used?
e. For what purposes are the space stations likely to be used by the governments?

50. **2059 Q.No. 1 Read the following passage and answer the questions below.** **[5×3=15]**

The Queen was said, last night to be "appalled" at claims that some of Prince Charles' personal phone calls home from Australia had been tapped and recorded.

The publishers of a West German Magazine aimed at middle-aged housewives said that they might publish the transcripts of the royal conversations on Monday.

There are said to be tapes of four phone conversations between the Prince and lady Diana, and one between him and the Queen in which he is alleged to have been rude about Australians in general and their Prime Minister Malcolm Fraser in particular.

The tapes were offered to the Germans by a British journalist, Mr. Simon Regan, who was in Australia to do research for a book. While he was there, he came into contact with an anti-British republican group, who brought the recordings to his hotel in Sydney.

'The tapes feel into my lap', said Mr. Regan. 'I heard four of the five tapes and I am convinced they are genuine because they contained aspects of Prince Charles' and Lady Diana's life which no-one else could have known about.'

Questions:

a. What 'appalled' the Queen? Why?

b. Why would the West German Magazine publish the story about the royal conversation?
c. In what two ways might the tapes be embarrassing to the British Royal Family?
d. Why do you think the republican group tapped the conversations?
e. What did Mr. Regan mean by 'the tapes fell into my lap'?

51. 2058 Q.No. 1 **Read the following passage and answer the questions that follow.** [5×3=15]

After having lived for over twenty years in the same city, Suman was forced to move to a new neighbourhood. She surprised her landlord by telling him that she was leaving because she could not afford to buy any more chocolate.

It all began a year ago, when Suman returned home one evening and found a large dog in front of her gate. She was very fond of animals and as she happened to have a small piece of chocolate in her pocket, she gave it to the dog. The next day, the dog was there again. It held up its paws and received another piece of chocolate as a reward. Suman called her new friend "Bingo'. She never found out the dog's real name, nor who his owner was. However, Bingo appeared regularly every afternoon and it was clear that he preferred chocolate to bones. He soon grew dissatisfied with small pieces of chocolate and demanded a large bar a day. If at any time Suman neglected her duty. "Bingo got very angry and refused to let her open the gate. Suman was now at Bingo's mercy and had to bribe him to get into her own house! She spent such a large part of her salary to keep Bingo supplied with chocolate that in the end she had to move somewhere else.

Questions:

a. What did Suman see in front of her gate one evening? What did she give it?
b. Why did the dog become a regular visitor?
c. What did Bingo demand in time?
d. What would Bingo do if he did not receive the thing he wanted?
e. Why did Suman decide to move to a new neighbourhood?

52. 2057 Q.No. 1 **Read the following passage and answer the questions given below.** [5×3=15]

Antlers grow from permanent knoblike bones on a deer's skull. Deer use their antlers chiefly to fight for mates or for leadership of a herd. Among most species of deer, only the males have antlers, but both the male and female reindeer and caribou have antlers. Musk deer and Chinese water deer do not have antlers at all.

Deer that live in mild or cold climates lose their antlers each winter. New ones begin to grow the next spring. Deer that live in tropical climates may lose their antlers and grow new ones at other times of year.

New antlers are soft and tender. Thin skin grows over the antlers as they develop. Short, fine hair on the skin makes it look like velvet. Full-grown antlers are hard and strong. The velvety skin dries up and the deer rubs the skin off by scrapping its antlers against trees. The antlers fall of several months later.

The size and shape of the deer's antlers depend on the animal's age and health. The first set grows when the deer is from one to two years old. On most deer the first antlers are short and straight. As deer gets older, their antlers grow larger and form intricate branches.

Questions:

a. According to the passage, how do deer primarily use their antlers?
b. In what way are reindeer and caribou different from other types of deer?
c. When do the deer that live in temperate climates begin to grow their antlers?
d. What factors influence the size and shape of a deer's antlers?
e. What happens to deer's antlers, as the deer grow older?

53. 2057 Q.No. 14 **Read this paragraph and answer the questions given below.** [10]

'Soon after I started teaching Math, I discovered that it was far harder work than I'd expected it to be. I'd imagined I would have plenty of time to myself (after all, I was officially working far fewer hours than I had been in my previous job) but instead I found myself working late every evening just to prepare for the next day's classes. But it was also a lot more satisfying than I'd imagine it would be....'

Why does the writer think:

a. That teaching would be an easier job.
b. That he would have lots of spare time to himself.
c. That teaching turned out to be a harder job.
d. That teaching job was more satisfying.
e. Summarize the passage in one sentence.

MEANINGS INTO WORDS

B. THE GRAMMAR

UNIT 1: EXPERIENCE

1. 2075 GIE Q.No. 4 Make questions only using the structure "Have you ever .....?", as in the example. [5]

Example: Have you ever been asked questions in the class?

a. The police shouted at me in the street.
b. They insulted my friend last week.
c. Somebody punched me on the nose this morning.
d. I lost my passport last week.
e. I flew in a supersonic jet yesterday.

2. 2075 Set B Q.No. 10 Continue the following remarks with a sentence using (not) **used to ... ing.** [5]

a. She was quite surprised when I gave her some flowers.
b. It's quite hard work doing all my washing and cleaning.
c. He won't mind if you stare at him.
d. The traffic doesn't wake him up at night.
e. I get a bit lonely sometime, now that she's gone.

3. 2073 Supp Q.No. 4 Make remarks with a sentence using (not) used **to + ing** in each of the following cases. [5]

Example: Bob was snoring, but John didn't wake up.
John is used to sleeping in a noisy place.

a. Mary was surprised when I invited her for lunch.
b. You can bring only two friends with you.
c. I have got a stomach-ache after eating the guava you brought.

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d. It's a hard work cooking for twenty people at home.
e. I don't mind washing my own clothes.

4. **2073 Set C Q.No. 4** Continue the remarks below with a sentence using **'Is/ am/ are' (not) used to+ing** form as in the example. [5]

Example: *My college principal was surprised when I gave her flowers.*
- She is not used to being wished.

a. My friend Bina is feeling terribly nervous.
b. My mother's feet are killing her.
c. Pandey sir has got a stomach-ache.
d. Mr. Dhakal is absolutely delighted today.
e. The bachelors are going to find it hard work working on building site.

5. **2073 Partial W Q.No. 4** Read the conversation below and write a similar conversation between 'A' and 'B' [5]

Example: Fine/for a parking offence (speeding)
A: Have you ever been fined for parking offence?
B: No, I haven't but I have been fined for speeding.

a. Steal/wallet? (umbrella)
b. Trap/ in a lift? (bathroom)
c. X-ray/chest? (hand)
d. Throw/out of class? (library)
e. Mistake/for a singer? (T.V. actor/actress)

6. **2072 Supp Q.No. 4** Read the example and write similar conversation between 'A' and 'B'. [5]

Example: Annoy/by friend (stranger)
A: Have you ever been annoyed by your friend?
B: No I haven't, but I have been annoyed by a stranger.
a. Participate/ Social works? (Cultural Programme)
b. Work/ remote? (city areas)
c. Play/ badminton? (Lawn tennis)
d. Performed/ on the stage? (in a group)
e. Help/ the poor? (handicapped)

7. **2072 Partial Set A Q.No. 4** Read the example and write similar conversation between 'A' and 'B'. [5]

A : Have you ever been fined for spitting in the classroom?
B : No I haven't, but I have been fined for making noise in the class.
a. steal/book? (umbrella)
b. trap/in bathroom? (lift)
c. X-ray/leg? (head)
d. asked/out of class? (hall)
e. mistake/for an artist? (business man)

8. **2072 Partial Set B Q.No. 4** Read the example and write similar conversation between 'A' and 'B'. [5]

Example: trap/in a bathroom? (storeroom)
A : Have you ever been trapped in a bathroom?
B : No I haven't, but I have been trapped in a storeroom.
a. x-ray/teeth? (Chest)
b. play/chess. (Badminton)
c. participate/cultural programmee? (Social works)
d. mistake/for a singer? (Player)
e. thrown/out of a bus? (Class)

9. **2071 Set C Q.No. 4** Read the example and write similar conversation between 'A' and 'B' [5]

Example: Fine/for spitting in the street (noise)
A. Have you ever been fined for spitting in the street?
B. No, I haven't, but I have been fined for making noise.
a. steal/ shirt? (sweater)
b. trap/in a bathroom? (lift)
c. X-ray/chest? (leg)
d. thrown/out of class? (hall)
e. mistake/for a business man? (scholar)

10. **2071 Partial Set A Q.No. 7** Continue the remarks below as shown in the example. [5]

Example: I can't get to sleep.
This is the first time I've ever slept in a tent.
I've never flown at night before.

a. I can't eat any more ...
b. She's feeling very drowsy ...
c. I hope they have reached home ...
d. Do you think you could speak a little louder ...
e. My hands are hurting real bad ...

11. **2070 Supp Set A Q.No. 2** Continue the remarks below with a sentence using **be (is/am/are) used to (not) + ing form**. [5]

a. My friend is going to find it hard work working on the construction site...
b. Sheela was surprised when she got flowers from her friends...
c. Bhuban won't mind if you stare at him...
d. Bina won't mind if you watch her dancing...
e. My grandfather feels a bit lonely when I am not in the room...

12. **2066 (Partial) Q.No. 7** Look at the example, and write about the other topics in the same ways: [5]

Example: Mean people:
The meanest person I've ever met was Jack Davies. He used to walk everywhere rather than paying for the bus.
a. frightening experiences b. stupid mistakes
c. uncomfortable beds d. boring jobs
e. funny films

13. **2062 Q.No. 2** Rewrite the following sentences using **'used to + ing'**. [5]

a. Suman enjoys eating fruits.
b. Sarita reads horror stories at least five hours a day.
c. The Buddhists pray for peace everyday.
d. Street children beg money from tourists.
e. Children make noise.

UNIT 2: APPEARANCE

1. **2076 Set B Q.No. 4** Rewrite these sentences using **seem (to be).** [5]

a. Mr. Thapa is very friendly.
b. He is very civilized.
c. He studies hard.
d. He is always ready to help others.
e. He scores excellent marks.

2. **2076 Set C Q.No. 4** Rewrite these sentences using **seem (to be).** [5]

a. Mr. Pun is a social worker.

b. He is honest in his activities.
c. He does not like gossiping.
d. He honours the seniors and loves the juniors.
e. He is liked by all.

3. **2075 Partial E Q.No. 2** Continue the following remarks with, **'look, sound, smell, feel, taste like'**. [5]
a. What's that you're cooking?
b. He's got a foreign accent.
c. They've very similar faces.
d. I've got something in my shoe.
e. I don't think you made this cake yourself.

4. **2075 Partial E Q.No. 6** Match the adjectives in the left hand column with suitable nouns in the right-hand column: [5]

a. crooked	i. chin
b. cleft	ii. hair
c. heavily	iii. nose
d. fair	iv. eyebrows
e. wavy	v. complexion
	vi. build

5. **2074 Supp Q.No. 9** Here are something you have observed about Mrs. X. What do they suggest you about her. Talk about her using **seem.** [5]
a. Her front garden looks a bit untidy.
b. There are a lot of books, well managed and kept in order in her room.
c. There are five bottles of milk on her front door step.
d. Her name is not in the phone book.
e. You only see her children during the school holidays.

6. **2074 Set A Q.No. 9** Here are some things you have noticed about Mr. X. What do they suggest to you about him. Talk about him using **'seem'**. [5]
a. He usually carries a walking stick when he goes out.
b. You only see his parents during holidays.
c. There are a lot of stamps in his room.
d. His front garden looks a bit neglected.
e. The postman always delivers a lot of letters with foreign stamps to his house.

7. **2074 Set B Q.No. 9** Here are something you have noticed about Mr 'Y'. What do they suggest to you about him? Talk about him using **'seem'**. [5]
a. He has rough hands.
b. He wears expensive ring.
c. He has nicotine stains on his fingers.
d. He meets his friends and relatives all the time.
e. He often wears glass, especially when he starts reading.

8. **2073 Supp Q.No. 5** Make a judgment in each of the following cases using **"look as if'**, [5]
Example: He is sitting on a rock with his hands under his chin.
He looks as if he has lost a close family member.
a. You see a man walking on the street at times laughing loudly and then crying.
b. You see a woman whose clothes are soaked, and she is sneezing.
c. You see a car with a smashed wind screen. It is the middle of the road.
d. You can hear people singing next door.
e. You see the man shouting at a boy.

9. **2073 Set D Q.No. 4** Rewrite these sentences using: **seem (to be)**. [5]
a. Mr Pandey is very friendly.
b. He is very hard working.
c. He is honest.
d. He is not very rich.
e. He forgets things.

10. **2073 Partial A Q.No. 4** Rewrite these sentences using **seem** [5]
a. He is very friendly.
b. He is honest.
c. They are regular.
d. They don't spend much money out.
e. She is very hardworking.

11. **2073 Partial W Q.No. 5** Use these phrases in sentences using **'look'** 'as if' as in the example. [5]
Example: They are unhappy.
They look as if they are unhappy.
a. He is a tramp.
b. He is going to fight.
c. They are frustrated.
d. He is seriously wounded.
e. He is about to die.

12. **2071 Supp Q.No. 4** Rewrite the following sentences about Murari using **'seem'**. [5]
a. He's an excellent driver.
b. He's not selfish.
c. He's used to live in cold climate.
d. He does not take much leave from office.
e. He takes care of his children.

13. **2071 Set C Q.No. 5** Use these phrases in sentence with **look as though**, as in the example. [5]
Example: They are happy.
They look as though they are happy.
a. He needs a wash.
b. He is aggressive.
c. It gives excellent result.
d. They are brother and sister.
e. She is celebrating.

14. **2071 Partial Set A Q.No. 2** Make comments based on the following statement using **looks as if/as though**. [5]
Example: you see a man lying underneath a car.
He looks as if he wants to commit suicide.
He looks as though he is drunk.
a. You see a big crowd gathered on the street.
b. When you get into the kitchen, you get a very bad smell.
c. When you touch your friend's shirt, you can feel it wet.
d. You see a man crying in front of a hospital.
e. When you go to school, you see the gate closed.

15. **2071 Partial Set B Q.No. 3** Continue the following remarks with selecting appropriate verbs from the box. One is done for you. [5]

Look, sound, smell, feel, taste, like

Example: Surely he's not a manual worker.
He looks like a businessman.
a. Are you sure this is tea?
b. I wonder who wrote that music.
c. He's got a foreign accent.

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d. This material is very soft.
e. They have got very similar faces.

16. 2070 Set D Q.No 2 Change the following sentences using **seem** as in the example. [5]
Example: He is very friendly.
He *seems* (to be) very friendly.
a. He isn't very rich.
b. He's happily married.
c. He's some kind of business man.
d. He doesn't spend much time out of doors.
e. He watches television a lot.

17. 2068 Q.No. 2 Rewrite the following sentences using **seem**.[5]
a. Mr. Harvey is very friendly.
b. He is not very rich.
c. He has lived very interesting life.
d. He watches television a lot.
e. He is some kind of businessman.

18. 2066 Q.No. 3 Talk about the people below in the same way as given in the example: [5]
Example: You see a man lying on the ground in a pool of blood.
He looks as if he is seriously wounded.
a. You see a girl standing on the seashore, staring into the water.
b. You see someone climbing through a window.
c. You see a man lying underneath a car.
d. You see a woman whose clothes are soaked, and she is sneezing.
e. You see a boy and a girl sitting together in a restaurant.

19. 2065 Q.No. 6 Rewrite these sentences about Rekha using **seem:** [5]
a. She's very friendly.
b. She isn't very rich.
c. She watches television a lot.
d. She's happily married.
e. She doesn't spend much time out of doors.

20. 2062 Q.No. 5 Make sentences from the following hints using **'look, look like or look as if/look as though'**. [5]
a. drunkard
b. terribly complicated
c. a honeymoon couple
d. they have come out of a swimming pool
e. she has never seen a mountain.

21. 2062 Q.No. 6 Rewrite these sentences about Shanti using **seem**. [5]
a. She's very friendly.
b. She isn't very rich
c. She's happily married.
d. She doesn't spend much time out of doors.
e. She watches televisions a lot.

22. 2060 Q.No. 3 Continue the following remarks with **look, sound, smell, feel** or **taste** (whichever is appropriate) **+ like**.[4]
Example: Surely he's not a manual worker.
Answer: He looks like a businessman to me.
a. I've got something in my shoe.
b. I wonder who wrote that music.
c. Are you sure this is tea?
d. He's got a foreign accent.

23. 2058 Q.No. 10 Change each of the following sentences using **seem**: [5]
a. Mr. Panth is very friendly.
b. He isn't very rich.
c. He's happily married.
d. He watches television a lot.
e. He has lived a very interesting life.

24. 2057 Q.No. 7 Rewrite the following sentences using **'seem'**[5]
a. You see someone climbing through a window.
b. When you touch your writing desk, you notice it's sticky.
c. The postman always delivers a lot of letters with foreign stamps to his house.
d. You only see his children during the school holidays.
e. He usually carries a walking stick when he goes out.

UNIT 3: RELATING PAST EVENTS

1. 2076 Set B Q.No. 7 Rewrite the following sentences, using the **past perfect tense** in the spaces given. [5]
a. I wanted to highlight all the programmes I.....
b. My sister showed me the marks she .....
c. Students wanted to study all the books they .....
d. The teachers visited all the places they .....
e. I could not repair the telephone that .....

2. 2076 Set C Q.No. 7 Rewrite the following sentences, using **past perfect tense** in the spaces given. [5]
a. My parents sent me all the books I . . .
b. The students showed all the medals they . . .
c. The NTC repaired all the telephones that . . .
d. I could not submit the essay I . . .
e. The juniors played much better than we . . .

3. 2076 Partial D Q.No. 4 Add appropriate **relative clauses** to these sentences. [5]
a. Mr. Gyawali became quite fond of Dillibazaar prison (he had spent 12 years there).
b. Mrs. Dhakal showed me round her house (She had paid 2 crore for it.)
c. Mr. Thapa (he had spent 30 years as a professor) was finally retired.
d. Mr. Rai (he had fought in world war II) died last year.
e. Jeevan (she had always been in love with him) finally asked her to marry him.

4. 2076 Partial E Q.No. 4 Join the following sentences together using a **relative clause.** [5]
a. Finally Mr. Thapa decided to retire. Mr. Rai had been sharing an office with him.
b. He proudly showed me round the house. He had paid 20 millions for it.
c. The old car was finally sold. Sohan had used it for more than 20 years.
d. Mohan finally asked her to marry him. She had always been in love with him.
e. He became quite fond of his office. He had served many years of his life there.

5. 2075 GIE Q.No. 5 Rewrite these sentences adding an appropriate **non-defining relative clause**. [5]
a. Anu went back to Butwal, ...
b. At last NTC managed to repair the telephone .....

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c. The teacher, ..., turned round suddenly.
d. We were all very grateful to our friend Hari, ...
e. The guard, ..., was rewarded.

6. **2075 Partial E Q.No. 3** Join the following sentences together using a **non-defining relative clause**. [5]
a. The old house (The family had lived in it for 100 years) was finally sold.
b. Luna noticed that Niru was wearing her ring (she had lost it two years before).
c. Mrs. Thapa (she was married with two children) never recovered.
d. He proudly showed me his laptop (he had paid Rs 50,000 for it).
e. Bipin (she had always been in love with him) finally asked her to marry him.

7. **2074 Partial E Q.No. 6** Add an appropriate **relative clause** to these sentences. [5]
a. When I came back, I found that my book, ... had disappeared.
b. The policeman,....., turned round suddenly.
c. I eventually found the letter,....., in my jacket pocket.
d. At last I got success to win the match,..... .
e. I couldn't wait for Ashu,..... .

8. **2073 Set C Q.No. 5** Rewrite these sentences using appropriate **relative clause** in the spaces given. [5]
a. The children could not wait to get back to Namche, ...
b. At last the contractors managed to repair the bridge, ...
c. The shopkeeper, ... turned round suddenly.
d. I eventually found the purse, ..., in my school bag.
e. We were all grateful to our principal, ...

9. **2072 Supp Q.No. 5** Rewrite these sentences adding an appropriate **non-defining relative clause**. [5]
a. I am very grateful to Madan, ...
b. My parents always helped the people, ...
c. The municipality repaired the road, ...
d. Anu showed me her house, ...
e. Bijay gave sweets to his friends, ...

10. **2072 Set C Q.No. 4** Rewrite these sentences adding an appropriate **non-defining relative clause**. [5]
a. My sister couldn't wait to get back to College, ...
b. The NTC managed to repair the telephone, ...
c. The coach, ..., is polite.
d. I found the check, ..., in my bag.
e. We were all very grateful to our college, ...

11. **2072 Set D Q.No. 4** Rewrite these sentences adding an appropriate **non-defining relative clause.** [5]
a. Janak went back to Mahendranagar, ...
b. At last the N-cell managed to repair the telephone, ...
c. The librarian, ..., turned round suddenly.
d. We were all very grateful to Mr Pandey, ...
e. The driver, ..., was rewarded.

12. **2072 Set E Q.No. 6** Add an appropriate **relative clause** to the following sentences. [5]
a. When I came back I found that my car, ..., had disappeared.
b. At last they managed to repair the telephone, ...
c. The teacher, ..., turned round suddenly.
d. I could not wait to get back to Sindhupalchok, ...
e. I eventually found the letter, ... in my jacket pocket.

13. **2072 Partial Set A Q.No. 5** Add an appropriate **relative clause** to these sentences. [5]
a. I am very much grateful to Madan, ...
b. I am proud of my college, ...
c. The Road Department managed to repair the road, ...
d. The Electricity Authority managed to repair the wire, ...
e. The boy, ..., turned round suddenly.

14. **2072 Partial Set B Q.No. 5** Rewrite these sentences adding a **non-defining relative clause**. [5]
a. The Old house, ..., was sold.
b. Madan became quite fond of Ilam, ...
c. Anju showed me round her house, ...
d. Bijaya took me to the college, ...
e. David, ..., did his work honestly.

15. **2071 Partial Set B Q.No. 2** Complete the following sentences using **past perfect tense.** [5]
a. I apologised to him for all the mistake I ....
b. I took back to the library all the books I ...
c. I wanted to show her the present I ...
d. I threw away the pieces of the vase I ...
e. He couldn't pay back the money I ...

16. **2070 Supp Set A Q.No. 4** Join the following sentences together using a **non-defining relative clause**. [5]
a. The principal presented the paper. The principal was highly qualified.
b. Nani Maiya was a veteran social worker. Nani Maiya was rewarded.
c. Mr. Khanal never missed any classes. Mr. Khanal's students always scored excellent marks.
d. Anish Showed me round his house proudly. Anish had paid Rs. 40,000,000 for it.
e. Laxmi installed solar plant. She paid Rs. 20,000 for it.

17. **2069 Q.No. 3** Join the following sentences together using a **relative clause**. [5]
a. The baby is catching a ball. She is my daughter.
b. There is some juice in the bottle. The juice is not fresh.
c. The place is called Gathaghar. I've been living there for 5 years.
d. My son lives in America. I love my son very much.
e. The lady is in the reception desk. Her job is to receive the guest.

18. **2067 Q.No. 3** Join the following sentences together using a **relative clause**. [5]
a. The woman is wearing a red saree. She is my math teacher.
b. There are some books in the library. They are not for reading.
c. The place is called Anamnager. I've been living there since 1990.
d. My son went to Australia last week. I also bought a car last week.
e. Ms. Gautam is going to spend her holidays in Bangkok. Her son works there.

19. **2066 Q.No. 8** Jo
clauses.
a. I saw her at
b. He had sp
there.
c. Phil was an
in sweat.
d. The dog w
loved trave
e. Alex had j
went anyw

20. **2065 Q.No. 3**
relative claus
a. There's a
b. There are
c. I was lool
d. Mrs. Jha
daughter
e. Hari pas

21. **2064 Q.No.**
relative clau
a. Finally
an office
b. The old
for 300
c. He pro
lakhs f
d. He bec
years
e. Harold
been i

22. **2063 Q.No**
a relative
a. Mary
She h
b. The
Mary
c. The
Mary
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d. Mar
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e. Mar
It se

23. **2058 Q.**
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a. Dia
b. A
c. A
d. A

UNIT 4

1. **2076**
who:
Exam
A per
a.
b.

19. **2066 Q.No. 8** Join the following sentences using a **relative clauses** [5]
   a. I saw her at the gate. A man was lying there
   b. He had spent many years in Pokhara. He was born there
   c. Phil was an excellent driver. Phil's forehead was covered in sweat
   d. The dog was sitting facing the back window. The dog loved travelling in fast cars.
   e. Alex had just taken the gun out of his pocket. Alex never went anywhere without his gun.

20. **2065 Q.No. 3** Join the following sentences together using a **relative clause.** [5]
   a. There's a woman living next door. She is a doctor.
   b. There are some words. They are difficult to translate.
   c. I was looking for a book. The book got lost yesterday.
   d. Mrs. Jha is going to spend her holidays in Birgunj. Her daughter lives there.
   e. Hari passed his examinations. This is a good news.

21. **2064 Q.No. 7** Join the following sentences together using a **relative clause.** [5]
   a. Finally Browne decided to retire. Willis had been sharing an office with him.
   b. The old house was finally sold. The family had lived in it for 300 years.
   c. He proudly showed me round his house. He had paid 40 lakhs for it.
   d. He became quite fond of his college. He had spent many years of his life there.
   e. Harold finally asked her to marry him. She had always been in love with him.

22. **2063 Q.No. 2** Combine the pairs of sentences into one using a **relative clause** in each case. [5]
   a. Mary was woken up suddenly by a strange noise.
      She had been in a deep sleep.
   b. The window was wide open.
      Mary had locked it securely the night before.
   c. The servants had left.
      Mary had laughed at them only that afternoon for being superstitious.
   d. Mary saw an old woman.
      'Her mouth was twisted into a toothless grin.'
   e. Mary heard a strange noise.
      It seemed to come from outside her window.

23. **2058 Q.No. 8** Join the following pairs of sentences each with a **relative clause.** [4]
   a. Diamond is a very hard substance. It is used of cutting.
   b. A road leads to the farm. It isn't suitable for cars.
   c. A girl was injured in the accident. She is now in hospital.
   d. A man answered the phone. He told me you were away.

UNIT 4: ATTITUDES AND REACTIONS

1. **2076 Partial D Q.No. 5** How would you describe a person who: [5]
   Example: *gives away lots of money?*
   A person who gives away lots of money is generous/kind.
   a. easily loses his temper?
   b. helps other people?
   c. believes whatever you tell him?
   d. expects good things to happen?
   e. expects bad things to happen?

2. **2075 Set A Q.No. 7** How would you describe a person who: [5]
   a. ..... gives away a lot of money?
   b. ..... believes whatever you tell him?
   c. ..... doesn't boast?
   d. ..... expects good things to happen?
   e. ..... easily loses her temper?

3. **2075 Set B Q.No. 5** Rewrite the sentences below beginning with "If there's one thing ....." [5]
   a. People who smoke in restaurants annoy me.
   b. People who are cruel to animals upset me.
   c. People who break promises make me angry
   d. I hate people who spit in the street.
   e. I detest people who interrupt when I'm speaking.

4. **2075 Set C Q.No. 4** Rewrite these sentences beginning with 'If there's one thing .....' [5]
   a. People who throw rubbish on the streets annoy me.
   b. People who kick the stray dogs upset me.
   c. People who break promises make me angry.
   d. I can't stand people who interrupt when I'm speaking.
   e. I object to people who play loud music at midnight.

5. **2075 Partial D Q.No. 6** What would you expect the following types of people to do? [5]
   Example: A considerate person
   A considerate person is someone who is careful not to hurt your feelings.
   a. An unreliable person .....
   b. A stingy person .....
   c. A thick-skinned person .....
   d. A vain person .....
   e. An optimistic person .....

6. **2075 Partial E Q.No. 7** Write a sentence showing your attitude to each of the following, using "The way ....." [5]
   a. Political leaders
   b. Doctors
   c. Visitors
   d. Ministers
   e. Policemen

7. **2074 Supp Q.No. 8** How would you describe a person who: [5]
   a. ..... worries what people think?
   b. ..... likes going to parties?
   c. ..... doesn't boast?
   d. ..... easily loses his temper?
   e. ..... only thinks about himself?

8. **2074 Set A Q.No. 8** How would you describe a person who..... [5]
   a. has high opinion about himself?
   b. doesn't like going to parties?
   c. never loses his temper?
   d. expects good things to happen?
   e. doubts whatever you tell him?

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9. 2074 Set B Q.No. 8 How would you describe a person who..... [5]
   a. lets people down?
   b. doesn't expect good things to happen in his life?
   c. gives away a lot of money?
   d. never buys you a drink?
   e. is insensitive to other's feelings?

10. 2074 Partial D Q.No. 7 How would you describe a person who..... [5]
   a. gives away a lot of money?
   b. believes whatever you tell him?
   c. doesn't boast?
   d. expects good things to happen?
   e. easily loses his temper?

11. 2074 Partial E Q.No. 5 Rewrite the following sentence using **'If there's one thing.....'** [5]
   a. People who jump queue infuriate me.
   b. I can't stand people who shout.
   c. I hate people who speak lie.
   d. People who complain a lot depress me.
   e. People who break promises upset me.

12. 2073 Supp Q.No. 6 Rewrite the following sentences beginning with **"If there's one thing ....."** [5]
   a. People who talk too much annoy me.
   b. I hate people who do not fulfill their commitments.
   c. I dislike people who give miss calls.
   d. I hate people who smoke in public places.
   e. People who are cruel to animals upset me.

13. 2073 Set D Q.No. 5 How would you describe a person who..... [5]
   a. easily loses his temper?
   b. gives away lots of money?
   c. doubts what you tell him?
   d. likes going to parties?
   e. doesn't boast?

14. 2073 Partial A Q.No. 5 Rewrite these sentences beginning **'If there's one thing ...'** as in the example. [5]
   Example: I hate people who telephone me early in the morning.
   If there is one thing I hate it is people who telephone me early in the morning.
   a. People who smoke in public places annoy me.
   b. People who are cruel to animals upset me.
   c. People who break public property make me angry.
   d. I hate people who violate rules.
   e. I detest people who don't help others in trouble.

15. 2073 Partial W Q.No. 6 Describe these persons' character. [5]
   a. a person who gives away a lot of money.
   b. never buys you a drink.
   c. has high opinion of himself.
   d. doesn't boast.
   e. doesn't like going to parties.

16. 2071 Supp Q.No. 2 How would you describe a person who:[5]
   a. ..... expects good things to happen?
   b. ..... jokes about everything?
   c. ..... worries about what people think?
   d. ..... doubts what you tell him/her?
   e. ..... doesn't like going to parties?

17. 2071 Set C Q.No. 6 How would you judge ... [5]
   a. a person who jokes about everything.
   b. ... doesn't joke about anything.
   c. ... worries about what people think
   d. ... doesn't care what people think
   e. ... doesn't boast

18. 2071 Set D Q.No. 7 Rewrite the following sentence using **there's one thing ...** [5]
   e.g.: I dislike, hate, detest:
   a. People who are cruel to pets are hateful.
   b. People who break promises make me angry.
   c. Alisha has forgotten to feed the cat again.
   d. I loathe people who ring me early in the morning.
   e. I hate people who speak while eating.

19. 2071 Partial Set A Q.No. 3 Rewrite these sentences beginning **'If there's one thing...'** [5]
   a. People who drive very fast irritate me.
   b. I detest people who disturb me when I'm working.
   c. I hate people who don't speak politely with kids.
   d. People who are cruel to animals upset me.
   e. I loathe people who ring me up early in the morning.

20. 2070 Supp Set B Q.No. 2 Rewrite the sentences below beginning **'If there's one thing ...'** as in the example. [5]
   Example:
   People who spit in the street irritate me.
   If there's one thing that irritates me it's people who spit in the street.
   a. People who scratch themselves all the time upset me.
   b. People who drive very fast terrify me.
   c. I hate people who smoke in the bus.
   d. I detest people who interrupt when I'm speaking.
   e. I loathe people who have shaggy hair.

21. 2070 Supp Set B Q.No. 3 How would you describe a person who ... [5]
   a. ..... easily loses her/his temper?
   b. ..... never buys you a drink?
   c. ..... doesn't boast?
   d. ..... doubts what you tell her/him?
   e. ..... Jokes about everything?

22. 2070 Set D Q.No 3 Rewrite the following sentences using ***'If there's one thing ....'*** as given in the example. [5]
   Example: People who smoke in restaurants annoy me.
   If there's one thing that annoys me it's people who smoke in restaurants.
   a. People who are cruel to animals upset me.
   b. People who break promises make me angry.
   c. I hate people who smoke in restaurants.
   d. I detest people who interrupt when I'm speaking.
   e. I loathe people who ring me up early in the morning.

23. 2069 Q.No. 7 Fill the gaps with a suitable form of each of these words: **impress, fascinate, confuse, depress, embarrass**. [5]
   a. Don't feel ... ... just go up and ask her to dance.
   b. I've always been ... ... by the play of children; I could watch them for hours.
   c. All the turnings look so similar. It's terribly... ... ...

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d. All those rows of beautiful houses! Don't you find it very ... ...to live there?
e. I don't really like her, but I find her strength of character rather... ... ...

24. **2068 Q.No. 6** How would you describe people who are: [5]
a. reliable? b. short-tempered?
c. sociable? d. serious?
e. pessimist?

25. **2068 Q.No. 7** Change the following verbs into adjectives. [5]
interest, confuse, irritate, shock, offend

26. **2066 Q.No. 7** How would you describe a person who ... [5]
(The first one is done for you).
a. ..... gives away lots of money. → **generous.**
b. ..... never loses his temper. .....
c. ..... expects good things to happen. .....
d. ..... jokes about everything. .....
e. ..... likes to go to parties. .....
f. ..... doubts what you tell him. .....

27. **2065 Q.No. 7** How would you describe these people: [5]
Example: gives away lots of money- **generous**
a. Helps other people.
b. Only thinks about himself/herself.
c. Always sees the dark side of life.
d. Never buys the children a doll.
e. Easily losses his/her temper.

28. **2061 Q.No. 3** Read the example and make similar construction using appropriate expression: [6]
Example: Politics
a. What do you think of Politics?
b. Oh, I find politics really depressing.
c. Yes, politics depresses me, too.
d. Yes, I agree, I get terribly depressed when people talk about politics.
(i) People who speak several languages.
(ii) People who talk about themselves.

29. **2059 Q.No. 9** Write definitions for the following. [5]
Example: An optimistic person = is someone who is always hopeful about good things to come.
a. A considerate person b. A stingy person
c. An unreliable person d. A thick-skinned person
e. A vain person

30. **2058 Q.No. 11** Write a sentence showing your attitude to each of the following. Using **"The way ..."** [5]
a. Parents b. Politicians
c. Teachers d. Advertisements on TV
e. Religious leaders

31. **2057 Q.No. 11** Rewrite these sentences beginning: [5]
"If there's one thing. e.g. (I hate / dislike / loathe / detest / etc.)
a. People who are cruel to animals.
b. I detest people who interrupt when I'm speaking.
c. People who break promises make me angry.
d. I hate people who speak while eating.
e. I loathe people who ring me up early in the morning.

UNIT 5: DURATION

1. **2076 GIE Q.No. 4** Fill in the blanks with the sentences below with 'for', 'in', 'until' or 'by' whichever is appropriate. [5]
a. They studied in the college ..... the break time.
b. I studied English ..... sixteen years.
c. My father will be in Norway ..... 2020.
d. The film was over ..... three hours.
e. He ran a business ..... two years.

2. **2076 Partial E Q.No. 7** Fill the gaps in the sentences below with **for, in, until, by.** [5]
a. I borrowed my friend's book . . . a few days.
b. He stayed in bed . . . breakfast time.
c. The game was over . . . 4:30.
d. He saved Rs. 2000 . . . Dashain.
e. They reached the top of mountain . . . four hours.

3. **2074 Partial E Q.No. 8** Complete these sentences as it is in the example. [5]
Example: I ordered a taxi for ten to eight, but.....
.....It didn't come for half an hour.
.....It was two weeks before it came.
a. I wrote to my mother by airmail, but in fact .... (two weeks)
b. I intended to have an early night, but as it happened..... (midnight)
c. I said he could borrow the record for a few days, but..... (six weeks)
d. It was supposed to be short meeting, but ..... (three hours)
e. She set us some homework for Monday, but as I was away for the weekend..... (Tuesday)

4. **2073 Set C Q.No. 6** For each of the following situation: [5]
i. ask a questions using, how long ... ?
ii. answer it using 'in/by/until/for' and the words in bracket.
a. The students talked on the telephone (40 minutes).
b. She painted the classroom ceiling. (6 o'clock)
c. The golfer played golf on Sunday. (dusk)
d. The gardener mowed the lawn (ten minutes)
e. The typist typed all her letters. (lunch time)

5. **2072 Supp Q.No. 6** For each of the situations below: [5]
A: Ask a question with 'How long ....?'
B: Answer the questions using the words in brackets. (Use: until/for, in/by whichever is correct)
a. Students talked to their parents. (20 minutes)
b. They played ball. (the television programme came)
c. She finished cleaning the room. (lunch time)
d. Madan wrote an essay. (3 days)
e. I changed the wheel of my car (10 minutes)

6. **2072 Set C Q.No. 6** For each of the situations below:
(i) Ask a question with 'How long...?'
(ii) Answer it using the words in brackets (use until/for, in/by whichever is appropriate) [5]
a. They played golf. (dusk)
b. The gardener mowed the lawn. (10 minutes)
c. We waited at the bus stop. (30 minutes)
d. My friend wrote all his letters. (lunch time)
e. The helper had to change the wheel. (five minutes)

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7. **2072 Set D Q.No. 6** For each of the situations below:
   i. Ask a question with 'How long.....?'
   ii. Answer it using the words in brackets. (use until/for, in/by whichever is appropriate) [5]
   a. They played cricket. (evening)
   b. Mrs Chang mowed the lawn. (30 minutes)
   c. We waited at the bus stop. (45 minutes)
   d. The secretary wrote all the letters. (lunch time)
   e. Sudha read the whole of Muna Madan. (5 days)

8. **2072 Partial Set A Q.No. 6** For each of the situation below:
   i. Ask a question with 'How long .....?'
   ii. Answer it using the words in bracket. (use: until/for, by/in whichever is appropriate.) [5]
   a. She wrote all her letters. (lunch time)
   b. The children watched television. (their class started)
   c. The students read the whole novel *War and Peace*. (two weeks)
   d. The boys waited at the bus station. (4 hours)
   e. The Hostel students talked to their parents. (more than one hours)

9. **2072 Partial Set B Q.No. 6** For each of the situations below: [5]
   i. Ask a question with How long .....?
   ii. Answer it using the words in bracket. (use: until/for, by/in whichever is appropriate.)
   a. Madan telephoned his father this morning. (20 minutes)
   b. Sita had a cold. (3 days)
   c. I wrote all my letters. (lunch time)
   d. They read the whole story "Hansel and Gretel". (5 hours)
   e. He watched television. (late movie came on)

10. **2071 Supp Q.No. 3** For each of the situation below ask questions with **'How long...?'** and answer them using the words in brackets. [5]
   Example: *They talked on the telephone. (20 minutes)*
   How long did they talk on the telephone?
   They talked on the telephone for 20 minutes.
   a. We played golf on Sunday. (dusk)
   b. We had to change the wheel of our car. (ten minutes)
   c. He read the whole of War and Peace. (two weeks)
   d. She watched television. (late movie came on)
   e. Santa did some piano practice. (bedtime)

11. **2071 Set D Q.No. 5** Fill in the gaps in the sentences below with **for, in, until** and **by:** [5]
   a. They studied in the college ..... the break time
   b. I studied English ..... sixteen years.
   c. The translator worked in USAID project ... ten years.
   d. My father will be in Norway ..... 2015.
   e. We did our project assignment ..... six hours.

12. **2071 Partial Set B Q.No. 5** Fill in the gaps in the sentences below with **for, in, until** or **by.** [5]
   a. She studied medicine ... the age of 25.
   b. We discussed politics ... three in the morning.
   c. He bought a new camera ... 50 Dollar.
   d. She learnt to swim ... six weeks.
   e. He saved up £200 ... Easter.

13. **2070 Supp Set A Q.No. 6** For each of the situations below. [5]
   i. Ask a question with 'How long ...?'
   ii. Answer it, using the words in brackets.
   a. Mr Chaudhary talked on the cell-phone. (half an hour)
   b. The painter worked in the theatre. (2 hrs)
   c. Grade 12 students studied English. (Eleven O'clock)
   d. Our college receptionist typed all letters. (lunch time)
   e. The young scholars read the whole of "MunaMadan". (Two hours)

14. **2070 Supp Set B Q.No. 4** For each of the situations below. Ask a question with 'How long ...' and answer it using the words in brackets. [6]
   a. She painted the bath room ceiling (six o'clock)
   b. They talked on the telephone. (20 minutes)
   c. We played cricket. (dark)

15. **2069 Partial Q.No. 5** Fill the gaps in the sentences below with ***for, in, until*** or ***by***. [5]
   a. I dug the garden ... ... a couple of hours.
   b. He stayed in bed... ... ... lunch time.
   c. We discussed politics... ... ...3 in the morning.
   d. My father ran a bookshop ... ... two years.
   e. I borrowed her book... ... ...a few days.

16. **2066 Q.No. 4** For each of the situation below, ask question with **'How Long'** and answer it using the words in the brackets. [5]
   a. They talked on the phone. (20 minutes)
   b. He mowed the lawn. (ten minutes)
   c. I wrote all my letters. (lunch time)
   d. I read the whole of 'War and Peace'. (two weeks)
   e. She did some piano practice. (bed time)

17. **2066 (Partial) Q.No. 2** Fill in the blanks with the sentences below with '**for, in, until** or **by**: [5×1=5]
   a. I will finish my work ... ... Monday.
   b. We did some work ... ... a couple of hours.
   c. My father ran a business ... ... two years.
   d. We lived in the same house ... ... my son was eleven.
   e. The film was over ... ... three hours.

18. **2064 Q.No. 4** Fill the gaps in the sentences below with **'for', 'in', 'until'** or **'by'.** [5]
   a. Last night we talked ... two in the morning.
   b. They will be here ... a couple of hours
   c. She studied Spanish ... five years.
   d. The food will be ready ... 9:30.
   e. He learnt to swim ... three weeks.

19. **2063 Q.No. 7** Fill in the gaps with appropriate prepositions. [5]
   a. We did all our housework ... a couple of hours.
   b. The engineer worked in a project ... five years.
   c. He stayed in bed ... lunchtime.
   d. The programme was over ... half-past nine.
   e. She studied medicine ... the age of 25.

20. **2060 Q.No. 7** Fill in the gaps in the sentences below with **for, in, on, until,** or **by.** [3]
   a. He stayed in bed ... lunchtime.
   b. I studied French ... five years.
   c. The train is running ... time today.
   d. We did some housework ... a couple of hours.
   e. We did all our housework ... a couple of hours.
   f. They lived in Palpa ... 1990.

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21 2059 Q.No. 7 Fill in the gaps in the sentences below with **until**, **in**, **by** or **for**. [5]

a. She studied medicine ... the age of 25.
b. They got the lunch ready ... 12.30.
c. He learnt to swim ... six weeks.
d. My father ran a bookshop ... two years.
e. He stayed in bed ... lunchtime.

UNIT 6: REPORTING

1. 2077 Set D Q.No. 4 Choose one of the verbs in the list to report each of the remarks below. [4]

Urge, beg, suggest, promise, recommend

a. I can't tell you how important it is for you to give up smoking.
b. You have got to lend me the money! oh! please, please
c. Why don't you paint the wall yellow?
d. I will buy you a bike if you pass grade XII.

2. 2076 Set B Q.No. 6 Report the remarks below, beginning:- **He told me . . .** [5]

a. I have been working for four hours.
b. She has had her meal in the college canteen.
c. I will do my responsibility honestly.
d. Students are trying their best for excellent achievement.
e. Health workers are demanding better remuneration.

3. 2076 Set C Q.No. 6 Report the following remarks, beginning: **He told me . . .** [5]

a. My subject teacher will inform me soon.
b. The game warden was not involved in unlawful works.
c. The culprits are trying to make money easily.
d. People in remote areas have not got proper health services.
e. Nepal can be a hub for medical science.

4. 2076 Partial D Q.No. 6 Choose one of the verbs in the list to report each of the remarks below. [5]

(Verbs: threaten/advise/recommend/urge/suggest)

a. I will report you to the police if you don't do what I say.
b. You really have to repair your gate, you know.
c. You should spend a week in Pokhara it's-lovely.
d. I can't tell you how important it is for you to give up smoking.
e. Why don't you buy SAMSUNG mobile.

5. 2075 Set B Q.No. 6 Report the following remarks, beginning with **"He told me ....."** [5]

a. I will inform him if I see him.
b. She has been feeling uneasy.
c. Pandey was not invited to the party.
d. Krishna has his bicycle repaired.
e. They do not play as much football as they used to.

6. 2075 Partial D Q.No. 7 Report the following remarks, beginning. **'He told me .....'** [5]

a. My father's ill.
b. The price of petrol's going to go up.
c. I've had my car serviced.
d. I'm reading the book you lent me.
e. They don't play as much tennis as they used to.

7. 2073 Set C Q.No. 7 Choosing the appropriate verbs from the list, report the remarks below. [5]

Verbs: Promise, threaten, agree, advise, recommend

Example: I told you to give up drinking for the betterment of your health.

- He urged me to give up drinking.

a. She says, "I will give you your bag back".
b. The father told the boy he would buy him a laptop if he was good.
c. The neighbour told me he would report the police if I didn't do what he said.
d. The doctor said, "you should spend a week in Bhedetar– it is lovely."
e. Why don't you paint the wall blue?

8. 2072 Supp Q.No. 7 Report the following remarks beginning. [5]

He told me that ...

a. She will come back soon.
b. She has finished her job.
c. They have paid the dues.
d. We have learned Chinese.
e. I have completed my assignment.

9. 2072 Set C Q.No. 7 Report the following remarks, beginning. **He told me .....** [5]

a. The children are playing well.
b. I repair my bike.
c. The workers look as if they have not eaten for weeks.
d. You have not done all your assignments.
e. I was not invited to the party.

10. 2072 Set D Q.No. 7 Change the direct speech into indirect speech beginning: **He told/asked me...** [5]

a. "Did you have your meal?"
b. "You can take as many books as you like".
c. "The rate of interest is going down".
d. "Have you finished all your book?"
e. "Have you cleaned your room?"

11. 2072 Partial Set A Q.No. 7 Report the following remarks, beginning, **'He told me ..... that'**; [5]

a. I will return soon.
b. I have finished my work.
c. She has not paid the rent.
d. I was sick for a long time.
e. My mother always helps the poor.

12. 2072 Partial Set B Q.No. 7 Report the following remarks, beginning **'He told me ..... that'**; [5]

a. I am from Pokhara.
b. My father is happy now.
c. She has been feeling well.
d. I am reading that book.
e. The bus fare is not decreasing.

13. 2070 Set C Q.No. 4 Choosing appropriate verbs from the list, report the remarks below. Begin with the words given. [5]

Verbs: **warm, accuse, assure, explain, admit**

a. You are interfering in a private matter.
The sales manager .....
b. You are under no obligation to buy the drill if you don't like it.
The salesman .....

c. I don't want the book, because its pages are torn.
The student .....

d. The pages of the book have been torn - the student has been right all along.
The bookseller .....

e. If you don't pay the previous balance within seven days, we will have to take legal action.
The grocery dealer .....

14. 2067 Q.No. 7 Report the following remarks, using one of the verbs below for each: [5]
deny, assure, suggest, beg, agree.
a. 'You'll be in absolutely no danger at all'
b. 'Ok, I'll give you'
c. 'Why don't you go to see a doctor?'
d. 'Please – you must help me!'
e. 'Me ? I didn't take your pen.

15. 2065 Q.No. 4 Choose one of the verbs in the list to report each of the remarks below. [5]
(Urge, insists, suggest, threaten, recommend, advise)
Example: It is very important for you to stop smoking.
He urged me to stop smoking.
a. I will report you to police if you don't do what I say.
b. Why don't you go to clinic if you can pay?
c. You should try it once again, you may win.
d. You really ought to have your car serviced.
e. No, I've already told you- I'm going to pay.

16. 2064 Q.No. 3 Choose one of the verbs in the list to report each of the remarks below. [5]
Urge, insist, advise, suggest, threaten, recommend
Example: It's very important for you to give up drinks.
He urged me to give up drinks.
a. I'll report you to the police if you don't do what I say.
b. Why don't you start medicine if you can't bear the pain?
c. No, I've already told you- I am going to pay.
d. You really ought to have your bike serviced, you see.
e. You should try it once again. You may win.

17. 2063 Q.No. 3 Report the following remarks, beginning **'He told me ....'** [5]
a. I've had my hair cut.
b. I'm reading that book you lent me.
c. I wasn't invited to the party.
d. The price of petroleum product's going to go up.
e. I'll tell her when I see her.

18. 2061 Q.No. 2 Report the following remark, using a suitable verb from the list. Decide who you think made the remark. [5]
beg, promise, suggest, threaten, recommend
a. If you don't do what I say, I'll report to the police.
b. Please! You must help me! I don't know what to do!
c. You should spend a week in Rara- it's lovely.
d. I'll buy you an ice-cream if you're good.
e. Why don't you paint the ceiling yellow?

19. 2058 Q.No. 5 Complete the sentences. Report what was said. [4]
a. Ram to Shyam: Would you like to stay for lunch?
Ram invited _____.
b. Ranjeeta: I'm sorry I caused so much trouble.
Ranjeeta apologized for _____.
c. Sita to Geeta: You ought to see a doctor.
Sita advised _____.
d. Tashi: I'll do the washing-up.
Tashi offered _____.

UNIT 7: DEDUCTIONS AND EXPLANATION

1. 2077 Set D Q.No. 5 Change the sentences below using must, can't and might/may, whichever is correct. [4]
For example: Perhaps he was tired.
He may have been tired.
a. I am sure he isn't from Cyprus.
b. Perhaps he was reading.
c. Perhaps Devkota wrote the poem.
d. Obviously, she passed the entrance.

2. 2076 GIE Q.No. 6 Rewrite the sentences below using 'must', 'can't', 'may/might' whichever is appropriate. [5]
a. I'm sure they've arrived.
b. Obviously, she is not going to marry him.
c. Perhaps he heard you.
d. I'm convinced she has not forgotten my name.
e. May be he was delayed.

3. 2076 Partial E Q.No. 9 Rewrite the sentences below, using **must**, **can't** or **may/might**. [5]
a. I'm sure he didn't steal the money.
b. Perhaps she isn't at work.
c. May be he was delayed.
d. Perhaps he finished his job.
e. I am convinced that she is working hard.

4. 2075 Set A Q.No. 11 Continue the sentences below with a deduction as in the example. [5]
Example: A: Her bed room light is on.
B: ..... so she must be reading in bed.
a. He's got a lovely Suntan .....
b. She's driving a Ferrari .....
c. He speaks excellent Spanish .....
d. He isn't wearing a uniform .....
e. I can hear music next door .....

5. 2075 Set B Q.No. 4 Rewrite the sentences below using **must, can't** or **may/might**. [5]
a. I'm sure she's not having lunch.
b. May be he was delayed.
c. I'm sure you're imagining things.
d. Obviously he's been Kidnapped.
e. Perhaps, she's going to ring.

6. 2075 Set C Q.No. 5 Change the given sentences using must, can't or may/might. [5]
a. I'm sure he is sleeping.
b. Certainly he was at home.
c. Perhaps she hasn't got the invitation.
d. I'm sure they didn't take the bus.
e. Probably she is absent.

7. 2075 Partial D Q.No. 4 Explain the following deductions using **'if'** sentence. [5]
a. He can't be a soldier - he's not wearing a uniform.
b. He must have been to America - he has a US stamp in his passport.

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c. She can't have been enjoying herself - she left early.
d. She must know English - she was listening to the BBC.
e. He can't have lived in India - he didn't understand the waiter who spoke to him in Hindi.

8. **2074 Supp Q.No. 7** Explain the following deduction using an 'if ..... sentence, as in the example. [5]

Example

- He must be a college student - he is wearing college uniform.
- If he was not a college student, he wouldn't be wearing college uniform.

a. It must be his birthday - he got a lot of posts this morning.
b. The table can't be an antique - it only cost him Rs.400.
c. He must be reading in bed - his bed room light is on.
d. She is rich - she is driving a Mercedes.
e. She must be French - she speaks excellent French.

9. **2074 Set A Q.No. 7** Explain the following deduction using an **'if ..... sentences'**, as in the example. [5]

Example:

– He can't be a soldier – he is not wearing a uniform.
– If he was a soldier, he would be wearing a uniform.

a. They must be having an argument – they have shut the door.
b. They must be working hard – they are tired.
c. She can't be working in the bank – I haven't seen her there.
d. She must know English – She was listening to the CNN.
e. They must be here around – He has not closed the door.

10. **2074 Set B Q.No. 7** Explain the following deduction using an **if ... sentence,** as in the example. [5]

Explain:

- He can't be a college student - he is not wearing a uniform.
- If he was a college student, he would be wearing a uniform.

a. They must have some important business - they are rushing.
b. They must be working hard - they are exhausted.
c. He can't be working in the hospital - I have never seen him there in hospital uniform.
d. She must be feeling cold- she is trembling.
e. The old man must have fractured his leg- he has been using crutch for several days.

11. **2074 Partial D Q.No. 8** Continue the sentences below with a deduction. [5]

Example:

A: Her bedroom light is on.
B: ..... so she must be reading in bed.

a. He's got a lovely suntan.....
b. She's driving a Ferrari.....
c. He speaks excellent Spanish.....
d. He isn't wearing a uniform.....
e. I can hear music next door.....

12. **2074 Partial E Q.No. 9** Re-write the sentences below, using **must, can't, may/might** whichever is correct. [5]

a. I'm sure the snow has melted.
b. Perhaps he was tired.
c. I'm sure they weren't camping.
d. Perhaps he was listening.
e. I'm sure they stole the money.

13. **2073 Supp Q.No. 7** Answer the questions in column 'A' using **'must'** or **'can't'**, giving reason suggested in column 'B'. [5]

Example:

A	B
Did he go abroad.	He hasn't got a passport.

He can't have gone abroad because he hasn't got a passport.

A	B
a. Has he passed the examination?	He was working very hard.
b. Has he not taken a bath?	He smells awful.
c. Have they been working all day?	They look exhausted.
d. Did you see the Himals?	The weather was clear.
e. Is he talking on the phone?	The line's engaged.

14. **2073 Set C Q.No. 8** Explain the following deduction using an if sentence. [5]

Example: They can't be school students-they are not wearing school uniform.

- If they were school students, they would be wearing school uniform.

a. The girl child must have been kidnapped - she is not here yet.
b. She must know English - she was reading The Sunday Times.
c. Sujan can't be teaching at college - I have not seen him dealing with the college students.
d. Her parents must have been here recently - the fire is burning in the hearth.
e. The children can't have been enjoying themselves - they left early.

15. **2073 Set D Q.No. 6** Change the sentences below, using **must, can't, may/might** whichever is correct. [5]

a. Perhaps she hears me.
b. I am sure you are tired.
c. I am sure they aren't busy.
d. Perhaps he is not listening.
e. I am sure they were present in class.

16. **2073 Partial A Q.No. 6** Change the sentences below, using **'must', 'can't', 'may' or might'** whichever is appropriate. [5]

a. I am sure he is working.
b. I am sure she is ill.
c. I am sure he doesn't smoke.
d. Perhaps he is listening.
e. Perhaps he was tired.

17. **2073 Partial W Q.No. 7** Rewrite the sentences below using **may/might, must, can't**. [5]

a. Perhaps the principal watches you.
b. Perhaps he is telling truth.
c. I am sure you are imagining things.
d. I am sure they work honestly.
e. I am sure she is not busy.

18. **2071 Set C Q.No. 7** Rewrite these sentences below using **may/might, must, can't** [5]

a. Perhaps he works hard.
b. Perhaps they are studying.

c. I am sure he is honest.
d. I am sure she was at work.
e. I am sure they are not working.

19. 2071 Set D Q.No. 8 Rewrite the following sentences using **must, can't,** or **may/ might**: [5]
a. I'm sure she will achieve the first position.
b. Obviously, Nepal won the final match.
c. May be he is sociable.
d. Many students are flying abroad.
e. He actively teaches well.

20. 2071 Partial Set A Q.No. 4 Change the sentences below, using **must, can't** and **might/may**. [5]
a. I'm sure they won't come.
b. Perhaps he's going to take me out.
c. I'm sure he's been drinking.
d. Perhaps she isn't studying.
e. I'm sure he's not a Nepali.

21. 2070 Set C Q.No. 9 Rewrite the sentences below, using **must, can't** and **might** or **may**. [5]
a. I am sure my friend has passed the entrance exam.
b. Perhaps the umpire heard the players' voice.
c. I am convinced you know the history of our country.
d. I am sure Ashok is not involved in unlawful works.
e. I am sure you have not done anything wrong.

22. 2070 Set D Q.No 4 Change the following sentences, using **must, can't** and **may/might.** [5]
a. I'm sure he's working.
b. Perhaps he's going to ask me.
c. I'm sure he's not French.
d. I'm sure they stole the money.
e. Perhaps he went home.

23. 2069 Q.No. 2 Rewrite the following sentences below using **must, can't or might/may.** [5]
a. I'm sure she has been studying hard.
b. Perhaps they're living in Pokhara.
c. It's possible that we're winning the game.
d. I'm sure they're not our enemies.
e. Perhaps she wasn't writing a letter.

24. 2069 Partial Q.No. 2 Rewrite the sentences below, using must, can't or might/may. [5]
a. It's possible that they are going away.
b. I'm sure you are exhausted,
c. Perhaps she didn't see you.
d. May be he was tired.
e. I'm sure they were not informed.

25. 2067 Q.No. 2 Rewrite the following sentences below, **using must, can't,** or **might/may**. [5]
a. I'm sure they have gone out.
b. Perhaps she didn't meet her friends.
c. It's possible that they are visiting us.
d. Obviously you've been unopposed.
e. Perhaps she wasn't telling the truth.

26. 2065 Q.No. 2 Read the situations and use the words in brackets to write sentences with **must, must have, can't and can't have.** [5]
Example: The Phone rang but I didn't hear it. (I/asleep)
I must have been asleep.
a. You've been travelling all day. (you / very tired)
b. That restaurant is always empty. (it / very good)
c. When I woke up this morning, the light was on. (I / forget / to turn it off)
d. They haven't lived here for long. (They / know / many people)
e. The jacket you bought is very good. (it / very expensive)

27. 2064 Q.No. 2 Rewrite the following sentences below using **'must, can't or might/may'.** [5]
a. Perhaps she didn't get what you said.
b. I'm sure they have left.
c. May be the election will be postponed.
d. It's possible that there will be peace in Nepal.
e. Obviously the gardener was not serious.

28. 2063 Q.No. 5 Rewrite the sentences below, using **must, can't** or **might / may.** [5]
a. I'm sure she's working.
b. I'm sure it hasn't been snowing.
c. May be she was delayed.
d. Perhaps he's telling the truth.
e. I'm sure the snow has melted.

29. 2061 Q.No. 4 Draw two conclusions using **must** and **can't** for each of the following pieces of evidence. [4]
a. His name isn't in the phone book.
b. The door is open.

30. 2059 Q.No. 6 Rewrite the sentences below using **must can't** or **might / may** [4]
a. I'm sure they've arrived.
b. Perhaps he didn't hear you.
c. Maybe he was delayed.
d. It's possible that they're going away.

31. 2058 Q.No. 14 Rewrite the following conclusions using **must, can't** or **might/may**. [5]
a. I'm sure they've arrived.
b. I'm sure she is not having dinner.
c. Perhaps, he heard you.
d. I'm convinced he hasn't forgotten my name.
e. May be, he was delayed.

UNIT 8: ADVANTAGES AND DISADVANTAGES

1. 2075 Partial D Q.No. 8 Change the suggestions below, using **'ought to', 'ought not to', 'might as well'** or **'there's no point in'**. [5]
Example: Let's not take the lift - he only lives on the first floor.
There's no point in taking the lift.
a. Why don't we give it away? - it is not worth anything anyway.
b. Don't ask him - he does not speak English.
c. Don't take your children to see that film - it will frighten them.
d. Let's not sell it - it is not worth anything anyway.
e. Let's watch TV - there's nothing else to do.

2. 2074 Partial E Q.No. 7 Change the suggestions below, using **ought to, ought not to, might as well,** or **there's no point** in whichever is appropriate. [5]

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Example: Let's not take the lift- he only lives on the first floor.
There's no point in taking the lift.

a. Don't take your children to see that film - it'll frighten them.
b. Why don't we give it away - it's not worth anything any way.
c. Don't ask him -he doesn't speak English.
d. Why don't you take a pullover-it might turn cold.
e. Let's not talk about it now- the children are listening.

3. **2073 Supp Q.No. 8** Give an advice by using **"there's no point in"** or **"its not worth"**. [5]

Example: Do you think I should go by bus?
There's no point on going by bus-it's only a short distance.

a. What shall I do with the money? Shall I invest it in business?
b. Let's buy electronic gadgets.
c. Do you think I should sell the old furniture?
d. Shall I buy new bookcases?
e. Do you think I should replace my old car with a new one.

4. **2072 Set E Q.No. 4** Write sentences which have the same meaning as those below. Choose the verbs given and begin with the words given. [5]

Make it more difficult, make it easier, allow, discourage, force, encourage

Example: *When they took the drug, it was more difficult for them to think rationally.*
The drug made it more difficult for them to think rationally.

a. When they took the drug, they could relax and enjoy themselves more easily.
The drug ...
b. Although there was a shortage of food, people still wanted to take the drug.
Even the food shortage didn't ...
c. Because of the economic crisis, the government had to take some decisive action.
The economic crisis ...
d. After the new law was introduced, people wanted to take the drug even more.
The new law ...
e. When the drug was exported, they were able to sit in the sun all day long.
This ...

5. **2073 Partial A Q.No. 7** Change the suggestions below, using ought to, ought not to, might as well, or there is no point in whichever is appropriate. [5]

a. Let's not walk - it is more than five kilometers.
b. Don't ask him - he does not speak English.
c. Why don't we give it away- it is not worth anything anyway.
d. Don't take your children to see that film- it will frighten them.
e. Why don't you get up early - you might miss the college bus.

6. **2072 Set E Q.No. 7** Write advantages and disadvantages to the expressions below as given in the example. [5]

Example: *Package holidays*
Package holidays enable people to travel abroad cheaply.
They discourage people from being adventurous.

a. Being rich and famous.
b. Having a freezer
c. Practicing English in groups
d. Driving a motorbike on highways
e. Watching television

7. **2071 Supp Q.No. 5** Give advice to the following remarks. Follow the examples. [5]

Example: Do you think I should keep all these old clothes?

No, | there's no point in / it's not worth | keeping all these old clothes.

a. What shall we do with the money? Invest it?
b. Let's not get into the trouble. It is nothing important.
c. May be we ought to keep some of this ice-cream for Mary.
d. Do you think we should go to school today?
e. I think I'll make a bookcase.

8. **2071 Set D Q.No. 6** Change the suggestions between using **ought to, ought not to, might as well as there's no point**. [5]

Example: Let's not take the lift – he only lives in the first floor.
There's no point in taking lift.

a. Let's not sell it – it's not worth anyway.
b. Don't ask him – he doesn't speak English.
c. Why don't you take a hot soup – it might turn cold.
d. Let's not argue about it – that won't solve the problem.
e. Let's not use the mobile now – the examination is going on.

9. **2070 Set C Q.No. 6** Change the suggestions below, using **ought to, might as well, ought not to,** or **there's no point**.[5]

a. Let's not argue about these people's character - that won't solve the problem.
b. Why don't we take the example of Dil Sobha- she is a very unselfish social worker.
c. Let's not talk about that news now- the children are listening.
d. Why don't we give up the idea of going to foreign countries- there are a lot of opportunities here.
e. Why don't you take a pair of riding boots- when you go mountain climbing- there is a lot of space in your bag.

10. **2070 Set D Q.No 5** Change the suggestions below using **ought to, ought not to, might as well** or **there's no point in**. [5]

Example: Let's not take the lift - he lives only on the first floor.
There's no point in taking the lift.

a. Don't take your children to see that film - it'll frighten them.
b. Let's not sell it - it's not worth anything anyway.
c. Why don't we give it away? - it's not worth anything anyway.
d. Don't ask him - he doesn't speak English
e. Let's not talk about it now - the children are listening.

UNIT 9: CLARIFYING

1. 2076 GIE Q.No. 7 Change the following questions into **indirect questions**. Begin with the sentence given. [5]
   Example: What colour shirt did they buy?
   I want to know .....
   I want to know what colour shirt they bought.
   a. Has the train left? Have you found out . . . ?
   b. Have the election results been announced yet? Have you any idea . . . ?
   c. Was he alone? Do you know . . . ?
   d. What color curtains did they buy? I am longing to know . . .
   e. What are golf balls made of? Do you know . . .?

2. 2076 Set B Q.No. 5 Change these yes/no questions below into **information questions**; as in the example. [5]
   Example: Did Manoj leave for Dhangadi at 4 O'clock?
   What time did Manoj leave for Dhangadi?
   a. Are the juniors jogging/playing?
   b. Do you like to read novels/stories?
   c. Is your relative suffering from cold/fever?
   d. Did he use half inch/one inch screws?
   e. Are you taking your bicycle or mine?

3. 2076 Set C Q.No. 5 Change these yes/no questions below into **information questions**; as in the example. [5]
   Example: *Are we getting up at 7 O'clock today?*
   What time are we getting up today?
   a. Are you planning to stay in Pokhara for a week?
   b. Did you buy brown/grey colour sweater for me?
   c. Do you take 40/42 size of shoes?
   d. Are there four/five/six of you?
   e. Did you perform worship at 6:30?

4. 2075 GIE Q.No. 6 Change these yes/no questions into **information questions**, as in the example: [5]
   Example: Did you take my/her/Nira's book?
   Whose book did you take?
   a. Would you like to sing Nepali/Hindi/English songs?
   b. Do you get up at 6/7/8 in the morning?
   c. Was this book printed in Kathmandu/Pokhara/Butwal?
   d. Did they buy Hari's/Deepa's/your house?
   e. Was he born in 2000/2001/2002?

5. 2075 Set A Q.No. 6 Change the questions below to **information questions**. [5]
   a. Are we having tomato/chicken/mushroom soup today?
   b. Was it raining/foggy/cold when we were in London?
   c. Are you going to boil/fry/scramble those eggs?
   d. Are there four/five/six of you?
   e. Are you Margaret's cousin/brother/nephew?

6. 2075 Set A Q.No. 9 Look at the sets of words below and decide what each set has in common. [5]
   a. arson/blackmail/assault.
   b. stew/grill/roast.
   c. ford/volkswagen/citroen.
   d. rubber/leather/plastic.
   e. major/sergeant/corporal.

7. 2075 Set B Q.No. 8 Change the questions below into **information questions**. [5]
   a. Are we having chicken/mushroom/tomato soup today?
   b. Are there five/six/seven of you?
   c. Did you use half-inch/one-inch/three quarter inch screw?
   d. Was it raining/foggy/cold when you were in Pokhara?
   e. Is the cinema opposite/next to/round the corner from the station?

8. 2075 Set C Q.No. 6 Rewrite the following sentences as **indirect questions** with the prompts given in brackets. [5]
   a. When did you come back? (I wonder ...)
   b. Does that mobile-phone cost high? (Do you know ...)
   c. What time does the film start? (Have you any idea ...)
   d. Did I return your book? (I'm longing to know ...)
   e. Are you coming next week? (I need to know ...)

9. 2075 Partial D Q.No. 5 Rewrite the following questions as **indirect questions**. Begin with the words given. [5]
   a. What time did you wake up this morning?
   Can you remember ..... ?
   b. What does he do for a living?
   I often wonder ..... ?
   c. When are they getting married?
   I'm longing to know .....
   d. What's your brother's name?
   I've forgotten .....
   e. What time does the film start?
   I wonder .....

10. 2075 Partial E Q.No. 4 Rewrite the following questions as **indirect questions**: [5]
    a. Did I lock the front door?
    Do you remember ..... ?
    b. What time does the film start?
    I wonder .....
    c. Has the train left?
    Have you found out ..... ?
    d. What are golf balls made of?
    Do you know ..... ?
    e. What colour curtains did they buy?
    Do you know ..... ?

11. 2074 Supp Q.No. 6 Rewrite the following questions as **indirect question**. Begin with the words given. [5]
    a. What time did you wake up this morning? Can you remember ..... ?
    b. How much does normal cell phone cost these days?
    Have you any idea .....?
    c. What time does the play start? I wonder .....
    d. Was he alone in the hall? Did you notice ..... ?
    e. When are they getting engaged? I am longing to know .....

12. 2074 Set A Q.No. 6 Combine the following pairs of sentences into **indirect questions**. [5]
    Example:
    What time did he wake up? Do you know?
    Do you know what time he woke up?
    a. Was he alone? Did you notice?
    b. Has the train left? Have you found out?
    c. What time does the concert start? I have no idea.

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d. Are you coming tomorrow? I need no idea.
e. Did I lock the front door? Do you remember?

13. **2074 Set B Q.No. 6** Combine the following pair of sentences into **indirect questions**. [5]
Example:
What time did he wake up? Do you know?
a. Did he go away? Did you notice?
b. Has the bus left? Have you noticed?
c. What time does the meeting begin? I have not been informed
d. Are you leaving for Pokhara tomorrow? I want to know now.
e. Did I lock the gate? Do you remember?

14. **2074 Partial D Q.No. 9** Look at the sets of words below and decide what **each set has in common**. [5]
a. Arson/blackmail/assault
b. Stew/grill/roast
c. Ford/Volkswagon /citroen
d. Rubber/leather/plastic
e. Major/sergeant/corporal

15. **2074 Partial D Q.No. 6** Change the questions below to **information questions**. [5]
a. Are we having tomato/chicken/mushroom soup today?
b. Was it raining/foggy/cold when you were in London?
c. Are you going to boil/fry/scramble those eggs?
d. Are there four/five/six of you?
e. Are you Margaret's cousin/brother/ nephew?

16. **2073 Set D Q.No. 7** Change the questions below to **information questions**, as in the example. [5]
Example: Are we having tomato/chicken soup today?
– What flavour soup are we having today?
a. Was it raining/cold when you were in Butwal?
b. Are you planning to drive your father's bike/my bike?
c. Are there seven/ten/eleven of you?
d. Are you Sita's cousin/brother/nephew?
e. Have you given away/sold my old sweater?

17. **2072 Set E Q.No. 5** Rewrite the following questions into **indirect questions**. [5]
Example: *What are golf balls made of?*
Do you know what golf balls are made of?
a. What time did you wake up this morning?
Can you remember ...?
b. Was he alone?
Did you notice ...?
c. When are they getting married?
I'm longing to know ...?
d. Has the train left?
Have you found out ...?
e. How much do touch- screen laptops cost these days?
Have you any idea ...?

18. **2071 Partial Set B Q.No. 6** Complete the following sentences. [5]
a. I'm starving. I could eat a horse.
But you told me just now ...
b. Oh look! It's raining.
What? But they said on the weather forecast ...
c. The rent's a $50 a week.
But when I spoke to you earlier you said ...
d. Can I have one of your cigarettes?
But I thought ...
e. Didn't you get me a ticket?
No, I didn't realize ...

19. **2070 Supp Set B Q.No. 6** Change the following questions into **information questions**. [4]
a. Are there four/five/six of you?
b. Are you Rita's cousin/ brother/ nephew?
c. Are we having tomato/ chicken/ mushroom soup today?
d. Was it raining/ foggy/ cold when you were in London?

20. **2070 Set C Q.No. 7** Combine the following pair of sentences into **indirect questions**: [5]
Example: What does he do for a living? I often wonder.
I often wonder what he does for a living.
a. When are you coming back from Jomsom? Have you decided yet?
b. Did you ever find your lost book? I wanted to know.
c. Did the hailstorm destroy the crops? The minister wants to know.
d. Did the lab boy get angry? Did you notice?
e. What are your parents busy with? The CEO wants to know.

21. **2063 Q.No. 4** Change the questions below to **information questions**, as in the example. [5]
Example: Are we having **tomato /chicken / mushroom** soup today?
Which soup *are we having today?*
a. Was it **raining / foggy / cold** when you were in Pokhara?
b. Is it **500 km. / 1000 km / a long way** to Dhangadhi from here?
c. Are you planning to use **your father's / your mother's / your friend's** car?
d. Did you use **half-inch / one-inch / three-quarter-inch** screws?
e. I hear she's hurt her leg. Has she broken / bruised / cut it?

22. **2059 Q.No. 8** Change the following into indirect speech: Begin with the words given in brackets. [4]
a. 'Shall we go for a walk?' (She asked)
b. 'What else would you suggest for the trip?' (He wanted to know from me)
c. How does it feel like to ride a cable car?' (She questioned)
d. 'I'm counting on your help.' (He repeated)

23. **2059 Q.No. 13** Correct the following as in the example below. [4]
Example: Doctors look after your teeth.
It isn't doctors who look after your teeth. It is dentists.
a. Marco Polo discovered America.
b. The sun causes the tides.
c. Democracy started in Italy.

24. **2057 Q.No. 8** Change the following sentences into **indirect narration**. [4]
a. "Shall we take sandwiches?"
b. "Do you think I should buy some spare batteries?"

c. "What does it feel like to be hypnotized?"
d. "Please, you must help me! I don't' know what to do?"

UNIT 10: WISHES AND REGRETS

1. WISHES

1. 2076 GIE Q.No. 8 Express your response to the following situations using 'I wish' or 'if only' . . . as indicated in the brackets. [5]
   a. You are jobless now. (wish)
   b. Your bike has stopped working. (wish)
   c. You are lonely. (wish)
   d. You are suffering from sun stroke. (regret)
   e. You feel sea sick. (regret)
2. 2076 Partial D Q.No. 9 Make sentences with **I wish,** using **would** or **could** whichever is correct. [5]
   Example: *Your car's broken down.*
   I wish I could call a mechanic.
   a. It's raining.
   b. I obtained poor marks in the term exam.
   c. My shirt's torn.
   d. I've lost my umbrella.
   e. It's very hot.
3. 2076 Partial E Q.No. 8A Imagine you're in the situation below. Write a wish for each. [3]
   a. You are out of work.
   b. Your are in bed with headache.
   c. You are lost.
4. 2075 Set A Q.No. 5 You are feeling depressed. Make **wishes** in three different ways. [5]
5. 2074 Partial D Q.No. 5 You are feeling depressed. Make wish in five sentences. [5]
6. 2073 Set D Q.No. 8 For each of the following situations, make sentences with **I wish/if only**, using (a) **would** (b) **could**. [5]
   a. The weather is unfriendly.
   b. You are alone at home.
   c. Your bicycle has a puncture.
   d. You don't have enough money today.
   e. You missed your last bus home.
7. 2073 Partial A Q.No. 8 For each of the following situations, make sentences with **I wish/if only,** using **would or could**.[5]
   a. It is raining.
   b. You are alone at home.
   c. You are thirsty.
   d. Your car has broken down.
   e. You have no money.
8. 2073 Partial W Q.No. 8 For each of the following situation, make a wish with **I wish/if only**, using– [5]
   i. would ii. could iii. past tense
   Example: It is raining.
   I wish I could buy a raincoat.
   a. You are alone.
   b. You are ill in bed.
   c. Your car has broken down.
   d. You are short of money.
   e. You are preparing for your exam.
9. 2072 Set C Q.No. 5 For each of the following situations make sentences with **I wish/ if only,** using: [5]
   (i) would, or (ii) could, or (iii) simple past tense.
   a. It is cold here.
   b. You are jobless.
   c. Your bicycle has a puncture.
   d. You are staying in a rented house.
   e. You are ill in bed.
10. 2072 Set D Q.No. 5 For each of the following situations make sentences with ***I wish/if only,*** using
    (i) would, or (ii) could, or (iii) simple past tense. [5]
    a. It is hot here.
    b. You are out of work.
    c. Your bike has a puncture.
    d. You are living in a small room.
    e. You are ill in bed.
11. 2071 Set C Q.No. 8 For each of the following situation, make a wish with *I wish/ If only* using **a) would** or **b) could** or **c) past tense** [5]
    Example: I am tired
    I wish I could take rest.
    a. My friend has lost his purse.
    b. You are out of work.
    c. You are in bed with flu.
    d. You are asked by the bank to pay in time.
    e. Your cell phone doesn't have balance.
12. 2071 Set D Q.No. 4a Write a wish for the following sentences.
    i. You're suffering from swine flu.
    ii. You have lost the way. [3]
13. 2068 Q.No. 4 Express wish for the following remarks using 'I wish' with the past tense as in the example. [5]
    Example: It's raining
    I wish I had an umbrella.
    a. You're lonely.
    b. You are ill in bed.
    c. Your bike has stopped working.
    d. You're short of money.
    e. You could not attend the classes.
14. 2058 Q.No. 9 Write a wish for each of the following situations. [5]
    Example: to someone who never answers the phone.
    I wish you'd answer the phone.
    a. to someone who makes rude remarks about you.
    b. to someone who won't hurry up.
    c. to someone who blows cigarette smoke in your face.
    d. to someone who always leaves the door open.
    e. to someone who won't tell you what he is thinking
15. 2057 Q.No. 9a Write a wish for each of the following situations. [3]
    i. It is your birthday.
    ii. You're tired.
    iii. You're stuck half way up a mountain in fog.

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2. REGRETS

1. 2076 Partial E Q.No. 8B Express a **regret** in each of the following situation. [2]
   a. Your house has burnt down.
   b. You are short of money.
2. 2075 Set C Q.No. 7 Change the following sentences using 'I wish ...../If only .....' or 'I should/ shouldn't' to express your regrets. [5]
   a. Your crops have been damaged by heavy rain.
   b. You feel seasick.
   c. You got a bad common-cold.
   d. Your house is robbed.
   e. You're short of sleep.
3. 2071 Supp Q.No. 6 What might you **regret** in these situations,
   use I wish... / if only... S + had + v_3 or I shouldn't ... have + v_3. [5]
   Example: *He regrets investing his savings in silver.*
   I wish I'd known more about the stock market. If I had known I would never have invested in silver.
   a. You are suffering from sunstroke.
   b. You feel seasick.
   c. Someone has just refused to marry you.
   d. War has suddenly broken out, and you are stuck in your hotel room.
   e. You are short of sleep.
4. 2071 Set D Q.No. 4b Express **regret** for the following.
   i. You are jobless now.
   ii. She is angry with you.
   iii. You missed the class. [5]
5. 2069 Partial Q.No. 3 Express **regret** for the following situations as in the example. [5]
   Example: You are suffering from sunstroke.
   I wish I had sat in the shade.
   a. You feel sea sick
   b. You're short of sleep.
   c. Someone has just refused to marry you.
   d. Your purse was stolen.
   e. Your bike stopped working.
6. 2066 (Partial) Q.No. 4 Add two sentences to the remarks below. [5]
   (a) with could have (b) with needn't have.
   Example: You didn't tell me you could do electrical repairs.
   (i) You could have mended my radio for me.
   (ii) I needn't have taken my radio to the shop to be repaired.
   a. I wish I had known their telephone had been repaired.
   b. If only you'd told me you were ill.
   c. I didn't realize I still had Rs. 10 in my pocket.
   d. I didn't know I was going to spend all that money.
   e. I had no idea it would be so warm here.
7. 2060 Q.No. 2 Regret doing things below. Add and **'if'** ..... sentence showing the consequence of your action and then ..... . Sentence, showing a further consequence. [5]
   Example: You went to the party.
   Answer: I wish I hadn't gone to the party. If I hadn't gone, I wouldn't have drunk, and then I wouldn't have had that accident on the way home.
   a. You didn't unplug your television.
   b. You lost you passport.
8. 2057 Q.No. 9b Express **regrets** for the following situations. [2]
   i. You forgot to write home to your parents.
   ii. You left your motor bike at the college.

UNIT 11: EVENTS IN SEQUENCE

1. 2076 Set B Q.No. 8 Change the sentences below, using: [5]
   (i) As soon as + past + past
   or
   (ii) As soon as + past perfect + past, whichever is appropriate.
   a. They saw the vase and liked it immediately.
   b. I dropped the chalk and it broke.
   c. He reached home and started doing his assignment.
   d. The Prime Minister resigned and the president called the leader of opposition.
   e. I paid the bill and left the restaurant.
2. 2076 Set C Q.No. 8 Change the sentences below, using: [5]
   (i) As soon as + past + past
   or
   (ii) As soon as + past perfect + past, whichever is appropriate.
   a. I broke the vase and I burst into tears.
   b. The thief opened the window and the bell rang.
   c. The coordinator entered the classroom and he started counselling students.
   d. The programme was over and the driver started the bus.
   e. I finished reading the book and returned it to the library.
3. 2076 Partial D Q.No. 8 Change the following sentences below using: [5]
   either **as soon as + past** or **as soon as + past perfect.**
   a. She saw a snake and screamed.
   b. I wrote a letter and posted it straight away.
   c. The news on television finished and then I went straight to bed.
   d. The mother peeled the banana and she gave it to her baby.
   e. She brought an ice-cream and started eating it.
4. 2075 GIE Q.No. 7 Change the following sentences using **'when'** instead of **'and'** or **'but'** as in the example. [5]
   Example
   - He kicked the dog and it barked.
   - When he kicked the dog, it barked.

   a. He drank coffee and asked for another cup.
   b. I sat down and read my letters.
   c. I heard the news and I was upset.
   d. He put his foot on the brake but nothing happened.
   e. The plane took off and the stewardess came round with the orange juice.
5. 2075 Set B Q.No. 9 Change the sentences below using **'as soon as'**. [5]
   a. He saw me and immediately ran away.

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b. They saw the house and immediately fell in love with it.
c. I wrote the letter and posted it straight away.
d. He got his exam results and immediately rang up his parents
e. He got married again immediately after his wife's death.

6. **2072 Supp Q.No. 9** Change the sentences below using: [5]
A As soon as + simple past + simple past, or,
B As soon as + past perfect + simple past (omit and or but)
a. I saw the house and liked it.
b. I looked in the fridge and found a glass of yoghurt.
c. He pressed the brake, the bike stopped.
d. He broke the pot and threw it away.
e. The thief opened the window and entered the room.

7. **2072 Set C Q.No. 9** Change the sentences below, using: [5]
i. As soon as + Past + Past Simple.
OR
ii. As soon as + Past Perfect + Past Simple.
a. I broke the vase and burst into tears.
b. The Prime Minister was elected and his supporters cheered.
c. The thief opened the window and the bell rang.
d. The teacher went into the classroom and started teaching.
e. The Principal entered the hall and started counselling the students.

8. **2072 Set D Q.No. 9** Change the sentences below using: [5]
i. As soon as + simple past + simple past.
ii. As soon as + past perfect + simple past. (omit and or but)
a. My neighbour peeled the banana and gave it to the baby.
b. I looked in the fridge and found some oranges.
c. He kicked the dog and it barked.
d. I went to the shop and bought a carate of eggs.
e. I paid my bill and left the shop.

9. **2072 Set E Q.No. 8** Change the sentences below using either **when/ as soon as + past or when/as soon as + past perfect**. [5]
a. They saw the house and I immediately fell in love with it.
b. I wrote the letter and posted it straight away.
c. The train passed and immediately the crossing barrier went up.
d. He left the house straight after breakfast.
e. The television program finished and then I went straight to bed.

10. **2072 Partial Set A Q.No. 9** Change the sentences below using: [5]
i. As soon as + simple past
OR
ii. As soon as + past perfect + simple past (omit and or but).
a. I made the bed and felt tired.
b. I pressed the brake but nothing happened.
c. He pushed the puppy down and it cried.
d. I checked the bill and paid it.
e. My parents saw my exam result and congratulated me.

11. **2072 Partial Set B Q.No. 9** Change the sentences below using: [5]
i. As soon as + simple past + simple past
OR
ii. As soon as + past perfect + simple past (omit and or but)
a. He put his foot on the brake but nothing happened.
b. He peeled the banana and gave it to the baby.
c. He kicked the dog and it barked.
d. He broke the glass and picked up all the pieces and threw them away.
e. I read the letter and threw it into the wastepaper basket.

12. **2071 Set D Q.No. 3** Change the following sentences using **when** instead of **and** or **but**.
Example: She went to the kitchen and started cooking.
When she went to the kitchen, she started cooking.
a. I looked in the kitchen and found some fried eggs.
b. She drank the coffee and asked for another cup.
c. He put his foot on the brake but nothing happened.
d. I read his autobiography and discovered him as a man of multiple intelligent.
e. He kicked the ball to the post but it got punctured.

13. **2071 Partial Set A Q.No. 5** Rewrite the sentences below as shown in the example. [5]
Example: They moved in. They gave us a house-warming party.
As soon as they had moved in, they gave us a house-warming party.
a. I filled in the form and submitted it straight away.
b. I told him about my problem and he instantly offered to help.
c. The concert finished and then I went straight to my place.
d. He left the school right after the class ended.
e. He got his gift, and he immediately called up his friends.

14. **2071 Partial Set B Q.No. 4** Write a sentence for each pair of events below, showing that the person did them in the right order as given in the example. [5]
Example: Read the instructions/switch on the machine.
Very sensibly, he read the instructions before he switched on the machine.
a. Measure the room/order the carpet.
b. Leave the class room/check his answers.
c. Put it up for sale/have their house decorated.
d. Turn off the electric blanket/get into bed.
e. Tore the envelope/check the address.

15. **2070 Supp Set A Q.No. 5** Explain the newspaper headlines below using: [5]
i. ..... had only just ... when
ii. No sooner had ... than
Example:
a. *The class had only just begun when some student unions called for strike.*
b. *No sooner had the class begun than some student unions called for strike.*
a. Mobile thief caught red-handed.
b. New film hall destroyed in blaze.
c. The principal resigned on the first day.
d. Sahara club player breaks leg in first minute of match.
e. The plane hijacked as it takes off.

16. **2070 Set D Q.No 6** Change the following sentences using **when** instead of **and** or **but**: [5]
a. She peeled the banana and gave it to the baby.
b. I looked in the fridge and found something.

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c. The security man searched our had baggage and we boarded the plane.
d. He put his foot on the brake but nothing happened.
e. I paid my bill and left the restaurant.

17. **2069 Partial Q.No. 7** Rewrite the following pairs of sentences to show the events happened in rapid succession using **"No sooner..."** as in the example. [5]

Example: My grandfather retired/he had a heart attack.
No sooner had my grandfather retired than he had a heart attack.

a. Rita went to bed/she heard a strange noise.
b. The plane took off/two hijackers walked into the cabin.
c. The new cinema hall was opened/it was destroyed by fire.
d. They came back from their honeymoon/they had a terrible quarrel.
e. We had the washing machine repaired/it broke down again.

18. **2066 (Partial) Q.No. 5** Write two sentences for each pair of events below, showing that the person did them in the right order: [5]

Example: Turn off the mains/touch the wire.
(i) *He turned off the mains before he touched the wire.*
(ii) *He didn't touch the wire until he'd turned off the mains.*

a. Read the instructions/switch on the machine.
b. Measure the room/order the carpet.
c. Check his answer! leave the exam room.
d. Have their house decorated/put it up for sale.
e. Turn off the electric blanket/get into bed.

19. **2064 Q.No. 6** Write a sentence showing how the following pairs of events happened in rapid succession using **'No sooner'.** [5]

a. May grandfather retired / he had a heart attack.
b. Sharma went to bed / Sharma heard a strange noise.
c. The plane took off / three hijackers walked into the cabin.
d. The new exhibition hall was opened / it was destroyed by fire.
e. We had the washing machine repaired / it broke down again.

20. **2061 Q.No. 5** Write two sentences showing how the following pairs of events happened in rapid successions, using (a) had only just ..... when (b) No sooner had ..... than.[5]

Example: My father retired/he had a heart attack.

a. My father had only just retired when he had a heart attack.
b. No sooner had my father retired than he had a heart attack.
i. We went to bed/ my brother heard a strange noise.
ii. I sat down to watch my favourite programme/ some friends turned up.
iii. The auditorium was opened/it was destroyed by fire.
iv. We had the machine repaired/ it broke down again.
v. I finished my exams/ I got a job offer.

21. **2060 Q.No. 8** Write two sentences for each pair of events below, showing that the person did them in the right order. [4]

Example: Read the instructions /switch on the machine
(i) Very sensibly, he read the instructions before he switched on the machine.
(ii) Very sensible, he didn't switch on the machine until he'd read the instructions.

a. Measure the room/order the carpet.
(i) Very wisely _____.
(ii) Very wisely _____.
b. Check his answers/leave the exam room.
(i) Sensibly _____.
(ii) Sensibly _____.

22. **2059 Q.No. 4** Change the following sentences using **when** instead of **and** or **but**. [4]

a. She peeled the banana and gave it to the baby.
b. I looked in the fridge and found some sausages.
c. He kicked the dog and it barked.
d. The plane took off and the stewardess came round with orange juice.

23. **2059 Q.No. 11** Complete the following half sentences in a suitable way. [5]

a. As soon as the chief guest arrived _____.
b. No sooner had the thief opened the window _____.
c. When the police had searched the car _____.
d. As soon as the teacher had gone into the classroom __.
e. When I'd made the bed _____.

UNIT 12: COMPARISON

1. **2076 Partial E Q.No. 6** Change these sentences below into comparative sentences using as . . . as. [5]

The exam is not usually very difficult, but this year it was quite though. This year the exam was not as easy as it usually is.

a. I had imagined our teacher would be in his 40s but he turned out to be early 30s.
b. They could have helped me a lot but in fact they hardly helped me at all.
c. The car makes a lot of noise, although it used to be fairly quiet.
d. I hadn't expected her to be so friendly but in fact she was extremely friendly.
e. You said I would enjoy the book but I didn't like it much.

2. **2075 GIE Q.No. 8** Change the sentences below into comparatives using as ..... as: [5]

a. Twenty people had been invited, but fifty came.
b. I had imagined my teacher would be in his fifties, but he turned out to be thirty.
c. His parents would like him to work hard, but he doesn't.
d. They could have helped me a lot, but in fact they hardly helped me at all.
e. You said I would enjoy the film, but in fact I didn't like it much.

3. **2075 Set A Q.No. 4** Write the nouns of the following adjectives as in the examples. [5]

Examples: expensive: price
deep: depth

a. high b. wide c. thick
d. heavy e. fast

4. **2074 Supp Q.No. 4** Compare the prices of the things below, as in the examples. [5]

Example: Hard cover binding Rs. 400.
Normal binding Rs. 60

- Hard cover binding is almost seven times as expensive as hard binding.
- Normal binding is almost a seventh the price of normal binding.

a. Ordinary Bed Rs.4,000. Standard Bed Rs.16,000.
b. Colour TV Rs.25,000. Black and White TV Rs.6,000.
c. Cotton gloves Rs.200. Woolen gloves Rs.390.
d. Aluminium spoon Rs.10. Steel spoon Rs.22.
e. Local jacket Rs.900. Standard jacket Rs.2600.

5. **2074 Set A Q.No. 4** Compare the prices of the things below, as in the examples. [5]

Example:
Steak Rs. 800 kilo
Chicken Rs. 250 kilo
- Steak is about three times as expensive as chicken.
- Chicken is about a third the price of steak.

a. Pilot pen Rs. 90.00 Gel pen Rs. 28.00
b. Cotton pants Rs. 1600.00 Jeans pants Rs. 900.00
c. Leather gloves Rs. 400.00 Woolen gloves Rs. 125.00
d. Colour T.V. Rs. 20,000.00 Black and White T.V. Rs. 5000.00
e. Mustard oil Rs. 210.00 Sunflower Rs. 135.00

6. **2074 Set B Q.No. 4** Compare the prices of the things below, as in the example. [5]

Example:
Fish Rs 400 kilo Chicken Rs. 210 kilo
- Fish is about twice as expensive as chicken.
- Chicken is about a half the price of fish.

a. Steel tray Rs. 150 Aluminium tray Rs 50
b. Local sweater Rs. 700 Foreign sweater Rs. 1300
c. Colour T.V. Rs. 15000 Black and White T.V Rs 6,000
d. Kantipur Rs. 10 Kathmandu Post Rs 5
e. Local Rice Rs. 40 kilo Basmati rice Rs 70 kilo

7. **2074 Partial D Q.No. 4** Write the noun for the following adjectives. [5]

Example: Expensive: Price
Deep: Depth

a. high b. wide c. thick
d. heavy e. fast.

8. **2072 Set E Q.No. 9** Change the sentences below into comparative using: (a) than, (b) as ... as. [5]

Example: *The exam is not usually very difficult, but this year it was quite tough.*
The exam this year was tougher than it usually is.
The exam this year was not as easy as it usually is.

a. His parents would like him to work hard, but he doesn't.
b. I had expected a lot of help from them, but in fact they hardly helped me at all.
c. I had not expected her to be very furious, but in fact she was absolutely angry.
d. I had imagined my principal madam would be in her forties, but she turned to be thirty.
e. You said I would enjoy the film, but in fact I didn't like much.

9. **2070 Set C Q.No. 5** Write comparative sentences based on the information below. In each case, write two sentences: (a) with **than** (b) with **as + adj + as .....** [5]

Example: Bhoj is 16.5 Rishav is 17
a) Rishav is a bit older than Bhoj. (a bit)
b) Bhoj is not quite as old as Rishav. (not quite)

a. Exam Marks: (i) Kshitiz: 80% (ii) Yash 42%. (fairly nearly)
b. (i) My shoes: Rs 1700 (ii) Your shoes : Rs. 375 (a bit not nearly)
c. (i) Kathmandu - Changunarayan 11 km (not nearly)
(ii) Kathmandu - Dhulikhel 25 km (considerably)
d. Yesterday's temperatures:
(i) Bhairahawa: 19° (ii) Narayangarh: 17° (slightly/nearly)
e. (i) Madan's experience of teaching 19 years (a bit)
(ii) Hari's experience of teaching 17 years (not quite)

10. **2070 Set D Q.No 7** Change the sentences below into comparative sentence using **as .... as:** [5]

a. The exam is not usually very difficult, but this year it was quite tough.
b. I had imagined my landlady would be in her fifties, but she turned out to be thirty.
c. His parents would like him to make hard, but he doesn't.
d. They could have helped me a lot, but in fact they hardly helped me at all.
e. Fifty people had been invited, but eighty came.

11. **2066 (Partial) Q.No. 6** Write sentences making numerical comparisons based on the information below. [5]

a. George hotel: Single room £12.50 per night.
Double room £21.50 per night.
b. Estimated values: Cezanne, landscape in provence £ 375,000
Rembrandt, portrait of a merchant: £125,000.
c. Journey times: Dover-Boulogne: Car ferry 1:30 hrs
Hovercraft: 30 minutes.
d. London - Glasgow: British Rail: 5 hrs. £ 46 return
British Airways: 1 hour £ 90 return.
e. Americans killed since 1900: War - 400,000
Road accidents: 2,000,000

12. **2063 Q.No. 6** For each set of information below, write a comparative sentence using **than**. [5]

a.	Exam marks: Jane: 75%,	Paul 42%
b.	My house: 20 lakhs,	your house: 30 lakhs
c.	Yesterday's temperature: 27°C	Today's temperature: 32°C
d.	Jane: 17 years	Paul: 20 years
e.	Banepa-Kathmandu: 26 km	Pokhara-Kathmandu:200 km

13. **2061 Q.No. 6** Change the sentences below into comparative sentences using: [5]
(i) Than (ii) as .....as

a. The exam is not usually very difficult, but this year it was quite tough.
b. I had imagined my landlady would be in her fifties, but she turned out to be thirty.

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c. His parents would like him to work hard, but he doesn't.
d. I had hoped to do quite a lot of work today, but I've only managed to do a little.
e. They could have helped me a lot, but in fact, they hardly helped me at all.

14. **2060 Q.No. 6** Express the meaning of the sentences below with another comparative sentence, beginning with the words given. [4]
Example: Those children ought to go to bed much earlier than they do.
Answer: Those children go to bed much later than they ought to.
a. He's not supposed to drink quite as much as he does.
He drinks _____.
b. You didn't need to get up early as you did.
You got up _____.
c. I had thought the room would be more expensive than it actually was
The room was actually _____.
d. I've never been as frightened as I was during the flight.
During that flight, I _____.

UNIT 13: PROCESSES

1. **2075 Set C Q.No. 8** Write what happens to the state of matter when you take the following actions. [5]
Example: Leave a pullover in hot water.
: The pullover shrinks.
a. Blow into a balloon.
b. Leave liquid cement on the ground.
c. Fill a bowl with blood and leave it.
d. Leave rice in a bowl of water.
e. Put a lump of sugar in your coffee.

2. **2073 Partial A Q.No. 9** Join the following prompts using **when .....** to show the right process. [5]
Example; arrive/border-show/passport
When you arrive at the border, you show your passport.
a. water/boil-pour/tea pot.
b. turn off/light-change/bulb.
c. turn on/gas-light/gas
d. meet/stranger-shake/hands
e. eat/meal-pay/bill

3. **2071 Partial Set A Q.No. 6** Express the following instructions in proper order as shown in the example. [5]
Example; cross the road/ look both ways.
You should look both ways before you cross the road ...
a. pay the bill /check it
b. check the ticket/ get into the bus
c. bandage a wound/ clean it
d. buy a gift/ go to a birthday party
e. ask for permission/ get inside the class

4. **2069 Q.No. 6** Write a sentence for each pair of actions below with **shouldn't.... until ... ...** [5]
a. pay the bill/come out of the shop
b. take off the shoes/get in the house
c. brush your teeth/go to bed
d. test the temperature of the water/bath the baby
e. get driving license/drive the car

5. **2068 Q.No. 3** All the verbs below describe changes of state. Now match the words in column **A** with that of column **B**. [5]

A	B
changes in size	freeze
solids becoming liquid	contract
liquid becoming solid	melt
liquids becoming gas	condense
gases becoming liquid	evaporate

6. **2067 Q.No. 6** Write a sentence for each pair of actions below with 'shouldn't . . . . .until . . . .': [5]
a. close your windows/go out.
b. get driving license/drives the car.
c. brush your teeth/go to bed.
d. test the temperature of the water/bath the baby.
e. open other's gate/ring the door bell.

7. **2064 Q.No. 5** Write a sentence each using the following information showing right order of the action. [5]
Example: clean a wound/bandage it
You should clean a wound before you bandage it.
a. wash your hands/eat
b. close your windows/go out
c. have some driving lessons/take your driving test.
d. clean your teeth/go to bed
e. test the temperature of the water/bath the baby

8. **2057 Q.No. 6** Complete the sentences by joining the following words using, **When .....** [4]
a. meet/stranger – shake/ hands-
b. eat/meat -pay/ bill
c. water/boil - pour/ teapot -
d. arrive/border - show/passport

UNIT 14: PREDICTION

1. **2076 GIE Q.No. 9** Rewrite the sentences below, using 'sure to', 'certain to', 'bound to', 'likely to' and 'unlikely to' whichever is appropriate. [5] [Unit 14]
a. The price of bread will definitely go up within a few weeks.
b. There will probably be more fighting in the capital.
c. I doubt if they'll move this summer.
d. In ten years' time everyone will have a digital watch.
e. I'm sure a new teacher will be appointed soon.

2. **2076 Partial D Q.No. 7** Change the following sentences below, **using sure to, certain to, bound to, likely to** and **unlikely to**. [5]
a. The price of petrol will definitely go up after Tihar.
b. I am sure a new principal will be appointed soon.
c. I expect there will be all the Ministers at the meeting.
d. The farmers will definitely grow more crops this year.
e. I doubt if the government increases the allowance.

3. **2074 Supp Q.No. 5** Change the sentences below using **likely to, unlikely to, could, sure to or definitely won't**. [5]
a. The stationery may open this week.
b. I am sure a new CEO will be appointed soon.
c. The price of edible oil will probably go up again.
d. There certainly won't be much price hike of essential commodities this year.

e. There probably won't be many patients of heart problems.

4. 2074 Set A Q.No. 5 Change the sentences below using **likely to, unlikely to, could, sure to, or definitely won't** whichever is appropriate. [5]
   a. The price of gas will probably go up again in a few months.
   b. Our former principal probably won't be back.
   c. I am sure a new chairman will be appointed soon.
   d. The letter may arrive this week.
   e. There certainly won't be much food problem this year.

5. 2074 Set B Q.No. 5 Change the sentences below using **likely to, unlikely to, could, sure to or definitely won't** whichever is correct. [5]
   a. The textbooks may arrive this week.
   b. I am certain a new manager will be appointed soon.
   c. There certainly won't be much power cut this year.
   d. There probably won't be many visitors this year.
   e. The price of fuel will probably increase in a few months.

6. 2073 Set D Q.No. 9 Change the sentences below, using **could, sure to, certain to, likely to, unlikely** to whichever is correct. [5]
   a. The price of edible oil will definitely go up within a few weeks.
   b. There will definitely be a few books left.
   c. I doubt if the school teacher will go on strike.
   d. The new principal probably won't arrive.
   e. There will probably be more power cut next year.

7. 2071 Supp Q.No. 7 Change the sentences below, using **sure to, certain to, bound to, likely to and unlikely to,** whichever is appropriate. [5]
   a. He probably won't arrive.
   b. By the end of this century, cars will probably be obsolete.
   c. In ten years' time, everyone will have a smartphone.
   d. I'm sure a new chairman will be appointed soon.
   e. The price of petrol will definitely go up within this month.

8. 2070 Supp Set A Q.No. 7 Change the sentences below, **using sure to, certain to, likely to, unlikely to and definitely won't.** [5]
   a. I doubt if the transport workers will go on strike.
   b. The vice-principal probably won't arrive.
   c. The price of everyday needs will definitely go up if there is election for parliament.
   d. The Nepalese government certainly won't ban the students' union in Government College.
   e. There will definitely be a few papaya trees in the garden.

9. 2066 Q.No. 5 Change the sentences below using **sure to, certain to, bound to, likely to, and unlikely to.** [5]
   a. The price of bread will definitely go up within a few weeks.
   b. I doubt if the miners will go on strike.
   c. The government probably won't make its policy implemented easily.
   d. We expect a lot of people will take part in the mass meeting.
   e. In five years time everyone will have a laptop.

10. 2062 Q.No. 7 Rewrite each of the following expressi using the word in brackets.
    a. There will probably be a lot of tourists there. (lik
    b. She'll certainly be able to walk again soon. (
    c. There probably won't be much show this winter.(unlik
    d. A new chairperson will certainly be appointed soon.(b
    e. New plants will not grow on the wetland. (ne

11. 2058 Q.No. 7 Rewrite the 'if-clause' using **unless**. Example: You won't get there in time unless you hurry (= you don't hurry)
    a. We can't have a picnic ___ (if it isn't a nice day).
    b. Don't leave the TV on ___ (if you aren't watching it).
    c. We can't do the job ___ (if we don't get help).
    d. I wouldn't buy the picture ___ (if I don't like it).

12. 2057 Q.No. 13 Change the sentences below, using sure certain to, bound to, likely to and unlikely to.
    a. The price of bread will definitely go up within a weeks.
    b. He probably won't arrive.
    c. I doubt if they'll move out this summer.
    d. I expect there will be lots of people at the meeting.

UNIT 15: NEWS (HEARSAY)

1. 2077 Set D Q.No. 3 Change the following remarks usi 'supposed to.'
   a. They say it's unlucky to walk under a ladder.
   b. Apparently Maldives is slowly sinking into the sea.
   c. They say Dinosaurs lived for many years.
   d. People say he was born in Lumbini Province.

2. 2076 GIE Q.No. 5 Change the following remarks usi 'supposed to'.
   a. People assume wild animals eat spiders.
   b. They say the universe is getting hotter.
   c. It is said that she was born in a flying plane.
   d. They say they have twelve children.
   e. They believe that the earth is round.

3. 2076 Set B Q.No. 9 Change the following remarks usi **supposed to**
   a. They say that the sun is becoming hotter.
   b. People say she was born on board a ship.
   c. I have heard that prices of every day needs are decreasing.
   d. They say that he was a lorry driver at one time.
   e. I am told that garlic stops you catching a cold.

4. 2076 Set C Q.No. 9 Change the following remarks usi **supposed to.**
   a. I have heard that it is unlucky to walk under a ladder.
   b. We are told that she was a book-seller once.
   c. People say Phoenix lived for three hundred years.
   d. They say the universe is expanding all the time.
   e. I am told that onion is good for health.

5. 2076 Partial E Q.No. 5 Change the following remarks usi **'supposed to'.**
   a. They say it's unlucky to walk under a ladder.
   b. I've heard that garlic stops you catching a cold.
   c. People say she was born on board a ship.

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d. They say the universe in expanding all the time.
e. I hear she completed her study.

6 **2075 GIE Q.No. 9** Change the following remarks using **supposed to**. [5]
a. They say that the Sun is bigger than the earth.
b. Apparently, he is living in Birgunj.
c. People say that she was killed one week ago.
d. They say that it rains on 15 of Ashadh.
e. They say Mr. Pandey has ten children.

7. **2075 Set B Q.No. 7** Rewrite the information below as in the example. [5]
Example: He was born in Dharan in 1986. (know)
He is known to have been born in Dharan in 1986.
a. His parents took him to America when he was seven. (think)
b. He's living on a remote Island. (rumour)
c. He's been married five times. (believe)
d. He's had a serious heart attack recently. (think)
e. He's worth five billion dollars. (estimate)

8. **2075 Set C Q.No. 9** Change the following remarks using **'Supposed to'**. [5]
a. They say he's terribly selfish.
b. Apparently Hitler killed himself.
c. I have heard that there are lots of beggars in the USA.
d. Many people believe that Maldives is slowly sinking into the sea.
e. People say that she was born on board a ship.

9. **2075 Partial D Q.No. 9** Rewrite the following remarks using **supposed to:** [5]
a. They say that Methuselah lived for more than 300 years.
b. People say he was born on board a ship.
c. Apparently Venice is slowly sinking into the sea.
d. I'm told that garlic stops you catching cold.
e. They say that Alsatians make good pets.

10. **2075 Partial E Q.No. 11** Answer these questions making it clear that your answer are based on hearsay. Use **'I hear, I'm told, people say, supposed to, apparently'**. [5]
a. Do you know what is the problem with this college?
b. What does it feel like to be hypnotised?
c. I wonder what it's like to actually live in Hollywood?
d. Do you know if Alsatians make good pets?
e. What is Balidan, the film like? I want to see it.

11. **2073 Supp Q.No. 9** Answer these questions, making it clear that your answer are based on hearsay and not on personal knowledge or experience. [5]
Use **"supposed to", 'I' m told', 'I hear', 'people/they say'** or **'apparently'**
a. Does a dog make a good pet?
b. I wonder what is happening in our country?
c. What do you think our Prime Minister is like as a person?
d. What do you think is happening to Nepali economy?
e. Do you know anything about the life style of American Indians?

12. **2073 Set C Q.No. 9** Change the following remarks using **supposed to.** [5]
a. Apparently elephants have a long memories.
b. People say it is unlucky to drive when the cat crosses the road.
c. They say Lord Shiva had a garland of snake.
d. I am told that garlic stops you catching a cold.
e. Apparently herbalists have control over the unseen forces.

13. **2073 Partial W Q.No. 9** Change the following remarks using **supposed to.** [5]
a. They say the universe is expanding all the time.
b. People say Mina was born on board a ship.
c. I have heard that students are running different programme at college.
d. They say that Mrs. Jackson lived for more than two years.
e. Apparently, groundwater in Kathmandu is running short.

14. **2072 Supp Q.No. 8** Change the following remarks using **supposed to.** [5]
a. They say it rains on the day of Teej.
b. People say it is unlucky to walk under the ladder.
c. I am told that garlic stops you catching a cold.
d. They say the universe is expanding all the time.
e. I have heard that the businessmen are hiding the food stuff.

15. **2072 Set C Q.No. 8** Change the following remarks using **supposed to.** [5]
a. People say more than thirty million Armenians were killed in 1915 and 1916.
b. They say King Cobra is most dangerous.
c. Apparently, elephants have a good memory.
d. I hear that sneezing is the sign of evil.
e. They say it rains on the day of Shivaratri.

16. **2072 Set D Q.No. 8** Change the following remarks using **supposed to.** [5]
a. They say the earth is round.
b. Apparently, elephants have good memories.
c. People say it is unlucky to sit under a ladder.
d. I am told that Birman was a lorry driver at one time.
e. People say consumption of yoghurt on the day of exam brings good luck.

17. **2072 Partial Set A Q.No. 8** Change the following remarks using **supposed to**. [5]
a. Apparently elephants have very long memories.
b. People say it is good to take fruits after the meal.
c. They say Pokhara is sinking every day.
d. I am told that turmeric is an antibiotic.
e. I hear that millions of people offer prayer every year at Pashupatinath.

18. **2072 Partial Set B Q.No. 8** Change the following remarks using **supposed to**. [5]
a. People say Alsatians make good pets.
b. They say the earth is becoming hot.
c. I hear people are making good fortune by selling orange.
d. I am told that horse is more intelligent than other animals.
e. People say birds are used as messenger of gods.

19. **2071 Set C Q.No. 9** Change the following remarks using **supposed to**. [5]
a. People say onion is good for health.
b. Apparently, Sanu was an insomniac.

c. They say there is a large snake at Pashupatinath.
d. People say it is unlucky to walk or drive when a cat crosses the road.
e. They say January is a cold month of the year.

20. 2071 Set D Q.No. 2 Change the following sentences using **supposed to.** [5]
a. I'm told garlic stops you catching cold.
b. People say the universe is collapsing by 2015.
c. Apparently Kathmandu is slowly getting over populated.
d. People say she was born in flying plane.
e. People say the students waste their golden time just kidding.

21. 2070 Supp Set A Q.No. 3 Change the following remarks using **supposed to**. [5]
a. People say media men earn a lot.
b. They believe teaching job is highly honourable.
c. Civil society report that the political leaders are not honest enough.
d. Everyone knows that market price is uncontrolled.
e. Villagers say that the rebel's weapons came across the border by road.

22. 2070 Supp Set B Q.No. 5 Change the following remarks using **supposed to** as in the example. [5]
Example: *Apparently he's living in Paris.*
He's supposed to be living in Paris.
a. They say the universe is expanding all the time.
b. Apparently Venice is slowly sinking into the sea.
c. People say that it is unlucky to walk under a ladder.
d. I'm told that he was a lorry driver at one time.
e. Apparently she was an insomniac.

23. 2069 Partial Q.No. 4 Rewrite the following remarks using **supposed to** as in the example. [5]
Example: They say he's terribly stingy.
He's supposed to be terribly stingy.
a. Apparently there has been a robbery in the High Street.
b. They say that a tiger has been on the loose.
c. They say the universe is expanding all the time.
d. People say that she was born on board a ship.
e. I'm told that garlic stops you catching a cold.

24. 2068 Q.No. 5 Rewrite the following using **supposed to**. [5]
a. They say he is terribly stingy.
b. Apparently he is living in Paris.
c. I'm told he was a lorry driver at one time.
d. Apparently Marilyn Monroe was an insomniac.
e. I'm told that Rajesh got married.

25. 2066 Q.No. 2 Change the following remarks using **supposed to**. [5]
a. They say that the earth is round.
b. Apparently, the environment of Kathmandu is deteriorating every year.
c. We are told that watching television is a waste of time.
d. People say that she was killed one week ago.
e. He said that the man was in his late 80s.

26. 2065 Q.No. 6 Change the following remarks using **supposed to.**
a. People say Madhav eats spiders.
b. Scientists say the universe is getting hotter.
c. People say the terrorists robed a bank a few days ago.
d. It was said that she was born in a flying plane.
e. They say Mr. Chaudhary has 12 children.

27. 2062 Q.No. 4 Change the following remarks using **supposed to**.
a. People say it's unlucky to walk under a ladder.
b. I'm told that garlic stops you catching a cold.
c. They say the universe is expanding all the time.
d. People say that she was born in a flying plane.
e. Apparently Venice is slowly sinking into the sea.

28. 2057 Q.No. 4 Change the voice of the following sentences using **supposed to.**
a. They say there's a monster in Loch Ness.
b. I am told that garlic stops you catching a cold.
c. Apparently Marilyn Monroe was an insomniac.
d. They say Methuselah lived for more than 300 years.

UNIT 16: REVISION

1. 2075 Partial E Q.No. 5 Rewrite the following sentences as shown in the example below:
Example: He didn't write a letter.
A letter was not written.
a. They asked me some difficult questions at the interview.
b. How much will they pay you?
c. You must not throw away empty bottles.
d. Has anybody shown you what to do?
e. Didn't anybody ever teach you how to behave?

2. 2074 Partial E Q.No. 4 Rewrite these sentence, beginning with the words given so that they mean the same.
a. She solved all the problems in two hours.
It took.....
b. I was very much impressed by his speech.
I found.....
c. Meera said, ' I'll do my work myself if I have enough time'.
Meera said that.....
d. He's lived most of his life with his wife.
He seems.....
e. Has anyone ever shouted at you?
Have you.....?

3. 2071 Partial Set B Q.No. 7 Change the following sentences into **passive.**
a. They pulled her down.
b. They have turned the house into offices.
c. We shall finish the whole work by 6 O'clock.
d. She was dismantling her old house.
e. The police asked me a lot of questions.

4. 2070 Supp Set B Q.No. 7 Use the following phrases in the sentences of your own so as to bring out their meaning clearly:
might as well, there's no point in, supposed to, if only, I wish

5. 2070 Set C Q.No. 8 Respond to these situations.
a. You are becoming upset these days. Make a wish.

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b. You had and accident while crossing the road, and now you are in hospital. Explain to your friend what you did wrong.
c. A friend asks you, "What are the advantages of having a credit card of 'Nepal Bank Limited?" What do you reply?
d. Your flatmate says to you 'Manoj is coming to supper to night, isn't he?' Correct him/her.
e. Someone asks you how long the post office takes to deliver a letter. What do you reply?

6. **2069 Q.No. 4** Rewrite these sentences, beginning with words given, so that they mean the same. [5]
a. He completed the race in 15 minutes. It took ... ...
b. People were very much impressed by his behaviour. They found ... ...
c. Gopal s aid to me, "The earth moves round the sun". Gopal told me that ... ...
d. He's lived most of his life in Pokhara. He seems ... ...
e. Has anyone ever laughed at you? Have you ... ...

7. **2069 Q.No. 5** Rewrite these sentences, using the words in brackets, so that they mean the same: [5]
a. It was foolish of him to borrow the money from her. (wish)
b. The distance was very long. I could not complete in one day. (so that)
c. I met my friend and I started telling her a story. (as soon as)
d. She does not call me because she thinks I'm always out of home. (thinking that)
e. My father asked me not to go to the cinema. (prevent)

8. **2069 Partial Q.No. 6** Use the following phrase in the sentences of your own so as to bring out their meanings clearly. [5]
Look as if, there's no point in, if only, as soon as, if there's one thing.

9. **2067 Q.No. 4** Rewrite these sentences, beginning with the words given, so that they mean the same. [5]
a. She solved all the problems in 2 hours. It took . . . .
b. I was very much impressed by his speech. I found . . .
c. Meera said, "I'll do my work myself If have enough time." Meera said that . . . .
d. He's lived most of his life with his wife. He seems . . . .
e. Has anyone ever shouted at you? Have you . . . .

10. **2067 Q.No. 5** Rewrite these sentences, using the words in brackets, so that they mean the same. [5]
a. It was stupid of him not to tell his teacher the truth. (wish)
b. He climbed up the tree and immediately jumped of it. (as soon as)
c. The shirts were very cheap. I bought three at a time. (so. . . that)
d. They have built a special fence, so that animals can't get in. (prevent)
e. I did not telephone you because I thought you would not be at home. (if)

11. **2066 Q.No. 6** Write down how you will feel if someone: [5]
a. interrupts you ?
b. twists your arm ?
c. corrects your English ?
d. laughs at you ?
e. scratches your back ?

12. **2066 (Partial) Q.No. 3** Here are some things that someone said to you. Report each one, beginning 'She offered...' [5]
a. Would you like a sandwich?
b. You can drive if you like.
c. Shall I carry it for you ?
d. Would you like me to help you?
e. Would you like to sit down?

13. **2062 Q.No. 3** Rewrite these sentences, beginning with the words given so that they mean the same. [5]
Example: *When did you last have a holiday?*
How long is it .....?
How long is it since you last had a holiday?
a. Having lessons is far more interesting than doing tests. Doing tests isn't .....
b. John said, "I'll come if I have enough time." John said that .....
c. He did all the shopping in an hour. It took .....
d. I was impressed by his speech. I found .....
e. People who don't say 'think you' really get on my nerves. If there's one thing .....

14. **2061 Q.No. 7** Respond to the following situations briefly. Use appropriate communicative structure for each. [5]
a. You want someone to take a photo of you, but he/she doesn't know how to use your camera. Tell him.
b. You are feeling depressed. Make a wish.
c. You had a quarrel with your friend. Express your regret.
d. You had an accident while doing an electrical repair, and are now in hospital. Explain to a visitor exactly what you did wrong.
e. In a job interview, you are asked what sort of people you get on with. What do you say?

15. **2059 Q.No. 5** Change the verbs given in branches into the correct form. [4]
a. He's (get) a lovely suntan.
b. She's (carry) a handbag.
c. He always (wear) a uniform while on duty.
d. My brother (speak) excellent English.

16. **2058 Q.No. 4** Fill in the blanks with the correct form of the verbs given in brackets. [4]
a. A young couple ____ (buy) the house. But they didn't live there long.
b. I ___ (lose) my purse. I can't find it anywhere.
c. I felt very tired when I got home, so I ___ (go) straight to bed.
d. The house was very quiet when I got home. Everybody ___ (go) to bed.

17. **2058 Q.No. 6** Fill in the blanks with the passive form of the verbs given in brackets. [4]
The palace _____ (build) in 1827 and today it _____ (regard) as the finest Victorian building in the country. A number of changes _____ (make) since it was built, but the front of the building ____ (not change).

18. **2057 Q.No. 5** Change the verbs given in brackets into their correct form. [4]
a. I think they are (go) to declare war.
b. They've been (mend) the road since last week.
c. I (find) people who spit in the street offensive.
d. People who are always (complain) depress me.

C. COMPOSITIONS / FREE WRITING

UNIT 1: LETTER WRITING

1. APPLICATION LETTERS

1. 2076 GIE Q.No. 12 Write a job application for the post of an IT officer. State your age, qualifications, experiences and trainings. Write to: The Mayor, Kathmandu Metropolis, Kathmandu. [10]
2. 2076 Set B Q.No. 13 Write a job application for the position of teaching assistant (part time) that has fallen vacant in your college. State your age, qualification and experiences. Write to the principal, xyz college. [10]
3. 2076 Set C Q.No. 13 Write a job application for the position of a junior level counsellor that has fallen vacant in your college. Write to the director, XYZ college, state your age, qualifications, and experiences if you have. [10]
4. 2075 GIE Q.No. 11 Write a letter of job application to any one of the Travels and Tours Pvt. Ltd. for the post of tourist guide. [10]
5. 2075 Partial E Q.No. 8 Stating suitable qualifications and experiences, write a job application for the post of a receptionist addressing The Director, Bir Hospital, Kathmandu. (You are named as Bimal Wagle) [10]
6. 2074 Partial E Q.No. 12 Write a job application for the post of a 'Social Worker' addressing the Director, Lovely Children's Home, Imadol, Lalitpur. State your qualifications, experiences, age hobby etc. [10]
7. 2073 Set C Q.No. 13 Apply for the position of an English Teacher that has fallen vacant in a college in the downtown. State your age, qualification, experience, to the director ABC college, Kathmandu. [10]
8. 2073 Partial W Q.No. 13 Write a job application for the post of Lower Secondary Level English teacher. State your age, qualification and experience; to the Chairman, School, Management Committee, EFG Secondary school. [10]
9. 2072 Supp Q.No. 13 Write a job application for the position of *Technical Assistant*, stating your age, qualification, experience and other trainings you have. [10]
10. 2072 Partial Set A Q.No. 13 Write a job application for the post of an Office Assistant lying vacant in your college. State your age, qualification, experience and trainings. [10]
11. 2072 Partial Set B Q.No. 13 Write a job application for the post of an Office Assistant lying vacant in a local Finance Company. Address the Manager and state about your age, qualifications, experience and other trainings you have. [10]
12. 2071 Supp Q.No. 9 Write a letter of application for the post of an account assistant stating your name, age, experiences, qualification and relevant trainings. [5]
13. 2071 Partial Set B Q.No. 9 Write an application letter to the Managing Director, Hotel Yak and Yeti Pvt. Ltd. for the 'Post of Store Keeper'. Mention your qualification, training and experience. [10]
14. 2070 Supp Set A Q.No. 10 Apply for the position of a 'Students' Counsellor' that has fallen vacant in your college. State your age (below 50), qualification (master degree in psychology), experience (at least five years in a reputed organization). [10]
15. 2070 Set C Q.No. 12 Apply for the position of an Advisor that has fallen vacant in the school from where you had ear your S.L.C. State your age (below 40) qualification (Ma degree in any discipline), experience (at least five years reputed organization) and other details.
16. 2069 Q.No. 8 Write a job application for the post of English Teacher for secondary Level addressing the he teacher of a government school.
17. 2067 Q.No. 8 Write a job application for the post of a 'So Worker' addressing the Director, Lovely Children's Ho Imadol, Lalitpur.
(Suppose you are Lalita Limbu from Panchthar with requi qualifications & experience)
18. 2065 Q.No. 8 Stating suitable qualification and experience write a job application for the post of Accountant address the Manager, Asian Development Bank, Kathmandu.
19. 2062 Q.No. 9 Stating suitable qualification and experience write a letter of application for the post of a Primary Le English teacher.

2. PERSONAL LETTERS

1. 2077 Set D Q.No. 7 Write a letter to your father requesti him to send you money for various purpose (like colle fee/tuition fee/hostel fee or for the language class)
2. 2076 Partial D Q.No. 12 Write a letter to your frien congratulating him/her on getting admission in MBBS. Als ask some tips about his/her success.
3. 2075 Partial D Q.No. 12 Suppose you are Tribikram Dar from Chitwan and you are studying at a language scho Write a letter to a friend telling him/her what it is like.
4. 2073 Supp Q.No. 11 Write a letter to your friend inviting hi to your village or town.
5. 2072 Set C Q.No. 13 Write a letter to your friend abroa giving him/her a brief description of some tourist destination which have made Nepal truly incredible.
6. 2072 Set E Q.No. 10 A friend has written to you saying tha s/he is on a strict diet and is eating very little, but that s/he still putting on weight. Write a reply giving some advice (i about 150 words).
7. 2071 Set D Q.No. 9 Imagine that your friend Cheung Ya from Thailand is coming to visit Nepal soon. Write a letter t her explaining about The Lord Buddha and holy place Lumbini (in about 200 words).
8. 2070 Supp Set B Q.No. 8 Write a letter to your friend describing your locality or your village.
9. 2070 Set D Q.No 9 Write a letter to your friend explaining the advantages and disadvantages of living in a village.
10. 2068 Q.No. 8 You are studying at a college away from your house. Write a letter to a friend telling him/her what it is like.
11. 2066 Q.No. 11 Imagine that your friend is gradually losing his/her weight. Write a letter explaining what he/she is doing wrong and giving good advice for him/her.
12. 2064 Q.No. 9 Suppose that your foreign friend is visiting Nepal in the near future. Write a letter to him or her describing about the places he or she should visit. (*Suppose You are **Bidhyapati** and your school's name is **Rara Higher Secondary School, Mugu.***)

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13. 2063 Q.No. 9 A friend has written to you, saying she/he is eating very little, but that she/he is still putting on weight. Write a reply explaining what she/he in doing wrong and giving some good advice. (*Suppose: You are Geeta and your address is* ***Mukti Higher Secondary School, Dolakha.)*** [10]

3. LETTERS TO THE EDITOR

1. 2076 Set C Q.No. 10 Write a description of your brother/sister who is leaving for Pokhara today. [5]
2. 2076 Set C Q.No. 11 Write a paragraph expressing your attitude towards people who talk while crossing the road. (Use the way . . . structure) [5]
3. 2075 Set C Q.No. 12 Write a letter to the editor of the Rising Nepal requesting him/her to highlight the issue of waste-management in your locality. [10]
4. 2074 Partial D Q.No. 12 A magazine has asked its readers for their views on astrology. Write to the magazine expressing your opinion. [10]
5. 2072 Set E Q.No. 11 Write a letter to a newspaper giving your reaction to news on "Women beaten to death for alleged witchcraft". [5]
6. 2061 Q.No. 9 Write a letter to the editor of "The Everest Post" saying how you feel about the growing use of computers in our daily lives. [10]

4. OFFICIAL LETTERS

1. 2076 Partial E Q.No. 12 Write a letter to the Mayor of your municipality asking him/her to improve the condition of street light. [10]
2. 2074 Supp Q.No. 12 Smoke ! Dust ! Plastic ! Wastage ! everywhere. What's not ..... ! Write a letter to the chief of your city to pass strict rules in order to control them and ensure healthy living of the city dwellers. [10]
3. 2074 Set A Q.No. 12 Write a letter to the Chairperson of your Ward/VDC requesting him to work in order to ban the use of plastic bag, the sole cause of pollution, and use cotton bag instead. Write XYZ in place of address and your signature.[10]
4. 2074 Set B Q.No. 12 Write a letter to the Mayor of your town, explaining a number of ways to control pollution in your town.[10]
5. 2073 Set D Q.No. 12 Write a letter to the Local Development Officer (LDO) of your district about the poor condition of road in the district, asking him to start improvement works as early as possible, Write xyz in place of address on the right top. [10]
6. 2073 Partial A Q.No. 13 Write a letter to the Chief of District Development Committee complaining about conditions of road and drinking water. [10]
7. 2072 Set D Q.No. 12 Write a letter to the Chief of your VDC asking him to make yearly plan on priority basis for the development of your village. [10]
8. 2072 Supp Q.No. 12 Suppose public transportation in your village or city needs a lot of improvement. Women, children, and physically impaired people have been really suffering because of the lack of proper transportation system. Write a letter to the chief of VDC or the Mayor of the city to work in order to bring change in transportation system. [10]
9. 2071 Set C Q.No. 12 Write a letter to the Secretary of your Village Development Committee/ Municipality ward office for the proper management of garbage in your locality. [10]

UNIT 2: PARAGRAPH WRITING

1. 2077 Set D Q.No. 6 Write a short paragraph about your visit to a new place. [5]
2. 2076 GIE Q.No. 10 Write a paragraph about the advantages and disadvantages of using cell phones by school students.[5]
3. 2076 GIE Q.No. 11 Write a description of a man whom the security officers are searching in connection of a robbery in a local bank. [5]
4. 2076 Set B Q.No. 10 Write a description of your friend who is leaving for Mustang today. [5]
5. 2076 Set B Q.No. 11 Write a paragraph expressing your attitude towards the people who talk aloud in public transport. (Use the way . . . structure) [5]
6. 2076 Partial D Q.No. 10 Describe a painting or a picture or a statue you like most. [5]
7. 2076 Partial D Q.No. 11 Write a short paragraph comparing you and your best friend. [5]
8. 2076 Partial E Q.No. 10 Write a paragraph about the festival you like most. [5]
9. 2076 Partial E Q.No. 11 Write a paragraph describing a tourist area of your province. [5]
10. 2075 GIE Q.No. 10 Write a description of your friend whom you are receiving at the airport. [5]
11. 2075 GIE Q.No. 12 Express your attitudes on "home delivery online marketing". [5]
12. 2075 Set A Q.No. 8 Write the advantages and disadvantages of mobile phone. [5]
13. 2075 Set A Q.No. 10 You've just come back from a disappointing holiday. Tell a friend how it was different from what you had expected. [5]
14. 2075 Set C Q.No. 10 Write a paragraph on either your own or any other person's success story. (In about 100 words) [5]
15. 2075 Set C Q.No. 13 Write a paragraph about an unpleasant experience you have recently had. (In about 100 words) [5]
16. 2075 Partial D Q.No. 10 Write a short report on the damage caused by the earthquake in your village. [5]
17. 2075 Partial D Q.No. 11 Imagine that you are a film star and you've an exciting career in film. Write a paragraph explaining your experience and achievements. [5]
18. 2075 Partial E Q.No. 9 Write a paragraph about the advantages and disadvantages of growing use of computers.[5]
19. 2074 Supp Q.No. 10 If you could be in charge of any organization you liked, which organization would you choose and how would you run it. (in about 120 words) [5]
20. 2074 Supp Q.No. 11 Write your reaction about the teaching learning system of your college. [5]
21. 2074 Set A Q.No. 10 Write a short description of a lorry driver who had hit a pillar last morning and run away. [5]

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22. 2074 Set A Q.No. 11 Write what each of the following suggests/indicates/means (or doesn't suggest/ mean/ indicate) Since divorce has become easier to obtain now a days, the divorce rate has gone up dramatically. [5]
23. 2074 Set B Q.No. 10 Write a short description of a person whom the security personnel are searching in connection with a crime in the capital city [5]
24. 2074 Set B Q.No. 11 Write what each of the following suggests/ indicates/means (or doesn't suggest/mean/ indicate.) [5]
One of the seniors in my locality smoked all his life, and he died at the age of 90.
25. 2074 Partial D Q.No. 10 You've just come back from a disappointing holiday. Tell a friend how it was different from what you had expected. [5]
26. 2074 Partial D Q.No. 11 Write the advantages and disadvantages of mobile phone. [5]
27. 2074 Partial E Q.No. 10 Write a paragraph about the effect of load shedding in our country. [5]
28. 2074 Partial E Q.No. 11 Write a paragraph about advantages and disadvantages of studying in a foreign country. [5]
29. 2073 Supp Q.No. 10 Write a paragraph on the advantages of computer in your educational life. [5]
30. 2073 Set C Q.No. 10 Write a paragraph about the advantage of games and sport. [5]
31. 2073 Set C Q.No. 11 Express your attitude about the horoscope in a paragraph. [5]
32. 2073 Set D Q.No. 10 Develop the notes below into a short paragraph, listing each person's experiences and achievements. Begin with the sentence given: [5]
The new party leader, Mr. Yadav, is a man of wide and varied experience.
Journalist
Economist
Minister
Governor of the Central Bank
World-wide travel
Many heads of state
33. 2073 Partial A Q.No. 10 Write a paragraph about a person whom you like most. [5]
34. 2073 Partial A Q.No. 11 Describe briefly some historical places of your district. [5]
35. 2073 Partial A Q.No. 12 Write a few paragraphs on the transportation system of your city. [10]
36. 2073 Partial W Q.No. 10 Express your reaction about the film you watched with your friend. [5]
37. 2073 Partial W Q.No. 11 Write a paragraph in about 120 words on 'Tourists'. [5]
38. 2072 Supp Q.No. 10 Write a paragraph on the condition of drinking water in your village or town. [5]
39. 2072 Supp Q.No. 11 Write a paragraph about the importance of agriculture in our country. [5]
40. 2072 Set C Q.No. 10 Write a paragraph expressing your reaction to street protests organized frequently by the political parties and other associations. (about 120 words) [5]
41. 2072 Set C Q.No. 11 As an honest and responsible citizen, your country, write a police description of a person w throws garbage in the public places.
42. 2072 Set D Q.No. 10 Give a short description of your brot or sister to your friend so that s/he will not have any probl in receiving her/him at the airport.
43. 2072 Set D Q.No. 11 Write a paragraph on the 'Importan of Planting Trees'.
44. 2072 Partial Set A Q.No. 10 Write a paragraph "Importance of Being Healthy".
45. 2072 Partial Set A Q.No. 11 Write a police description o person who was involved in kidnapping a child.
46. 2072 Partial Set B Q.No. 10 Write a piece of really go news that would bring change in the life of the youth of yo district.
47. 2072 Partial Set B Q.No. 11 Internet has become a boo today for the students of remote localities, especially in the advance education. Write in brief the advantage they ca have from using the Internet.
48. 2071 Supp Q.No. 8 The advancement in science an technology has brought a lot of changes in the life styles people and their socio-cultural situations. Write a couple paragraphs describing this situation and the relate problems.
49. 2071 Supp Q.No. 10 Write a paragraph on 'climate chang a threat for future generations.
50. 2071 Set C Q.No. 11 Give the description of a person wh the police are searching in connection with the robbery of finance company in the town.
51. 2071 Partial Set A Q.No. 10 Write paragraph on you impression of your favourite teacher.
52. 2071 Partial Set A Q.No. 11 Write paragraph on an incide where you regret the decision you made.
53. 2071 Partial Set B Q.No. 8 Write a 'police description' of person with detail information.
54. 2071 Partial Set B Q.No. 11 As a journalist write your like and dislikes.
55. 2070 Supp Set B Q.No. 10 Write a paragraph describing ho someone tried to deceive you.
56. 2070 Supp Set B Q.No. 11 Write a short account of your vis to a dentist.
57. 2070 Supp Set A Q.No. 9 Give an imaginary description your friend, (complexion, height, dress ...) in about 1 words.
58. 2070 Set C Q.No. 11 Write a description of 'an elder woman' who has been missing for a fortnight.
59. 2070 Set D Q.No 10 Write a paragraph reporting about a accident that you saw on the road.
60. 2070 Set D Q.No 11 Write a paragraph expressing yo attitude about politics.
61. 2069 Q.No. 10 Write a paragraph on the advantage a disadvantage of using mobile phone.

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62. **2069 Q.No. 11** Describe a person who has been the role model for you. [5]
63. **2069 Partial Q.No. 8** In one paragraph write a joke which you have heard recently. [5]
64. **2069 Partial Q.No. 9** Write in a paragraph about an event in which you were very frightened. [5]
65. **2068 Q.No. 10** Write a paragraph describing your reactions (likes or dislikes) about the zoo you have visited. [5]
66. **2068 Q.No. 11** Write a paragraph making small and big comparison between two cities of Nepal. [5]
67. **2067 Q.No. 10** Write a paragraph about the importance of physical exercise. [5]
68. **2067 Q.No. 11** Describe the most impressive person you have ever met. [5]
69. **2065 Q.No. 9** Write a paragraph about the disadvantages of television for the students. [5]
70. **2065 Q.No. 11** Write the most interesting event of your school life. [5]
71. **2064 Q.No. 8** Write a paragraph predicting future developments concerning world population using the ideas below: birth control, government control, new sources of food, disease, longer life. [5]
72. **2064 Q.No. 11** Write a 'police description' of a person you know well. [5]
73. **2063 Q.No. 8** Write in a paragraph showing the importance of education in our life. [5]
74. **2063 Q.No. 11** Write about a festival you like most. [5]
75. **2062 Q.No. 8** In a paragraph, answer this question. [5]
If you could spend a day anywhere in the world you wanted to, where would you choose and what would you do there?
76. **2062 Q.No. 11** Write the most interesting event of your childhood. [5]
77. **2060 Q.No. 4** Write a description of yourself when you were seven years old. Mention briefly about your height, weight and build, and describe your face in detail. [8]
78. **2060 Q.No. 5** Develop the notes below into short paragraph, listing the person's experiences and achievements. Being with the sentences given: [5]
Brenda Gibbons is just the right person for the job .....
Notes: Science (University); Industrial Chemist; Two books on oil; Experience on North Sea oil rig; Lecture on energy (University of Cambridge, 1980)
79. **2059 Q.No. 10** Write one paragraph about disadvantages of having a telephone. [5]
80. **2058 Q.No. 13** Write a paragraph about the advantages and disadvantages of studying in a foreign country. [5]
81. **2058 Q.No. 15** Write a paragraph predicting future developments on world population. [5]
Hints: Birth control; role of government; starvation; new sources of food; disease; etc.
82. **2057 Q.No. 10** Write in about 50 words a joke you shared with a friend. [5]

UNIT 3: ESSAY WRITING

1. **2076 Set B Q.No. 12** Write an essay on 'Nepal: a Safe Destination for Tourism'. Talk about peaceful environment, hygienic living and tempting landscape. [10]
2. **2076 Set C Q.No. 12** Write an essay on 'Nepal; a Hub for Medical Education'. Talk about Nepal's beautiful landscape, peaceful environment and hygienic living. [10]
3. **2076 Partial D Q.No. 13** Write an essay on 'Prosperous Nepal, Happy Nepalese.' [10]
4. **2076 Partial E Q.No. 13** Write an essay on 'controlling environment pollution' in your locality. [10]
5. **2075 OIE Q.No. 13** Write an essay on 'Nepal as a Land of Cultural Diversity' in about 200 words. [10]
6. **2075 Set A Q.No. 12** Write two paragraphs about the growing use of computers in our daily lives. [10]
7. **2075 Set B Q.No. 12** Explain the educational process in Nepal from the beginning of school to the end of university.[10]
8. **2075 Set C Q.No. 11** If you could lead any organization, which one would you prefer? What changes would you bring there and how? [10]
9. **2075 Partial D Q.No. 13** Write an essay on 'Deforestation, its Consequences and Remedies' in about 200 words. [10]
10. **2075 Partial E Q.No. 10** Write an essay on "Tourism in Nepal". [10]
11. **2074 Supp Q.No. 13** Write an essay on the "Importance of Female Education in Schools and Colleges". [10]
12. **2074 Set A Q.No. 13** Write an essay on "Empowerment for Women: A Base for Development." [10]
13. **2074 Set B Q.No. 13** Write an essay on the "Importance of Extra Curricular Activities: their Advantage and Disadvantages." [10]
14. **2074 Partial E Q.No. 13** Write an essay on 'National Unity for Development' with reference to Nepal. [10]
15. **2073 Supp Q.No. 13** Write an essay on your "Experience of Living in a City or Village". Your essay must have an introductory paragraph, a few body paragraphs and a concluding paragraph. [10]
16. **2073 Set C Q.No. 12** Write three paragraphs about the advantages and disadvantages of celebrating festivals. The first paragraph should be about the advantages, second paragraph about the disadvantages and third paragraph about the conclusion. [10]
17. **2073 Partial W Q.No. 12** Write an essay in about 200 words on the importance of discipline in college life. [10]
18. **2072 Set C Q.No. 12** Write an essay on "My Country Nepal" focusing on its major natural resources. You may choose the rivers, forests, wildlife or natural beauty. [10]
19. **2072 Set E Q.No. 12** Write couple of paragraphs on "Role of Youths in Nation Building". [10]
20. **2072 Set E Q.No. 13** Write an essay on "Politics in Educational Institutions". Explain its advantages and disadvantages. [10]

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21. 2072 Partial Set A Q.No. 12 Write a few paragraphs on 'Seniors should be honoured and respected and juniors should be loved and encouraged'. [10]
22. 2072 Partial Set B Q.No. 12 Write an essay on the "Importance of Discipline at School" in about 200 words. [10]
23. 2071 Supp Q.No. 11 Write an essay on 'driving in the dark'.[10]
24. 2071 Set C Q.No. 13 Write an essay on the "Importance of Health Education" in school level curriculum. [10]
25. 2071 Set D Q.No. 11 Imagine that you have just visited your countryside after 10 years. Explain your feeling about the changes you found focusing on the climate change. [10]
26. 2071 Partial Set A Q.No. 8 Write an essay on "Controlling Environment Pollution at School" in 200 words. [10]
27. 2071 Partial Set B Q.No. 10 Write an essay on 'The impact of Television on students'. [10]
28. 2070 Set D Q.No 8 Write an essay describing an interesting event you witnessed. [10]
29. 2068 Q.No. 9 Write a story of a dream that you have had recently in about 200 words. [10]
30. 2069 Q.No. 9 Write an essay on the role of English language in the context of present Nepal. [10]
31. 2069 Partial Q.No. 10 Write an essay on Air pollution (in 200 words). [10]
32. 2067 Q.No. 9 Write an essay on 'National Unity for development' with reference to Nepal. [10]
33. 2066 Q.No. 9 Imagine that you worked as a tourist guide in Seaside Travel and Trekking Company for about one year. Describe what the job was like. (in about 150 words) [10]
34. 2066 (Partial) Q.No. 10 Write a couple of paragraphs on "Tourist Trade in Nepal — Prospects & Challenges". [10]
35. 2066 (Partial) Q.No. 11 Write an essay in about 200 words, debating on– "Physical Punishment– Good weapon for misdoers". [10]
36. 2065 Q.No. 10 Write an essay on Role of youths on Nation Building. [10]
37. 2063 Q.No. 10 Write advantages and disadvantages of living the village or living in the town. [10]
38. 2062 Q.No. 10 Write advantages and disadvantages of keeping a dog at home. [10]
39. 2060 Q.No. 9 Write three paragraphs about the advantages and disadvantages of having a television. The first paragraph should be about the advantages, the second about disadvantages and the third a conclusion. Use the ideas that you think of. [12]
40. 2059 Q.No. 12 Write about 120 words about the most memorable day in your student life at Higher Secondary School. [10]
41. 2059 Q.No. 14 Write two paragraphs predicting future developments concerning world population. Also suggest three solutions to deal with the problems. [10]
42. 2057 Q.No. 12 Write in about 120 words about the most exciting event in your life. [10]
(Describe the event, where did it take place, who were involved, how did it affect you/your friends, how do you remember it.)

UNIT 4: NEWSPAPER/ MAGAZINE ARTICLE/ STORY WRITING

1. 2076 GIE Q.No. 13 Write a newspaper article in about 20 words on 'challenging life in a big city.' [10]
2. 2075 Set B Q.No. 11 Write a newspaper article on "Foreig Employment and Socio-economic Development of m country." [5]
3. 2075 Set B Q.No. 13 Write a paragraph giving description o a person whom you admire the most. [10]
4. 2073 Set D Q.No. 13 Computers cell phones have becom proper electronic devices for learning for school students Write an article on the proper use of these electronic device for getting maximum benefits in your learning process. [10]
5. 2073 Set D Q.No. 11 Imagine a piece of good news that yo would like to read in a newspaper. Write the headline on to of your page, and the details of the news story. (about 12 words) [5]
6. 2071 Set C Q.No. 10 Write a piece of good news that yo have read in a national newspaper. [5]
7. 2072 Set D Q.No. 13 Write a newspaper article on 'The Role of Politicians in Building the Future of the Country'. [10]
8. 2071 Set D Q.No. 10 Write a magazine article describing about practical education as the real education in an individuals' life. [10]
9. 2071 Partial Set A Q.No. 9 Write a newspaper article on schools of Nepal in 200 words. [10]
10. 2070 Supp Set A Q.No. 8 Write a piece of good news story that is sure to be a boon in your district. (in about 130 words). [5]
11. 2070 Supp Set A Q.No. 11 Write a newspaper article regarding the role of security personnel for the security as well as well-being and happiness of females; in Nepal. [10]
12. 2070 Supp Set B Q.No. 9 Write a newspaper article on the advantages and disadvantages of the mobile phone. [10]
13. 2070 Set C Q.No. 10 Imagine a piece of good news story that would ultimately be a boon for your district. Write about its advantages. (in about 100 words) [5]
14. 2066 (Partial) Q.No. 9 Imagine a piece of really good news that you would like to read in a local or national daily. Write the story including the headline and the detail. [5]
15. 2061 Q.No. 8 Make up a news story with a headline 'Peace talks break down". (Consider what has happened, the details of what happened, what has /hasn't happened since, what has been happening, what is going to happen.) [5]

UNIT 5: BOOK/ FILM REVIEW

1. 2075 Set A Q.No. 13 Write a review of a movie you have recently watched. [10]
2. 2074 Partial D Q.No. 13 Write a review of a movie you have recently watched. [10]
3. 2073 Supp Q.No. 12 Have you watched any movie or read a book recently? Write a review of the movie or the book in about 100 – 150 words. [10]

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THE HERITAGE OF WORDS

UNIT 1: LOVE AND REMINISCENCE

1. Grandmother, (A Poem) –Ray Young Bear

Short Answer Questions

1. 2076 Partial E Q.No. 2c What impression of grandmother does the speaker give in the poem? [3]
2. 2075 Set B Q.No. 2f What is the theme of the poem 'Grandmother'? [3]
3. 2075 Partial D Q.No. 2a What impression of grandmother does the speaker give in the poem 'Grandmother'? [3]
4. 2075 Partial E Q.No. 12a What feelings does the poet express toward his grandmother? [3]
5. 2073 Supp Q.No. 2a How does the speaker feel towards his grandmother? What words or images make his feeling clear? [3]
6. 2071 Supp Q.No. 12a How does the speaker feel towards his grandmother? [3]
7. 2071 Partial Set B Q.No. 12 a The speaker in 'Grandmother' seems to be emotionally attached to his grandmother. How? [3]
8. 2070 Set C Q.No. 2 f How does the poet express his memory and honour toward his grandmother? [3]
9. 2070 Set D Q.No 12 a How does the speaker remember his grandmother? [3]
10. 2065 Q.No. 12 a What impression of grandmother does the speaker give in the poem 'Grandmother'? [3]
11. 2063 Q.No. 12 a What is the main idea of the poem 'Grandmother' by Ray Young Bear? [3]
12. 2057 Q.No. 2 b What are the four things that Ray Young Bear remembers about his grandmother? [3]

2. About Love, (A Story) –Anton Chekov

Short Answer Questions

1. 2076 GIE Q.No. 2b How does Alyohin define love? [3]
2. 2076 Set B Q.No. 2d How does the narrator plan to reconcile his life of toil with civilized living? [3]
3. 2076 Set C Q.No. 2d What compels the narrator to quit his prestigious position and start the monotonous work of farming? [3]
4. 2075 Set A Q.No. 2e Describe the three dimensions of love in "About Love" by Anton Chekhov. [3]
5. 2075 Set C Q.No. 2b Why is Alyohin compared to 'a squirrel in a cage'? [3]
6. 2074 Partial D Q.No. 2e Describe the three dimensions of love in "About Love" by Anton Chekov. [3]
7. 2072 Supp Q.No. 2f 2065 Q.No. 12 f 2064 Q.No. 12 a How did Alyohin define love? [3]
8. 2072 Set C Q.No. 2f Describe the circumstances which compelled Alyohin, the narrator of the story, quit the position of the judge? [3]
9. 2072 Set D Q.No. 2f Why did Alyohin quit the position of the judge? [3]
10. 2072 Partial Set A Q.No. 2f Explain the significance of the statement – "a village cat driven by hunger to eat cucumber in the kitchen garden." [3]
11. 2072 Partial Set B Q.No. 2f Explain the significance of the statement 'a village cat driven by hunger to eat cucumber in the kitchen garden'. [3]
12. 2071 Supp Q.No. 12d Sketch the character of Luganovich briefly. [3]
13. 2071 Partial Set B Q.No. 12 e What is love according to Alyohin? [3]
14. 2070 Supp Set A Q.No. 12'a' Would you call the affair between Alyohin and Anna platonic or consummate? Give reasons for your answer. [3]
15. 2069 Partial Q.No. 12b What, according to Alyohin, is the definition of love? Discuss. [3]
16. 2068 Q.No. 12 c Sketch the character of Luganovich briefly. [3]
17. 2057 Q.No. 2 f What kinds of love experiences are suggested by Alyohin in 'About love'? [3]

Long Answer Questions

18. 2075 Set B Q.No. 3a What kind of love experiences are suggested by Alyohin in "About Love"? [10]
19. 2074 Supp Q.No. 3a Why couldn't Alyohin remain in the position of 'honorary Justice' of the peace? What were the circumstances that compelled him to leave the honorary status? Explain on the basis of the story 'About Love'. [10]
20. 2074 Set A Q.No. 3a Alyohin is said to rush around like a squirrel in a cage (P.19), and this judgment is echoed in the final paragraph of the story (P. 23). What is the significance of this repetition? Does Luganoviches' reading about Alyohin differ from Burkin and Ivan? [10]
21. 2074 Set B Q.No. 3a Would you consider Alyohin a successful person? Or a failure one? If failure, what makes you judge him a failure person? Explain on the basis of the text. [10]
22. 2071 Set C Q.No. 3 a Sketch the character of Alyohin. Do you consider him a successful or a failure person? [10]
23. 2062 Q.No. 13 a Sketch the character of Alyohin. [10]

3. The Lamentation of the Old Pensioner (Poem) – W.B.Yeats

Short Answer Questions

1. 2077 Set D Q.No. 2d What makes the old pensioner lament in his old age? Give at least three reasons. [3]
2. 2076 Partial D Q.No. 2a What are in the memory of the speaker in his old age? [3]
3. 2075 GIE Q.No. 2a Why is the poet angry with the time? Explain. [3]
4. 2074 Supp Q.No. 2e What does the broken tree symbolize in the poem? Does Yeats compare himself with the broken tree in his old age? [3]
5. 2074 Set A Q.No. 2e Why does the old Pensioner lament in his old age? [3]
6. 2074 Set B Q.No. 2e Why does the old pensioner spit into the face of Time? [3]

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7. 2074 Partial E Q.No. 2d How does the speaker feel about old age in 'The Lamentation of the Old Pensioner'? [3]
8. 2073 Set C Q.No. 2e What makes the old pensioner feel isolated in his old age? [3]
9. 2073 Set D Q.No. 2c Why does the poet spit into the face of Time? [3]
10. 2072 Set E Q.No. 2b What is the lamentation of the old pensioner? [3]
11. 2071 Supp Q.No. 12b How and why does the old pensioner lament? [3]
12. 2071 Set C Q.No. 2 f Why does the old pensioner condemn the Time? [3]
13. 2071 Partial Set B Q.No. 12 b Why does the old pensioner want to spit into the face of Time? [3]
14. 2070 Supp Set A Q.No. 12'b' What makes the old pensioner feel isolated in his old age? [3]
15. 2068 Q.No. 12 e Why does the poet want to spit into the face of Time? [3]
16. 2067 Q.No. 12 a Why is the poet angry in 'The lamentation of the Old pensioner'? [3]
17. 2066 Q.No. 12 a Explain the title of the poem "The Lamentation of the Old Pensioner". [3]
18. 2065 Q.No. 12 e Why does the poet show his anger against Time? [3]
19. 2062 Q.No. 12 a What is the speaker lamenting on? [3]
20. 2061 Q.No. 10 f How and why does the old pensioner lament? [3]
21. 2059 Q.No. 2 a Mention the three things the old man laments about. Why is he sad about them? [3]
22. 2058 Q.No. 3 b Why does the old man want to 'spit into the face of Time'? [3]

■ **Long Answer Questions**

23. 2075 Set A Q.No. 3a 2074 Partial D Q.No. 3a Write an essay on "An Old Man Remembers". [10]
24. 2060 Q.No. 12 Write an essay on Youth and Age. [10]

UNIT 2: ECOLOGY AND CHANGE

4. Two Long-term Problems: Too Many People, too Few Trees -Moti Nissani.

■ **Short Answer Questions**

1. 2076 Partial E Q.No. 2b How can we save world's tree? Write in brief. [3]
2. 2073 Supp Q.No. 2b Why does Moti Nissani think that deforestation is a major problem? [3]
3. 2073 Partial A Q.No. 2f What are the causes of deforestation, according to Moti Nissani? [3]
4. 2072 Set E Q.No. 2e How can we save our forests? [3]
5. 2071 Set D Q.No. 12 f What are the consequences made by over population? Suggest some of the solutions of it. [3]
6. 2071 Partial Set B Q.No. 12 c What are the key elements in environmental change? [3]
7. 2070 Supp Set B Q.No. 12 e What, according to Moti Nissani, are the remedies of over population? [3]
8. 2070 Set C Q.No. 3 a 'Over population' has become a serious issue today. Write about the causes, consequences and cures of over population in the Third World Countries. [3]
9. 2067 Q.No. 12 b What leads Moti Nissani to the belief that the world is facing an overpopulation problem? [3]
10. 2062 Q.No. 12 b How can we save our forests? [3]

■ **Long Answer Questions**

11. 2076 GIE Q.No. 3a What are the causes, consequences and cures of over population and deforestation? [10]
12. 2076 Set C Q.No. 3b What are the two long term problems as described by Moti Nissani? [10]
13. 2076 Partial D Q.No. 3b What are the causes, consequences and remedies of overpopulation and deforestation in Nepal? Relate your answer with 'Two Long Term Problem . . .' [10]
14. 2075 Partial D Q.No. 3a Explain the links between overpopulation and deforestation. [10]
15. 2074 Partial E Q.No. 3a What are the causes, consequences and cures of over population and deforestation? [10]
16. 2073 Set C Q.No. 3a How does deforestation become the cause of creating imbalance in nature and environment? Explain [10]
17. 2073 Partial A Q.No. 3a What are the two long term problems as stated in the essay? How can we solve those long term problems? [10]
18. 2073 Partial W Q.No. 3a What are the causes and consequences of over population according to Moti Nissani? [10]
19. 2072 Set C Q.No. 3a How does Moti Nissani picture the condition of environment in the essay, Two Long term Problems? What are the causes of environmental degradation? [10]
20. 2072 Set D Q.No. 3a How did Moti Nissani portray the condition of environment? What suggestion did he put forward to control deforestation? [10]
21. 2070 Supp Set A Q.No. 13 a 'Deforestation has become a serious long term problem today'. Write about the causes, consequences and cures of deforestation, especially in the context of Third World Countries. [10]
22. 2070 Supp Set B Q.No. 13 a Write an essay on the problem of over population in Nepal. [10]
23. 2070 Set D Q.No 13 a Discuss the two long-term problems. [10]
24. 2066 Q.No. 13 a What are the causes, consequences and cures of over population and deforestation? [10]
25. 2061 Q.No. 11 b What are the causes, consequences and cures of over population and deforestation? [10]
26. 2058 Q.No. 2 b Explain the links between overpopulation and deforestation. [10]

5. Full Fathom Five Thy Father Lies, (A Poem/Song) W.Shakespeare.

■ **Short Answer Questions**

1. 2076 Set B Q.No. 2e Does death have any meaning in the poem? Explain. [3]

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2. 2076 Set C Q.No. 2e How is death taken in the poem? Is it a transition from one form to the other form of life? Explain. [3]
3. 2075 Set B Q.No. 2b Do you agree that death is not the end of life? Explain with reference to the poem. [3]
4. 2072 Set E Q.No. 2a What is the relation between life and art? Describe briefly. [3]
5. 2067 Q.No. 12 c Write the central idea of the poem 'Full Fathom Five Thy Father Lies'. [3]

6. Hurried Trip to Avoid A Bad Star (An Essay) M. Lilla and C. Bishop Berry

Short Answer Questions

1. 2075 GIE Q.No. 2f What is the life of the people of Karnali zone like? [3]
2. 2075 Set A Q.No. 2d Give a short account of the life of the people of Karnali. [3]
3. 2075 Set C Q.No. 2a What is Silajit? Why is it important? [3]
4. 2075 Partial D Q.No. 2b How is Karnali linked economically with the lowland regions to the south? [3]
5. 2074 Partial D Q.No. 2d Give a short account of the life of the people of Karnali. [3]
6. 2074 Partial E Q.No. 2f What does the skeletal-looking Sal trees indicate about the exploitation of nature? [3]
7. 2073 Set C Q.No. 2f Explain in brief a sad tale of Karnali Zone. [3]
8. 2073 Partial W Q.No. 2e Why were the travelers going to Nepalgunj? What had they carried? [3]
9. 2071 Set C Q.No. 2 d Why did Karma buy only distillery equipment? [3]
10. 2070 Supp Set B Q.No. 12 b What is silajit? What are its uses? Explain. [3]
11. 2070 Set C Q.No. 2 e What is Silajit? What are its medicinal uses? [3]
12. 2069 Partial Q.No. 12a What does the skeletal looking sal trees indicate about the exploitation of nature? Explain. [3]
13. 2069 Q.No. 12b Give a short account of the life of the people of Karnali. [3]
14. 2068 Q.No. 12 d Describe briefly how Karnali is economically linked with the low land Terai. [3]
15. 2066 Q.No. 12 f Give a short account of the life of the people of Karnali as you find in "Hurried Trip to Avoid a Bad Star". [3]
16. 2063 Q.No. 12 b How is Karnali linked economically with the lowland regions to the south? [3]
17. 2061 Q.No. 10 a How is Karnali zone economically linked with the lowlands of the southern Nepal? [3]
18. 2059 Q.No. 2 b What did the two writers learn about the life and culture of the people of the Karnali region during their journey on foot? [3]
19. 2057 Q.No. 2 e How is Karnali linked economically with the low land regions to the south? [3]

Long Answer Questions

20. 2072 Supp Q.No. 3a Write a few paragraphs to show how Karnali Zone is economically linked to the lowland regions. Explain if any changes have taken place in Karnali regions since the text was written. [10]
21. 2072 Partial Set A Q.No. 3a Write a paragraph or two to show how the remote Karnali zone is economically linked with the lowland regions to the south. [10]
22. 2072 Partial Set B Q.No. 3a Present a short account of Karnali Zone, explaining how it is economically linked to the lowland region. Include if some changes have taken place there since the essay was written. [10]
23. 2071 Partial Set B Q.No. 13 a Write how is Karnali linked economically with the lowland regions to the south. [10]

7. Travelling Through the Dark (A Poem) William Stafford.

Short Answer Questions

1. 2075 Partial E Q.No. 12e How does the poet do justice to the two realities of life? [3]
2. 2074 Partial E Q.No. 2c At what point does the physical action cease to be replaced by another kind? [3]
3. 2073 Supp Q.No. 2c Why is the reference to the alive but never–to–be–born fawn moving? [3]
4. 2073 Set D Q.No. 2f How do the last two lines of the poem 'Travelling Through the Dark' complete both types of action? [3]
5. 2073 Partial A Q.No. 2e How do the last two lines complete both the types of action, in the poem 'Traveling Through the Dark'? [3]
6. 2069 Q.No. 12a Why do you think the reference to the alive but never-to-be-born fawn sentimental? [3]
7. 2063 Q.No. 12 e Do you agree with what the narrator did? Why? [3]
8. 2060 Q.No. 10 b Show how the action develops stanza by stanza in the poem, "Traveling Through the Dark'. [3]
9. 2057 Q.No. 2 c What is the central idea of the poem 'Traveling Through the Dark'? [3]

Long Answer Questions

10. 2075 Set B Q.No. 3b Explain the central theme of the poem "Travelling Through the Dark". Also write your impression of the poem. [10]
11. 2068 Q.No. 13 a Write an essay on "Travelling in the dark through the dense forest." [10]

UNIT 3: HUMOUR AND SATIRE

8. A Story, (A Story), Dylan Thomas

Short Answer Questions

1. 2076 Set B Q.No. 2f What message does the boy's aunt leave in the kitchen before she goes to her mother's home? [3]
2. 2076 Set C Q.No. 2f Write in short 'the unkind and inhuman' nature of the grown ups that they show to the boy, the narrator of the story. [3]
3. 2076 Partial D Q.No. 2b Why do the outing members stop at Hermit's Nest? [3]
4. 2075 Set A Q.No. 2b Write a paragraph to describe the outing as Thomas would describe it. [3]
5. 2075 Partial D Q.No. 2c Describe the relation between the narrator's uncle and aunt. [3]

6. 2075 Partial E Q.No. 12f What were the boy's uncle and aunt like? [3]
7. 2074 Supp Q.No. 2f Describe the boy's aunt. Why does he call her his uncle's wife, not his aunt as we expect? [3]
8. 2074 Set A Q.No. 2f 'If you can call it a story'. What does Dylan Thomas mean by this conditional sentence? Does he mean to say it is not a story in a true sense? [3]
9. 2074 Set B Q.No. 2f Describe the boy's uncle. Does he look like a disciplined, honest and careful uncle? [3]
10. 2074 Partial D Q.No. 2b Write a paragraph to describe the outing as Thomas would describe it. [3]
11. 2074 Partial E Q.No. 2e Describe the relation between the narrator's uncle and aunt. [3]
12. 2072 Supp Q.No. 2e Describe the boy's aunt. Was there a good match between boy's uncle and his aunt? [3]
13. 2072 Set C Q.No. 2e Describe the landlord of the Mountain Sheep. How did he welcome the members of the outing? [3]
14. 2072 Set D Q.No. 2e What was the boy asked to do when his uncle and his friends entered the Mountain Sheep? [3]
15. 2072 Partial Set A Q.No. 2e Why didn't uncle Thomas take the boy into the Mountain Sheep? [3]
16. 2072 Partial Set B Q.No. 2e How did the landlord of the 'Mountain Sheep' welcome the members of the outing? [3]
17. 2071 Partial Set A Q.No. 12 d Describe the relationship between the boy's uncle and his wife. [3]
18. 2070 Supp Set B Q.No. 12 f Describe how the boy, the narrator, sketches the character of Mr. Thomas, his uncle. [3]
19. 2070 Set C Q.No. 2 d What role does the narrator have in the story to expose unkind, uncivilized nature of the grownups? [3]
20. 2070 Set D Q.No 12 b How does the boy describe his uncle and aunt? [3]
21. 2069 Q.No. 12e How does the writer describe the relation between Thomas and his wife? Explain. [3]
22. 2069 Partial Q.No. 12c Write, in brief, the difference between the boy's uncle and his wife. [3]
23. 2068 Q.No. 12 b Give a short description of the boy's uncle.[3]
24. 2067 Q.No. 12 d How does the writer describe the relation between Thomas and his wife? [3]
25. 2066 Q.No. 12 b Give a description of the outing as Thomas would describe it. [3]
26. 2066 (Partial) Q.No. 12 a Explain the preparation of the trip to Porthcawl. [3]
27. 2064 Q.No. 12 f The plan was to go to Porthcawl for the outing. Did they ever reach there? Why? [3]
28. 2063 Q.No. 12 f Write a paragraph to describe the relation between Thomas (the boy's uncle) and his wife. [3]
29. 2062 Q.No. 12 c Write a paragraph to describe the relation between Thomas (the boy's uncle) and his wife. [3]
30. 2060 Q.No. 10 c Describe the relation between Thomas (the body's uncle) and his wife. [3]
31. 2059 Q.No. 2 c How does the boy, the narrator, look at his uncle and his aunt? [3]
32. 2058 Q.No. 3 f What is the reason for which Will Sent always followed Mr. Franklyn? [3]

■ Long Answer Questions

33. 2075 Set C Q.No. 3b Explain 'A Story' as a story of humour [10]
34. 2074 Partial E Q.No. 3b Imagine that you are the boy, the narrator of the story. Give a description of the outing of the adult's world from your own perspective. [10]
35. 2069 Partial Q.No. 13 Write an essay on an outing (actual or imaginary) in which you were a participant. [10]

9. The Last Voyage of the Ghostship, (A story) G.Garcia Marquez.

■ Short Answer Questions

1. 2076 Partial E Q.No. 2e Why does the boy have to prove who he was? [3]
2. 2075 GIE Q.No. 2b Why do the villagers beat the boy? [3]
3. 2075 Set C Q.No. 2c Why doesn't the mother show her good interest to her son's story? [3]
4. 2075 Partial E Q.No. 12c What does the refrain of the boy 'Now they're going to see who I'm mean? [3]
5. 2073 Set D Q.No. 2e What is the significance of the repetition of words 'Now they are going to see who I am....? [3]
6. 2073 Partial A Q.No. 2d How does the boy prove his maturity at the end of the story? [3]
7. 2070 Supp Set A Q.No. 12 d "The story 'The Last Voyage of the Ghost Ship' is about the maturity, consciousness of the boy rather than the appearance and disappearance of the ship". Explain. [3]
8. 2066 (Partial) Q.No. 12 e What is the strangest thing about the ghost ship? [3]
9. 2064 Q.No. 12 b Why did the boy have to prove who he was? [3]
10. 2061 Q.No. 10 b What does the refrain of the boy "Now they're going to see who I am mean"? [3]

■ Long Answer Questions

11. 2071 Partial Set A Q.No. 13 a How does the nature of the boy change in the span of time from the first time he saw the ship to the time when he captures it? [10]
12. 2057 Q.No. 3 a Narrate the story of a boy's growth from an ordinary boy to an assertive young man. [10]

UNIT 4: GOD AND MAN

10. God's Grandeur

■ Short Answer Questions

1. 2076 GIE Q.No. 2f How is God's Grandeur reflected in the world? [3]
2. 2076 Partial D Q.No. 2f Why are people unable to understand the greatness of God? [3]
3. 2075 GIE Q.No. 2e Why men are unaware of the greatness of the God? Give reasons. [3]
4. 2075 Set A Q.No. 2a 2074 Partial D Q.No. 2a 2062 Q.No. 12d 2061 Q.No. 10 c 2059 Q.No. 2 d What is the central idea of the poem, "God's Grandeur"? [3]

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5. 2075 Set C Q.No. 2d How do the human beings hurt the world? [3]
6. 2074 Partial E Q.No. 2b How is the glory of God praised in the poem 'God's Grandeur'? [3]
7. 2072 Supp Q.No. 2d Write the central idea of the poem 'God's Grandeur'? [3]
8. 2072 Set C Q.No. 2d What is the significance of the repetition of the words, "have trod..." in the poem? [3]
9. 2072 Set D Q.No. 2d What is the significance of the repetition of the words, "have trod..."? [3]
10. 2072 Set E Q.No. 2d How is the glory of the God praised in the poem "God's Grandeur"? [3]
11. 2072 Partial Set A Q.No. 2d What do the words 'bleared', 'smeared' and 'seared' suggest? [3]
12. 2072 Partial Set B Q.No. 2d What do the words 'bleared', 'smeared' and 'seared' suggest? [3]
13. 2071 Set D Q.No. 12 a What are the reasons to determine the god as powerful? Illustrate. [3]
14. 2071 Partial Set A Q.No. 12 c What is the main idea of the poem 'God's Grandeur'? [3]
15. 2070 Supp Set B Q.No. 12 c What is the central idea of the poem 'God's Grandeur'? Discuss. [3]
16. 2070 Set C Q.No. 2 c When does the God show its greatness, according to GM Hopkins? [3]
17. 2069 Q.No. 12c What is the central idea of the poem 'God's Grandeur?' Explain. [3]
18. 2068 Q.No. 12 a Give the central idea of the poem "God's Grandeur." [3]
19. 2067 Q.No. 12e How is the glory of God praised in the poem 'God's Grandeur'? [3]
20. 2058 Q.No. 3 c Give reasons why men are unaware of the greatness of God? [3]

■ Long Answer Questions

21. 2071 Partial Set B Q.No. 13 b Critically appreciate the poem, 'God's Grandeur'. [10]
22. 2065 Q.No. 13 b What is the central idea of the poem "God's Grandeur"? [10]

UNIT 5: HUMAN RIGHTS

11. I Have a Dream (An Essay/ A speech) Martin Luther King, Jr.

■ Short Answer Questions

1. 2076 GIE Q.No. 2e What does Martin Luther King dream about? [3]
2. 2076 Partial E Q.No. 2d Discuss the dream of Martin Luther King in brief. [3]
3. 2075 Set B Q.No. 2e What does the ferm 'dream' refer to in Martin Luther King's speech? [3]
4. 2075 Partial E Q.No. 12b What is the dream of Martin Luther King? [3]
5. 2074 Supp Q.No. 2d What is the apparent purpose of Martin Luther King's speech? Does his action contradict his nonviolent philosophy? [3]
6. 2074 Set A Q.No. 2d What dream does Martin Luther King have? How does he want to fulfil it? [3]
7. 2074 Set B Q.No. 2d How does Martin Luther King want to fulfil his dream? Does he ask his activists be very calm and civilize in the process of their protest? Explain. [3]
8. 2074 Partial E Q.No. 2a Explain the purpose of Martin Luther King's speech. [3]
9. 2073 Set C Q.No. 2d When will the coloured people be satisfied, according to King? Does he encourage them to start violence? [3]
10. 2073 Partial W Q.No. 2f What does Martin Luther King dream about? [3]
11. 2071 Set C Q.No. 2 e What does Martin Luther King dream about? [3]
12. 2071 Set D Q.No. 12 c Why was Martin Luther King's speech so popular? Explain. [3]
13. 2072 Set E Q.No. 2c What does the sad picture of the society as exposed by Martin Luther King refer to? [3]
14. 2071 Partial Set A Q.No. 12 b What seems to be the King's purpose in making the speech? [3]
15. 2070 Set C Q.No. 2 b Martin Luther King exposes a sad picture of the coloured people in America. What does this sad picture refer to and how does he want to over this sad picture? [3]
16. 2066 Q.No. 12 c To what extent does King's personal authority lend power to his words? [3]
17. 2065 Q.No. 12 b What is the real dream of Martin Luther King about the future of America? [3]
18. 2063 Q.No. 12 c What is Martin Luther King cornplaining about? [3]

■ Long Answer Questions

19. 2075 GIE Q.No. 3a How does Martin Luther King expose the social discrimination prevailing in American society? [10]
20. 2075 Set A Q.No. 3b Discuss the dreams of Martin Luther king. [10]
21. 2075 Set C Q.No. 3a 'I Have a Dream' is a heart-breaking appeal for the human rights and values. Justify this statement. [10]
22. 2074 Partial D Q.No. 3b What dream does Martin Luther King envision for America? Write them in paragraph form. [10]
23. 2069 Q.No. 13a Discuss 'I Have a Dream' as a plea for freedom and equality. [10]
24. 2068 Q.No. 13 b Describe the dream which Martin Luther King had in his speech "I Have a Dream." [10]
25. 2067 Q.No. 13 b What is the dream of Martin Luther King as stated in 'I Have a Dream?' [10]
26. 2061 Q.No. 12 Argue in favour of some course of action in a situation that you consider an injustice. Racial injustice is one possible area, or unfairness to any minority, or to women, children, the old, ex-convicts, the handicapped, the poor. If possible narrow subject to a particular incident or a local situation on which you can write knowledgeably. [10]
27. 2061 Q.No. 11 a What is the dream Martin Luther King. Jr. has? How is he going to achieve it? [10]

28. 2057 Q.No. 3 a OR What is the historical significance of Martin Luther King's speech? [10]

UNIT 6: WOMEN AND CHILDREN

11. Women's Business, Ilene Kantrov

■ **Short Answer Questions**

1. 2077 Set D Q.No. 2c What was the business policy of Lydia Pinkham? [3]
2. 2076 GIE Q.No. 2a How did Lydia E. Pinkham become a notable American entrepreneur? [3]
3. 2076 Partial D Q.No. 2c What are the businesses of Getrude Muller and Helena Rubinstein? [3]
4. 2075 Set C Q.No. 2e Justify the title 'Women's Business'. [3]
5. 2075 Partial D Q.No. 2d How did Pinkham act as a savior of her sex? [3]
6. 2073 Set C Q.No. 2c What sort of strategy did Annie-Turnbo Malone develop to flourish her business? [3]
7. 2072 Supp Q.No. 2c Why did the FDA ask Helena Rubinstein to withdraw her claims? [3]
8. 2072 Set C Q.No. 2c What strategy did Lydia E Pinkham use to grow her business? [3]
9. 2072 Set D Q.No. 2c How did Margaret Rudkin and Jennie Grossinger grow their business? Did they help their class as they claimed? [3]
10. 2072 Partial Set A Q.No. 2c What was the major motive of the business women? Did they want to help their class? [3]
11. 2072 Partial Set B Q.No. 2c How did Annie Turnbo-Malone grow her business? What strategy did she develop? [3]
12. 2071 Set D Q.No. 12 e Why is Lydia Pinkham most notable character in the essay? Explain [3]
13. 2064 Q.No. 12 c What is the main idea of the essay? [3]
14. 2061 Q.No. 10 d How did the women start and flourish their business in America? [3]
15. 2058 Q.No. 3 e Why did Lydia Pinkham first begin to sell her products? [3]

■ **Long Answer Questions**

16. 2076 Set B Q.No. 3a How does Pinkham emerge in the pages of newspapers and magazines? What does she claim to get the trust of people? Does she get a success? [10]
17. 2076 Set C Q.No. 3a What kind of business did the business women from Pinkham to Malone, begin? What was their main purpose? Explain. [10]
18. 2070 Supp Set B Q.No. 13 b Write a newspaper article about a success story of a Nepali business woman. [10]

13. The Children Who Wait, (An Essay) Marsha Traugot

■ **Short Answer Questions**

1. 2076 Set B Q.No. 2c Why are the children like Tammy waiting for adoption? [3]
2. 2076 Set C Q.No. 2c What is the significance of starting and ending the essay with the reference of Tammy, the Negro Child? [3]
3. 2075 GIE Q.No. 2c Why is it difficult for the handicapped children to find permanent home? [3]
4. 2075 Partial E Q.No. 12d What does the title "Children Who Wait" actually signify? [3]
5. 2073 Supp Q.No. 2d According to Traugot, what changes are transforming the American adoption scene? What factors are responsible for the changes? [3]
6. 2073 Set D Q.No. 2d How did paper media help in the adoption process? [3]
7. 2073 Partial A Q.No. 2c Why were the children like Tammy not adopted in the past? [3]
8. 2073 Partial W Q.No. 2d How did the Negro's Civil Rights Movement help positively in the adoption process? [3]
9. 2071 Set C Q.No. 2 c Why was Tammy labelled as unadoptable in the past? [3]
10. 2071 Set D Q.No. 12 d How were the handicapped, black and weak children viewed in the past? [3]
11. 2069 Partial Q.No. 12f What is "fetal alcoholic syndrome"? Explain. [3]
12. 2065 Q.No. 12 d What had happened to the handicapped children in the past? [3]
13. 2064 Q.No. 12 e How do the adoption agencies find the potential parents? [3]
14. 2062 Q.No. 12 e What kinds of parent were considered suitable for adopting children? What kinds of children were considered 'Unadoptable'? [3]
15. 2060 Q.No. 10 d Why was it difficult for the handicapped and the black children to find Foster family? [3]
16. 2060 Q.No. 10 e According to Traugot, what changes are transforming American adoption scene? What factors are responsible for the changes? [3]
17. 2057 Q.No. 2 a Whom does Marsha Traugot refer to as the children who wait? [3]

■ **Long Answer Questions**

18. 2076 GIE Q.No. 3b According to Traugot, what changes are transforming the American adoption scene? What factors are responsible for the changes? [10]
19. 2074 Set A Q.No. 3b According to Traugot, What changes are transforming the American adoption scene? What factors are responsible for the changes? [10]
20. 2074 Set B Q.No. 3b Why were the children like Tammy not adopted in the past? Mention the factors which have brought changes in the adoption process. [10]
21. 2071 Supp Q.No. 13a "Many changes have undergone in the adaption process during the recent years." Explain. [10]

14. A Child is Born, (An Essay) Germaine Greer.

■ **Short Answer Questions**

1. 2076 Partial D Q.No. 2d Why does one of the Muslim Women decide to hold her tongue? [3]
2. 2074 Supp Q.No. 2c Why didn't the young woman with university graduation challenge the traditional outdated culture of the East? Was she superstitious herself? [3]

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3. **2074 Set A Q.No. 2c** Why does the writer bring in the examples of the east to discuss the problems of a modern western society? [3]
4. **2074 Set B Q.No. 2c** What kind of positive treatment does a young Sylheti woman get before and after the childbirth? [3]
5. **2073 Partial W Q.No. 2c** How is a child birth celebrated in the Sylheti community in Bengal in India? [3]
6. **2071 Supp Q.No. 12c** What differences does the writer show between a traditional society and a modern society in matters of child bearing? [3]
7. **2071 Partial Set A Q.No. 12 f** What are the practices of child-rearing seen in traditional societies? [3]
8. **2071 Partial Set B Q.No. 12 f** How did traditional society look into pregnancy and childbirth? [3]
9. **2070 Supp Set A Q.No. 12 c** Describe the appalling scene Sheila Kitzinger observed in the hospital set up for Bantu patient in South Africa. [3]
10. **2070 Set C Q.No. 3 b** The author has introduced number of examples of the east, in matters of pregnancy, childbirth and child rearing, in order to discuss with the problems of the west. In your view, what is the significance of the author's purpose to introduce them? Does she want to ask the West to follow examples of the East? Explain. [3]
11. **2066 Q.No. 12 d** What differences does the writer show between a traditional society and a modern society in matters of child bearing? [3]
12. **2066 (Partial) Q.No. 12 d** Sketch the differences of child bearing in traditional and modem western society. [3]
13. **2063 Q.No. 12 d** What kind of treatment does a woman in Bangladesh receive during her pregnancy and after the childhood? [3]

■ Long Answer Questions

14. **2076 Partial E Q.No. 3b** The writer, Germaine Greer, in her essay 'A Child is Born' differentiates the modern society and traditional society in matters of pregnancy, childbirth and child rearing practices. Do you agree with the writer? Give reasons. [10]
15. **2074 Supp Q.No. 3b** Can the children of different abilities be adopted today? How did electronic and paper media help in the adoption process? [10]
16. **2073 Set D Q.No. 3b** **2072 Set E Q.No. 3a** What differences does the writer show between a traditional society and modern society in matters of pregnancy, childbirth and childbearing? [10]
17. **2070 Supp Set A Q.No. 13 b** Many countries of Asia and Africa have realized that mother child death is a tragedy and it should be minimized as much as possible. Yet they are still irrational in this regard: they compel a woman to follow rituals, taboos and prohibitions and give birth at the cost of her life. Explain this statement in the context of the essay, 'A Child is Born'. [10]
18. **2069 Q.No. 13b** Write about the place of a mother in the Nepali family with reference to different stages of her life. [10]
19. **2067 Q.No. 13 a** The essay 'A Child is Born' is often found controversial and one-sided. Do you agree? Give reasons for you agreement or disagreement. [10]
20. **2066 (Partial) Q.No. 13 b** Write in about 100 words about the values held by the traditional Nepali society in which a woman who can not bear children considered as a failure in her personal life and a useless woman in the eyes of the society. Give your own views on the subject. [10]
21. **2065 Q.No. 13 a** What differences does the writer show between a traditional society and a modern society in matters of pregnancy, childbirth and child bearing? [10]
22. **2061 Q.No. 13** Write in about 100 words about the values held by the traditional Nepali society in which a woman who cannot bear children is considered as a failure in her personal life and a useless woman in the eyes of the society. Give your own views on the subject. [10]
23. **2060 Q.No. 11** What differences does the writer show between a traditional society and a modern society in matters of pregnancy, childbirth and childbearing? [10]
24. **2059 Q.No. 3 a** Discuss in about 200 words the advantages of child rearing in a traditional society. How is the traditional child-rearing a beneficial practice for the child and young mother? [10]

UNIT 7: CRIME AND CONFESSION

15. The Tell-Tale Heart (A story), Edgar Allan Poe.

■ Short Answer Questions

1. **2077 Set D Q.No. 2a** Why does the acute sense of hearing later become unbearable and lead the narrator to confess his crime? [3]
2. **2076 Set B Q.No. 2a** Explain the significance of the repetition of the words . . . "low, dull, quick sound - much such a sound as a watch makes when enveloped in cotton". Does this sound encourage the narrator to commit crime? [3]
3. **2076 Set C Q.No. 2a** How does the old man annoy the narrator? [3]
4. **2076 Partial E Q.No. 2f** How does the narrator kill the old man? [3]
5. **2075 Set C Q.No. 2f** How is the reality of the murder exposed in the story? [3]
6. **2074 Supp Q.No. 2b** How long did the narrator plan to kill the old man? Why couldn't he kill him all those nights? [3]
7. **2074 Set A Q.No. 2b** Why does the narrator want to kill the old man? Why does his effort to kill him go in vain for seven nights? [3]
8. **2074 Set B Q.No. 2b** Describe the scene in which the narrator killed the old man. [3]
9. **2073 Set D Q.No. 2a** Describe the situation which encouraged the narrator to kill the old man? [3]
10. **2072 Partial Set A Q.No. 2a** Why couldn't the narrator kill the Old Man for seven nights? [3]
11. **2072 Partial Set B Q.No. 2a** Why were the efforts of the narrator to kill the old man unsuccessful for seven nights? [3]
12. **2071 Supp Q.No. 12f** Write the summary of the story "The Tell-Tale Heart" in a short paragraph. [3]
13. **2071 Partial Set A Q.No. 12 e** Describe the nature of murderer. [3]

14. 2070 Supp Set A Q.No. 12 e Describe the situation and the sound which incited the narrator to commit crime, at first and to confess in at the end of the story. [3]
15. 2070 Supp Set B Q.No. 12 d Would you call the narrator mad? Give reasons for your answer. [3]
16. 2070 Set D Q.No 12 c Why does the narrator kill the man? How does he feel after the murder? [3]
17. 2069 Q.No. 12f How was the narrator betrayed by his own heart? Discuss. [3]
18. 2068 Q.No. 12 f Would you call the narrator mad? Give reasons for your answer. [3]
19. 2066 Q.No. 12 e Would you call the narrator of "The Tell-Tale Heart" mad? Give reasons for your answer. [3]
20. 2066 (Partial) Q.No. 12 f Why does the narrator confess his guilt? [3]
21. 2065 Q.No. 12 c What made the narrator confess his crime?[3]
22. 2064 Q.No. 12 d Describe the scene in which the narrator killed the old man. [3]
23. 2062 Q.No. 12 f What made the narrator confess his crime?[3]

■ **Long Answer Questions**

24. 2076 Partial D Q.No. 3a Why does the narrator kill the old man? What makes him confess the crime at the end? [10]
25. 2075 Partial E Q.No. 13a Why does the narrator develop hatred toward the old man? Would you call, the narrator mad? Give reasons for your answer. [10]
26. 2073 Supp Q.No. 3b In "The Tell-Tale Heart", Edgar Allan Poe makes the narrator unfold the minute details one after another. Discuss how he does it and what is the impact on his readers? [10]
27. 2071 Set D Q.No. 13 a Why does the narrator kill the old man? Would you call the narrator mad? Provide appropriate reasons to your answer. [10]
28. 2059 Q.No. 3 b Why does the narrator develop intense hatred against the old man? Would you call the narrator mad? Give reasons for your answer. [10]

16. Purgatory, (A Drama), W.B. Yeats

■ **Short Answer Questions**

1. 2076 GIE Q.No. 2c What is the old man's motive in murdering the boy? [3]
2. 2075 GIE Q.No. 2d What happens to the souls of dead ones in purgatory, according to W.B. Yeats? [3]
3. 2075 Set A Q.No. 2c What is the Old Man's motive in murdering the boy? [3]
4. 2075 Set B Q.No. 2a Why does the old man kill his son? [3]
5. 2074 Partial D Q.No. 2c What is the Old Man's motive in murdering the Boy? [3]
6. 2073 Supp Q.No. 2e What is the Old Man's motive in murdering the Boy? [3]
7. 2073 Set C Q.No. 2b What were the reasons which lead the old man kill the Boy? [3]
8. 2073 Partial A Q.No. 2a Why did the Old Man punish the Boy? [3]
9. 2073 Partial W Q.No. 2b How does the Old Man break the cycle of violence? [3]
10. 2072 Supp Q.No. 2a Why does the Old Man murder the Boy? [3]
11. 2072 Set C Q.No. 2a What were the circumstances which made the Old Man kill the Boy? [3]
12. 2072 Set D Q.No. 2a What is the motive of the Old Man in killing the Boy? [3]
13. 2071 Supp Q.No. 12e Discuss the kind of relationship between father and son in the play 'Purgatory'. [3]
14. 2071 Set C Q.No. 2 a Why does the Old Man kill the Boy? [3]
15. 2071 Partial Set B Q.No. 12 d Why did the Old Man kill his son? [3]
16. 2070 Set D Q.No 12 d Discuss the kind of relationship between father and son in the play "Purgatory". [3]
17. 2069 Q.No. 12d What is the Old Man's motive in murdering the Boy? Elaborate. [3]
18. 2069 Partial Q.No. 12d What is the Old Man's motive in murdering the Boy? [3]
19. 2067 Q.No. 12 f What is the Old Man's motive in murdering the Boy? [3]
20. 2066 (Partial) Q.No. 12 c Explain how "Purgatory" explores the relation of human life to supernatural forces. [3]
21. 2058 Q.No. 3 d Why did the Old Man kill his own son? [3]

■ **Long Answer Questions**

22. 2071 Set D Q.No. 13 b Why did the Old man kill his own son and father? Explain how this drama is connected with religious belief. [10]
23. 2064 Q.No. 13 b "We are always punished for our sins." Elaborate this statement. [10]
24. 2063 Q.No. 13.a Sketch the character of the Old Man. [10]

UNIT 8: PLAYING WITH THE TEXTS

17. a. Hansel and Gretel - Grimm Brothers

■ **Short Answer Questions**

1. 2076 Set B Q.No. 2b Why does Hansel drop shiny pebbles on the way to the forest? [3]
2. 2076 Set C Q.No. 2b What role does Gretel play in the story? How does she free her brother? [3]
3. 2076 Partial D Q.No. 2e What role does Gretel have in the story? [3]
4. 2076 Partial E Q.No. 2a How did Hansel and Gretel free themselves from the witch? [3]
5. 2075 Partial D Q.No. 2e How did the witch receive the two children in their first night at the witch's house? [3]
6. 2074 Supp Q.No. 2a How did Hansel and Gretel manage to come back their home the first time provided that they were lost in the forest the second time? [3]
7. 2074 Set A Q.No. 2a What role does the witch have in the story? What does she symbolize? [3]

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8. 2074 Set B Q.No. 2a How does Hansel show his boldness, wisdom, determination and vigour in the beginning of the story? [3]
9. 2073 Supp Q.No. 2f What types of character is Gretel? Describe her character in your own words. [3]
10. 2073 Set C Q.No. 2a How did Gretel free her brother and herself from the trap of the witch and prove her maturity and masculinity? [3]
11. 2073 Partial A Q.No. 2b Why did Gretel kill the witch? [3]
12. 2073 Partial W Q.No. 2a How does Gretel save her brother and herself from the witch? [3]
13. 2072 Set C Q.No. 2b How did the witch tempt the children in the ginger bread house? What had she planned at last? [3]
14. 2072 Set D Q.No. 2b How did the lost children find the witch's house? [3]
15. 2072 Partial Set B Q.No. 2b How did the shiny stones help Hansel and Gretel return home the first time? [3]
16. 2071 Set C Q.No. 2 b What role does Gretel play to save her brother and herself from the witch? [3]
17. 2070 Set D Q.No 12 e Describe the character of Hansel. [3]
18. 2060 Q.No. 10 a How did Hansel and Gretel free themselves from the witch? [3]
19. 2059 Q.No. 2 f How did the witch receive the two children in their first night at the witch's house? [3]

■ **Long Answer Questions**

20. 2075 Partial E Q.No. 13b Grimm Brothers' "Hansel and Gretel" reflects the social problems of eighteenth century. Explain the statement on the basis of Jack Zipe's interpretation of the story. [10]
21. 2073 Supp Q.No. 3a 2072 Supp Q.No. 3b Retell the story 'Hansel and Gretel'. [10]
22. 2073 Set D Q.No. 3a Summarise the story 'Hansel and Gretel' in about 200 words. [10]
23. 2066 Q.No. 13 b Narrate the story of 'Hansel and Gretel'. [10]
24. 2062 Q.No. 13 b Briefly narrate the story of 'Hansel and Gretel'. [10]

17. b, Gretel - Keillor

■ **Short Answer Questions**

1. 2076 GIE Q.No. 2d Why does Gretel condemn her father and brother? [3]
2. 2075 Set B Q.No. 2c How does Gretel stand as modern feminist woman? [3]
3. 2072 Supp Q.No. 2b Why does Gretel condemn her father and brother? [3]
4. 2071 Partial Set A Q.No. 12 a Sketch the character of Gretel in Keillor's version of the story? [3]
5. 2066 (Partial) Q.No. 12 b How was Garrison Keillor's Gretel? Sketch the character of Gretel in short. [3]
6. 2061 Q.No. 10 e Do you think Gretel represents modem feminist woman? Give your opinion briefly. [3]
7. 2058 Q.No. 3 a Why does Gretel blame her father and brother? [3]

17. c, Hansel and Gretel - Bruno Bettelheim and Jack Zipes

■ **Short Answer Questions**

1. 2077 Set D Q.No. 2b Briefly analyse the story 'Hansel and Gretel' from socio-economic perspectives. [3]
2. 2072 Partial Set A Q.No. 2b What role did the birds have in the story Hansel and Gretel? [3]
3. 2070 Set C Q.No. 2 a What role do the birds have in the story 'Hansel and Gretel'? What do they symbolize? [3]
4. 2057 Q.No. 2 d What do the bird and the expanse of water symbolize in the fairy tale 'Hansel and Gretel'?

■ **Long Answer Questions**

5. 2070 Set D Q.No 13 b Compare and contrast the Hansel and Gretel by Bruno Bettelheim and Jack Zipes. [10]

18. The Boarding House, James Joyce.

■ **Short Answer Questions**

1. 2075 Set A Q.No. 2f 2075 Set B Q.No. 2d 2074 Partial D Q.No. 2f Sketch the character of Mrs Mooney. [3]
2. Sketch the character of Mrs. Mooney. [3]
3. 2073 Set D Q.No. 2a How did Mrs Mooney prove herself bold, determined and imposing in the story 'The Boarding House'? [3]
4. 2072 Set E Q.No. 2f 2070 Supp Set B Q.No. 12 a Briefly sketch the character of Mrs. Mooney. [3]
5. 2071 Set D Q.No. 12 b How is Mrs. Mooney succeed in her mission at the end? Explain. [3]
6. 2070 Supp Set A Q.No. 12 f How did Mrs. Mooney solve the problem of her daughter and fulfill her responsibility? [3]
7. 2070 Set D Q.No 12 f Do you think Mr. Doran married Polly? Explain. [3]
8. 2069 Partial Q.No. 12e Briefly sketch the character of Polly Mooney. [3]
9. 2060 Q.No. 10 f Write an interpretation of the story, "The Boarding House". [3]
10. 2059 Q.No. 2 e How do you think Mrs. Mooney settled with Mr. Doran about Polly? Did Mr. Doran marry Polly or pay out compensation? [3]

■ **Long Answer Questions**

11. 2076 Set B Q.No. 3b Summarise the story 'The Boarding House' in your own words, avoiding the repetition and other unnecessary words. [10]
12. 2076 Partial E Q.No. 3a Narrate the story 'The Boarding House'. [10]
13. 2075 GIE Q.No. 3b Summarize the story "The Boarding House" at least in three paragraphs. [10]
14. 2075 Partial D Q.No. 3b What was the main problem in the relation between Mr. Doran and Polly and how did Mrs. Mooney settle her daughter's relation with Mr. Doran? [10]
15. 2073 Set C Q.No. 3b "Mrs Mooney got success in her business because of her straight forward nature, hard work, boldness and determination". Explain, how did these characteristics of her help in promoting her business. [10]

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16. 2073 Partial A Q.No. 3b Summarise the story 'The Boarding House' in about 200 words. [10]
17. 2073 Partial W Q.No. 3b 2071 Supp Q.No. 13b 2058 Q.No. 2a Sketch the character of Mrs. Mooney. [10]
18. 2072 Set C Q.No. 3b Describe Mrs. Mooney. How did she solve the problem of Miss Polly, her daughter and Mr. Doran? [10]
19. 2072 Set D Q.No. 3b Describe Mrs Mooney. How did she solve the problem of her daughter? [10]
20. 2072 Set E Q.No. 3b How did Miss Polly help her mother in the Boarding House? Did her mother solve her problem positively? Explain. [10]
21. 2072 Partial Set A Q.No. 3b Describe Mrs. Mooney. How did she grow her business and how she solved the problem of Miss Polly? [10]
22. 2072 Partial Set B Q.No. 3b Retell the story of Boardi... House. [1
23. 2071 Set C Q.No. 3 b Retell the story "The Boarding House... [1
24. 2071 Partial Set A Q.No. 13 b Summarize the story "Th... Boarding House". [1
25. 2069 Partial Q.No. 13 OR Imagine that you are Mr. Dora... Now rewrite the story of 'The Boarding House.' [1
26. 2066 (Partial) Q.No. 13 a Briefly narrate the story of 'Th... Boarding House'. [1
27. 2064 Q.No. 13 a Sketch the character of Mrs. Mooney. [1
28. 2063 Q.No. 13 b Briefly narrate the story 'The Boardi... House'. [1

YEARWISE QUESTIONS

2077 (Set D)

Time: 1:30 hrs **Full Marks (Condense): 40**

Attempt all the questions.

1. **Read the following passage and answer the questions that follow.** **[2×2=4]**

Someone once put forward an attractive though unlikely theory. Throughout the earth's revolution around the Sun, there is one point of space always hidden from our eyes. This point is the opposite part of the Earth's orbit which is always hidden by the Sun. Could there be another planet there, essentially similar to our own but always invisible?

If a space probe today sent back evidence that such a world existed, it would cause not much more sensation than Sir William Herscheel's discovery of a new planet, Uranus, in 1781. Herscheel was an extraordinary man- no other astronomer has ever covered so vast a field of work- and his career deserves study. He was born in Hanover in Germany, left German army in 1757 and arrived in England the same year with no money.

Serious observation began in 1774. He set himself the astonishing task of 'reviewing the heavens' in other words pointing his telescope to every accessible part of the sky and recording what he saw. The first review was made in 1775, the second and most momentous in 1780-81. It was that he discovered Uranus. Afterwards, supported by the royal grant in recognition of his work, he was able to devote himself entirely to astronomy. His final achievements spread from the Sun and Moon to remote galaxies.

Questions:

a. What was the attractive theory about?
b. What do you mean by 'reviewing the heavens'?

2. **Answer any three of the following questions.** **[3x3=9]**
   a. Why does the acute sense of hearing later become unbearable and lead the narrator to confess his crime? (The Tell-Tale Heart) [3]
   b. Briefly analyse the story 'Hansel and Gretel' from socio-economic perspectives. [Hansel and Gretel -Jack Zipes] [3]
   c. What was the business policy of Lydia Pinkham? (Women's Business) [3]
   d. What makes the old pensioner lament in his old age? Give at least three reasons. (The Lamentation ...) [3]
3. Change the following remarks using 'supposed to.' [4]
   a. They say it's unlucky to walk under a ladder.
   b. Apparently Maldives is slowly sinking into the sea.
   c. They say Dinosaurs lived for many years.
   d. People say he was born in Lumbini Province.
4. Choose one of the verbs in the list to report each of the remarks below. [4]

   Urge, beg, suggest, promise, recommend

   a. I can't tell you how important it is for you to give up smoking.
   b. You have got to lend me the money! oh! please, please
   c. Why don't you paint the wall yellow?
   d. I will buy you a bike if you pass grade XII.
5. Change the sentences below using must, can't and might/may, whichever is correct. [4]

   For example: Perhaps he was tired.
   He may have been tired.

   a. I am sure he isn't from Cyprus.
   b. Perhaps he was reading.
   c. Perhaps Devkota wrote the poem.
   d. Obviously, she passed the entrance.
6. Write a short paragraph about your visit to a new place. [5]
7. Write a letter to your father requesting him to send you money for various purpose (like college fee/tuition fee/hostel fee or for the language class) [10]

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ANSWER TO THE GRAMMAR

Unit 1: Experience

1.	(a) Have you ever been shouted in the street by police? (b) Has your friend ever been insulted by them? (c) Have you ever been punched on the nose? (d) Have you ever had your passport lost? (e) Have you ever flown in a supersonic jet?
2.	(a) She is not used to being given flowers. (b) I am not used to doing my washing and cleaning myself. (c) He is used to being stared at. (d) He is used to sleeping in the street. (e) I am not used to living alone.
3.	(a) She is not used to being invited for lunch. (b) I am not used to inviting/bringing all of them. (c) I am not used to eating guava. (d) We are not used to cooking lunch for many guests. (e) I am used to washing my own clothes.
4.	(a) She is not used to delivering speech on the stage. (b) She is not used to walking with high heels. (c) He is not used to eating spicy food. (d) He is not used to being praised (awarded). (e) They are not used to working on the construction site.
5.	(a) A: Have you ever had your wallet stolen? B: No, I haven't but I have had my umbrella stolen. (b) A: Have you ever been trapped in a lift? B: No, I haven't but I've been trapped in the bathroom. (c) A: Have you ever had your chest X-rayed? B: No, I haven't but I've had my hand X-rayed. (d) A: Have you ever been thrown out of class? B: No, I haven't but I have been thrown out of the library. (e) A: Have you ever been mistaken for a singer? B: No, I haven't but I have been mistaken for a TV actor.
6.	(a) A: Have you ever participated in social works? B: No I haven't, but I have participated in Cultural Program. (b) A: Have you ever worked in remote areas? B: No I haven't, but I have worked in city areas. (c) A: Have you ever played badminton? B: No I haven't, but I have played lawn tennis. (d) A: Have you ever performed alone on the stage? B: No I haven't, but I have performed in a group. (e) A: Have you ever helped the poor? B: No I haven't, but I have helped the handicapped.
7.	(a) A: Have you ever had your book stolen? B: No I haven't, but I have had my umbrella stolen. (b) A: Have you ever been trapped into a bathroom? B: No I haven't, but I have been trapped in a lift. (c) A: Have you ever had your leg x-rayed? B: No I haven't, but I have had my head x-rayed. (d) A: Have you ever been asked to go out of the class? B: No I haven't, but I have been asked to out of the hall. (e) A: Have you ever been mistaken for an artist? B: No I haven't, but I have been mistaken for a business man.
8.	(a) A: Have you ever had your teeth X-rayed? B: No I haven't, but I have had my chest X-rayed. (b) A: Have you ever played chess? B: No I haven't, but I have played badminton. (c) A: Have you ever participated in cultural programmee? B: No I haven't, but I have participated in social works. (d) A: Have you ever been mistaken for a singer? B: No I haven't, but I have been mistaken for a player. (e) A: Have you ever been thrown out of a bus? B: No I haven't, but I have been thrown out of the class.
9.	(a) A: Have you ever had your shirt stolen? B: No, I haven't, but I have had my sweater stolen? (b) A: Have you ever been trapped in a bathroom? B: No, I haven't, but I have been trapped in a lift. (c) A: Have you ever had your chest x-rayed? B: No, I haven't, but I have had my leg x-rayed. (d) A: Have you ever been thrown out of class? B: No, I haven't, but I have been thrown out of the hall. (e) A: Have you ever been mistaken for a business man? B: No, I haven't, but I have been mistaken for a scholar.
10.	(a) a: This is the first time I've ever taken spicy food. b: I've never taken Newari food before. (b) a: This is the first time she has ever got so drunk. b: She has never taken sleeping tablet before. (c) a: This is the first time they have ever stayed out late. b: They have never gone to picnic before. (d) a: This is the first time I've ever faced interview. b: I've never spoken on stage before. (e) a: This is the first time I've ever lifted the heavy load. b: I've never driven my car in the highway before.
11.	(a) My friend is not used to working on the construction site. (b) Sheela is not used to getting flowers from her friends. (c) Bhuban is used to being stared at. (d) Bina is used to dancing in parties. (e) My grandfather is not used to being alone in the room.
12.	(a) The most frightening experience I have ever had was my encounter with a cobra in Teral. It nearly bit me in the leg. (b) The stupidest mistake I have ever made was dropping my physics exam. The questions were so easy. (c) The most uncomfortable bed I have ever slept in was that of Ram's. It was as hard as rock. (d) The most boring job I have ever had was that of clerk. I could get only thousand in a month. (e) The funniest film I have ever watched was "Hera Pheri". I couldn't help laughing upto the end of the movie.
13.	(a) Suman is used to eating fruits. (b) Sarita is used to reading horror stories. (c) The Buddhists are used to praying for peace. (d) Street children are used to begging money from tourists. (e) Children are used to making noise.

Unit 2: Appearance

1.	(a) He seems (to be) very friendly. (b) He seems (to be) very civilized. (c) He seems to study hard. (d) He seems to be always ready to help others. (e) He seems to score excellent marks.
2.	(a) He seems to be a social worker. (b) He seems (to be) honest in his activities. (c) He doesn't seem to like gossiping. (d) He seems to honour the seniors and love the juniors. (e) He seems to be liked by all.
3.	(a) It smells like pizza. (b) He sounds like an American. (c) They look like twins. (d) It feels like gravel. (e) It tastes like bakery.
4.	(a) crooked-nose (b) cleft-chin (c) heavily-built (d) fair-complexion (e) wavy- hair
5.	(a) She does not seem to be keen on gardening.(b) She seems to have maintained a library at her home. (c) She seems to have children at her home. (d) She seems to be new to the place. (e) She seems to have her children admitted at boarding school.
6.	(a) He seems to be blind. (b) His parents seem to have a job in other city. (c) He seems to (love) be fond of stamps. (d) He doesn't seem to be interested in gardening. (e) He seems to have made a lot of friends in foreign.
7.	He seems to be a manual worker. (b) He seems to be rich. (c) He seems to be a chain smoker. (d) He seems to be careful about friends and relatives. (e) He seems to have problem of far-sightedness.
8.	(a) He looks as if he has lost his mind. (b) She looks as if she was walking in rain. (c) It looks as if it got collided with a truck. (d) They sound as if they are celebrating party. (e) They look as if they are quarrelling.
9.	(a) He seems (to be) very friendly. (b) He seems (to be) very hard working. (c) He seems (to be) honest. (d) He doesn't seem (to be) very rich. (e) He seems to forget things.
10.	(a) He seems to be very friendly. (b) He seems to be honest. (c) They seem to be regular. (d) They don't seem to spend much money out. (e) She seems to be very hard working.
11.	(a) He looks as if he is a tramp. (b) He looks as if he is going to fight. (c) They look as if they are frustrated. (d) He looks as if he's seriously wounded. (e) He looks as if he is about to die.
12.	(a) He seems to be an excellent driver. (b) He doesn't seem to be selfish. (c) He seems to be the Himalayan. (d) He seems to be punctual. (e) He seems to take care of his children./ He seems to be a loving father.
13.	(a) He looks as though he needs a wash. (b) He looks as though he is aggressive. (c) It looks as though it gives excellent result. (d) They look as though they are brother and sister. (e) She looks as though she is celebrating herself.
14.	(a) It looks as if someone has got an accident. It looks as though there is a show of magic trick. (b) It smells as if something is burning. It smells as though something is spilled over. (c) It feels as if he has completed marathon race. It looks as if he is sweating. (d) It sounds as if his relative has passed away. It sounds as though he has been injured. (e) It looks as if it is a public holiday. It looks as though the gate-keeper is out.
15.	(a) It tastes like coffee. (b) It sounds like a pop song. (c) He sounds like an American. (d) It feels like velvet. (e) They look like brothers.
16.	(a) He doesn't seem (to be) very rich. (b) He seems (to be) happily married. (c) He seems to be some kind of business man. (d) He doesn't seem to spend much time out of door. (e) He seems to watch TV a lot.

17.	(a) Mr. Harvey seems (to be) very friendly. (b) He doesn't seem (to be) very rich. (c) He seems to have lived a very interesting life. (d) He seems to watch television a lot. (e) He seems to be some kind of businessman.
18.	(a) She looks as if she is going to dive into the sea. (b) He looks as if he is a thief. (c) He looks as if he is repairing the car. (d) She looks as if she is walking in rain. (e) They look as if they are lovers.
19.	(a) She seems (to be) very friendly. (b) She doesn't seem(to be) very rich. (c) She seems to watch TV a lot. (d) She seems (to be) happily married. (e) She doesn't seem to spend much time out of doors.
20.	(a) He looks like a drunkard. (b) The building looks terribly complicated. (c) They look like a honeymoon couple. (d) They look as if/as though they have come out of a swimming pool. (e) She looks as if she has never seen a mountain.
21.	(a) Shanti seems (to be) very friendly. (b) Shanti doesn't seem (to be) very rich. (c) Shanti seems (to be) happily married. (d) Shanti doesn't seem to spend much time out of doors. (e) Shanti seems to watch television a lot.
22.	(a) It feels like a stone. (b) It sounds like Jazz. (c) It tastes like coffee. (d) He sounds like Russian.
23.	(a) He seems to be very friendly. (b) He doesn't seem to be rich. (c) He seems to be happily married. (d) He seems to watch television a lot. (e) He seems to have lived a very interesting life.
24.	(a) He seems to be a thief. (b) The desk seems to be recently painted. (c) He seems to know a lot of people in different places. (d) His children seem to be at boarding school. (e) He seems to have injured his leg.

Unit 3: Relating Past Events

1.	(a) I wanted to highlight all the programmes I had attended. (b) My sister showed me the marks she had secured. (c) Students wanted to study all the books they had borrowed from the library. (d) The teachers visited all the places they had thought. (e) I could not repair the telephone that had been dead for couple of days.
2.	(a) .....I had demanded. (b) .....had won. (c) ..... had been damaged. (d) .....I had been assigned. (e) .....had played.
3.	(a) Mr. Gyawali became quite fond of Dillibazaar prison, where he had spent 12 years. (b) Mrs. Dhakal showed me round her house, for which she had paid 2 crore. (c) Mr. Thapa, who had spent 30 years as a professor, was finally retired. (d) Mr. Rai, who had fougnt in world war II, died last year. (e) Jeevan, with whom she had always been in love, finally asked her to marry him.
4.	(a) Finally Mr. Thapa, with whom Mr. Rai had been sharing an office, decided to retire. (b) He proudly showed me round the house, for which he had paid 20 millions. (c) The old car, which Sohan had used for more than 20 years, was finally sold. (d) Mohan, with whom she had always been in love, finally asked her to marry him. (e) He became quite fond of his office, where he had served many years of his life.
5.	(a) Anu went back to Butwal, where she was born. (b) At last NTC managed to repair the telephone, which had been dead for couple of days. (c) The teacher, who was teaching philosophy, turned round suddenly. (d) We were all very grateful to our friend Hari, who gave us a house warming party. (e) The guard, who had caught the thief red handed, was rewarded.
6.	(a) The old house, in which the family had lived for 100 years, was finally sold. (b) Luna noticed that Niru was wearing her ring which she had lost two years before. (c) Mrs. Thapa, who was married with two children, never recovered. (d) He proudly showed me his laptop for which he had paid Rs. 50,000. (e) Bipin, who she had always been in love with, finally asked her to marry him.
7.	(a) When I came back, I found that my book, which I had bought yesterday, had disappeared. (b) The policeman, who was facing the other side, turned round suddenly. (c) I eventually found the letter, which had been written by my brother, in my jacket pocket. (d) At last I got success to win the match, which had been off track for a while. (e) I couldn't wait for Ashu, who had been in love with me.
8.	(a) The children couldn't wait to get back to Namche, where their parents lived. (b) At last the contractors managed to repair the bridge, which had been destroyed by earthquake. (c) The shopkeeper, with whom I had bargained a lot, turned round suddenly. (d) I eventually found the purse, which I had bought few days ago, in my school bag. (e) We were all grateful to our principal, who had taken us for educational tour in Hong Kong.
9.	(a) I am very grateful to Madan, who helped me in redecorating my house. (b) My parents always helped the people, who had been ignored by the government. (c) The municipality repaired the road which had been damaged for years. (d) Anu showed me her house, which she had bought a month ago. (e) Niru gave sweets to his friends, who had come to visit him.
10.	(a) My sister couldn't wait to get back to College, where she has studied. (b) The NTC managed to repair the telephone, which has been damaged. (c) The coach, who is from Pokhara, is polite. (d) I found the check, which had got lost, in my bag. (e) We were all very grateful to our college, where we pursued quality education.
11.	(a) Janak went back to Mahendranagar,where he was born. (b) At last the N-cell managed to repair the telephone, which has been damaged. (c) The librarian,who was issuing the book, turned round suddenly. (d) We were all very grateful to Mr Pandey, who had invited us in his party. (e) The driver, who had driven us safe, was rewarded.
12.	(a) ... which I had parked, ... (b) ... which had been out of order (c) ... who was writing on the board ... (d) ... where I was born ... (e) ... that I had written to John ...
13.	(a) I am very much grateful to Madan, who helped me in my business. (b) I am proud of my college, where I have spent my two years. (c) The Road Department managed to repair the road which had been damaged by the earthquake. (d) The Electricity Authority managed to repair the wire, that had been damaged. (e) The boy, who had been addressing the mass turned round suddenly.
14.	(a) The Old house, where I was born, was sold. (b) Madan became quite fond of Illam, where he had spent his childhood. (c) Anju showed me round her house, which was damaged by earthquake. (d) Bijaya took me to the college, where she has studied. (e) David, who got appointed yesterday, did his work honestly.
15.	(a) had made (b) had issued (c) had bought (d) had bought before (e) had borrowed
16.	(a) The principal, who was highly qualified, presented the paper. (b) Nani Maiya, who was veteran social worker, was rewarded. (c) Mr. Khanal, whose students always scored excellent marks, never missed any classes. (d) Anish showed me round his house proudly for which he had paid Rs. 40,00,000. (e) Laxmi installed a solar plant for which she paid Rs. 20,000.
17.	(a) The baby, who is catching a ball, is my daughter. (b) There is some juice in the bottle which is not fresh. (c) The place where I've been living for 5 years is called Gathaghar. (d) My son, whom I love very much, lives in America. e) The lady, whose job is to receive the guest, is in the reception desk.
18.	(a) The woman, who is wearing a red saree, is my math teacher. (b) There are some books in the library which are not for reading. (c) The place, where I have been living since 1990, is called Anamnagar. (d) My son went to Australia last week when I bought a car. (e) Ms. Gautam is going to spend her holidays in Bangkok where her son works.
19.	(a) I saw her at the gate where a man was lying. (b) He had spent many years in Pokhara where he was born. (c) Phil, whose forehead was covered in sweat, was an excellent driver. (d) The dog, which loved travelling in fast car, was sitting facing the back window. (e) Alex, who never went any where without his gun, had just taken the gun out of his pocket.
20.	(a) The woman, who is living next door, is a doctor. (b) There are some words which are very difficult to translate. (c) I was looking for a book which got lost yesterday. (d) Mrs. Jha, whose daughter lives in Birgunj is going to spend her holiday there. (e) Hari passed his examination that is good news.
21.	(a) Finally Browne ,with whom Willis had been sharing an office decided to retire . (b) The old house in which the family had lived for 300 years, was finally sold. (c) He proudly showed me round his house for which he had paid 40 lakhs. (d) He became quite fond of his college where he had spent many years of his life. (e) Harold, with whom he had always been in love, finally asked her to marry.
22.	(a) Mary, who had been in a deep sleep, was woken up suddenly by a strange noise. (b) The window ,whicht Mary had locked securely the night before, was wide open. (c) The servants, at whom Mary had laughed only that afternoon for being superstitious, had left. (d) Mary saw an old woman whose mouth was twisted into a toothless grin. (e) Mary heard a strange noise which seemed to come from outside her window.
23.	(a) Diamond, which is used for cutting is a very hard substance. (b) A road, which isn't suitable for cars, leads to the farm. (c) A girl who is now in the hospital, was injured in the accident. (d) A man who told me you were away, answered the phone.

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Unit 4: Attitudes and Reactions

1.	(a) A person who easily loses his temper is bad tempered (b) A person who helps other people is helpful (c) A person who believes whatever you tell him is gullible (d) A person who expect things to happen is optimistic (e) A person who expects bad things to happen is pessimistic
2.	(a) Generous (b) Gullible (c) Modest (d) Optimist (e) Bad tempered
3.	(a) If there is one thing that annoys me it's people who smoke in restaurants (b) If there is one thing that upsets me it's people who are cruel to animals (c) If there is one thing that makes me angry it's people who break promises (d) If there is one thing (that) I hate it's people who spit in the street (e) If there is one thing (that) I detest it's people who interrupt when I'm speaking
4.	(a) If there's one thing that annoys me it's people who throw rubbish on the streets (b) If there's one thing that upsets me it's people who kick the stray dogs (c) If there's one thing that makes me angry it's people who breaks promises (d) If there's one thing that I can't stand it's people who interrupt when I'm speaking. (e) If there's one thing that I object it's people who play loud music at midnight
5.	(a) An unreliable person is someone who lets people down. (b) A stingy person is someone who never buys you a drink. (c) A thick-skined person is someone who is insensitive to the criticism and insult about himself/herself (d) A vain person is someone who has a high opinion of himself (e) An optimistic person is someone who expects good things to happen.
6.	(a) The way political leaders give only speeches offends me. (b) The thing that I like about the doctors is the way they are punctual. (c) What I like about the visitors is the way they are curious about learning my culture. (d) The way ministers involve themselves in corruption annoys me. (e) The thing that I admire about the policemen is the way they petrol round my area at night.
7.	(a) sensitive (b) extrovert, outgoing, partygoer (c) modest (d) bad-tempered/hot-tempered (e) selfish/egoist/ self-centered
8.	(a) vain (b) shy/reserved (c) calm (d) optimistic (e) skeptic
9.	(a) unreliable (b) pessimistic (c) generous (d) stingy (e) inconsiderate
10.	(a) generous/kind (b) credulous (c) modest (d) optimist (optimistic) (e) quick-tempered/short – tempered
11.	(a) If there's one thing that infuriates me it's people who jump queue. (b) If there's one thing that I can't stand it's people who shout unnecessarily gullible (c) If there's one thing (that) I hate it's people who speak lie (d) If there's one thing that depresses me, it's people who complain a lot. (e) If there's one thing that upsets me it's people who break promises.
12.	(a) If there's one thing that annoys me it's people who talk too much (b) If there's one thing that I hate it's people who do not fulfil their commitments. (c) If there's one thing that I hate it's people who give miss calls (d) If there's one thing that I hate it's people who smoke in public places. (e) If there's one thing that upsets me it's people who are cruel to animals.
13.	(a) Bad-tempered (b) Generous (c) Skeptic (d) Sociable/ outgoing (e) Modest
14.	(a) If there is one thing that annoys me it's people who smoke in public places. (b) If there is one thing that upsets me it's people who are cruel to animals. (c) If there is one thing that makes me angry it's people who break public property. (d) If there is one thing I hate it's people who violate rules. (e) If there is one thing I detest it's people who don't help other people in trouble.
15.	(a) generous (b) stingy (c) vain (d) modest (e) reserved
16.	(a) optimistic (b) frivolous, (c) sensitive (d) skeptic (e) reserved/shy
17.	(a) frivolous (b) serious (c) sensitive (d) insensitive (e) modest
18.	(a) If there's one thing (that) I hate it's people who are cruel to pets. (b) If there's one thing that makes me angry it's people who break promises (c) If there's one thing (that) I can't stand it's people who forget to feed the pets. (d) If there's one thing that I can't stand it's people who ring me early in the morning. (e) If there's one thing (that) I hate it's people who speak while eating.
19.	(a) If there is one thing that irritates me it's people who drive very fast (b) If there is one thing that I detest it's people who disturb me when I'm working (c) If there is one thing (that) I hate it's people who don't speak politely with kids. (d) If there is one thing that upsets me it's people who are cruel to animals. (e) If there is one thing (that) I loathe it's people who ring me up early in the morning.
20.	(a) If there's one thing that upsets me it's people who scratch themselves all the time. (b) If there's one thing that terrifies me it's people who drive very fast (c) If there's one thing that I can't stand it's people who smoke in the bus. (d) If there's one thing I can't stand it's people who interrupt me when I'm speaking. (e) If there's one thing I can't stand it's people who have shaggy hair.
21.	(a) quick-tempered (b) stingy (c) modest (d) sceptical (e) frivolous/ light-hearted
22.	(a) If there is one thing that upsets me it's people who are cruel to animals (b) If there is one thing that makes me angry it's people who break promises. (c) If there is one thing (that) I hate it's people who smoke in restaurants. (d) If there is one thing (that) I detest it's people who interrupt when I am speaking. (e) If there is one thing (that) I loathe, it's people who ring me up early in the morning.
23.	(a) embarrassed (b) impressed (c) confusing (d) fascinating (e) depressing.
24.	(a) a person who doesn't let people down. (b) easily loses his/her temper. (c) likes going to parties. (d) doesn't joke about anything. (e) expects bad things to happen.
25.	interesting, confusing, irritating, shocking, offensive
26.	(b) placid/calm (c) optimistic (d) light-hearted (e) sociable (f) sceptical
27.	(a) helpful/considerate (b) inconsiderate (c) pessimist (d) greedy/stingy (e) quick tempered
28.	(i) People who speak several languages. A: What do you think of people who speak several languages? B: Oh, I find them impressive. C: Yes, they impress me too. D: Yes I agree. I get impressed when people speak several languages. (ii) People who talk about themselves. A: What do you think of people who talk about themselves? B: Oh, I find them boring. C: Yes, they bore me, too. D: Yes, I agree. I get terribly bored when people talk about themselves.
29.	(a) is someone who helps other. (b) is someone who never buys you a drink (c) is someone who lets people down. (d) is someone who is not easily upset by criticism or unkind comments. (e) is someone who has high opinion of himself
30.	(a) What I like about my parents is the way they care for me. (b) What I dislike about politicians is the way they do not keep promise. (c) What I like about teachers is the way they love children and teach them. (d) I like the way the businessmen put advertisement on T.V. (e) What I like about the religious leaders is the way they deliver religious speech to us.
31.	(a) If there is one thing (that) I hate it's people who are cruel to animals. (b) If there is one thing (that) I detest it's people who interrupt when I am speaking. (c) If there is one thing (that) I dislike it's people who break promises. (d) If there is one thing (that) I hate it's people who speak while eating. (e) If there is one thing (that) I loathe it's people who ring me early in the morning.

Unit 5: Duration

1.	(a) until (b) for (c) by (d) in (e) for
2.	(a) I borrowed my friend's book for a few days. (b) He stayed in bed until breakfast time. (c) The game was over by 4:30. (d) He saved Rs. 2000 by Dashain. (e) They reached the top of mountain in four hours.
3.	(a) It didn't reach for two week. - It was two weeks before it reached. (b) I didn't sleep till midnight. - It was midnight before I slept. (c) He didn't return the record for six weeks. - It was six weeks before he returned the record. (d) The meeting did not end for three hours. - It was three hours before the meeting ended. (e) I didn't submit the homework till Tuesday. - It was Tuesday before I submitted the homework.
4.	(a) (i) How long did they talk on the telephone? (ii) They talked on the telephone for forty minutes. (b) (i) How long did she take to paint the classroom ceiling? (ii) She painted the classroom ceiling by 6 o' clock . (c) (i) How long did the golfer play golf on Sunday for? (ii) He played golf on Sunday until dusk. (d) (i) How long did the gardener take to mow the lawn? (ii) The gardener mowed the lawn in ten minutes. (e) (i) How long did the typist take to type all her letters? (ii) She typed all her letters by lunch time.
5.	(a) A: How long did they talk to their parents? B: They talked to their parents for 20 minutes. (b) A: How long did they play ball? B: They played ball until the television program came.

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	(c) A: How long did she take to clean the room? B: She finished cleaning the room by lunch time. (d) A: How long did he take to write an essay? B: He wrote an essay in 3 days. (e) A: How long did you take to change the wheel? B: I changed the wheel of my car in 10 minutes.
6.	(a) (i) How long did they play golf for? (ii) They played it until dusk. (b) (i) How long did he take to mow the lawn? (ii) He mowed the lawn in ten minutes. (c) (i) How long did you wait at the bus stop. (ii) We waited at the bus stop for 30 minutes. (d) (i) How long did he take to write all his letters? (ii) He wrote all his letters by lunch time. (e) (i) How long did he take to change the wheel? (ii) He changed the wheel in five minutes.
7.	(a) (i) How long did they play cricket for? (ii) They played it until evening. (b) (i) How long did she take to mow the lawn? (ii) She mowed the lawn in 30 minutes. (c) (i) How long did you wait at the bus stop? (ii) We waited at the bus stop for 45 minutes.. (d) (i)How long did she take to write all the letters? (ii) She wrote all the letters by lunch time. (e) (i)How long did she take to read the whole of *Muna Madan*? (ii) She read the whole of *Muna Madan* in 5 days.
8.	(a) (i) How long did she take to write all her letters? (ii) She wrote all her letters by lunch time. (b) (i) How long did they watch the television for? (ii) They watched the television until their class started. (c) (i) How long did they take to read the whole of *War and Peace*? (ii) They read the whole of *War and Peace* in two weeks. (d) (i) How long did they wait at the bus station? (ii) They waited at the bus station for 4 hours. (e) (i) How long did they talk to their parents? (ii) They talked to their parents for more than one hours.
9.	(a) (i) How long did he telephone his father this morning? (ii) He telephoned his father this morning for twenty minutes. (b) (i) How long did she have a cold? (ii) She had a cold for three days. (c) (i) How long did you take to write all your letters? (ii) I wrote all my letters by lunch time. (d) (i) How long did they take to read the whole story of " Hansel and Gretel"? (ii) They read the whole story of "Hansel and Gretel" in five hours. (e) (i) How long did he watch television for? (ii) He watched television until late movie came on.
10.	(a) (i) How long did he play golf for? (ii) He played golf until dusk. (b) (i) How long did you have to change the wheel? (ii) We changed the wheel in ten minutes. (c) (i)How long did he take to read the whole of War and Peace? (ii) He read the whole of War and peace in two weeks. (d) (i) How long did she watch television? (ii) She watched television until late movie came on. (e) (i) How long did she do some piano practice? (ii) She did Piano practice until bed time.
11.	(a) until (b) for (c) for (d) until (e) in
12.	(a) by (b) until (c) in (d) in (e) by
13.	(a) How long did Mr. Chaudhary talk on the cell-phone? He talked for half an hour. (b) How long did the painter work in the theatre? He worked for 2 hours. (c) How long did class 12 students study English? They studied until eleven O'clock. (d) How long did our receptionist take to type all letters. She typed all letters by lunch time. (e) How long did the young scholars take to read the whole of *'Munamadan'*? They studied in 2 hours.
14.	(a) How long did she take to paint the bathroom ceiling? She painted by six o'clock. (b) How long did they, talk on the telephone? They talked for 20 minutes. (c) How long did you play cricket? We played until dark.
15.	(a) in (b) until (c) until (d) for (e) for
16.	(a) How long did they talk on the phone? They talked on the phone for 20 minutes. (b) How long did he take to mow the lawn? He mowed the lawn in ten minutes. (c) How long did you take to write all your letters? I wrote all my letters by the lunch time. (d) How long did you take to read the whole of "*War and Peace*"? I read the whole of "*War and Peace*" in two weeks. (e)How long did she practice piano?
	or How long did she do some piano practice? She did some piano practice till bed time.
17.	(a) by (b) for (c) for (d) until (e) in
18.	(a) until (b) in (c) for (d) by (e) in
19.	(a) We did all our housework in a couple of hours. (b) The engineer worked in a project for five years. (c) He stayed in bed until lunchtime. (d) The programme was over by half-past nine. (e) She studied medicine by the age of 25.
20.	(a) He stayed in bed until lunch time. (b) I studied French for five years. (c) The train is running on time today. (d) We did some housework for a couple of hours. (e) We did all our housework in a couple of hours. (f) They lived in Palpa until 1990.
21.	(a) She studied medicine by the age of 25. (b) They got the lunch ready by 12.30. (c) He learnt to swim in six weeks. (d) My father ran bookshop for two years. (e) He stayed in bed until lunch time.

Unit 6: Reporting

1.	(a) He urged me to give up smoking. (b) He begged me to lend him the money. (c) He suggested me that I should paint the ceiling yellow. (d) He promised to buy me a bike if I passed grade XII.
2.	(a) He told me that he had been working for four hours. (b) He told me that she had had her meal in the college canteen. (c) He told me that he would do his responsibility honestly. (d) He told me that the students were trying their best for excellent achievement. (e) He told me that the health workers were demanding better remuneration.
3.	(a) He told me that his subject teacher would inform him soon. (b) He told me that the game warden had not been involved in unlawful works. (c) He told me that the culprits were trying to make money easily. (d) He told me that people in remote areas had not got proper health services. (e) He told me that Nepal could be hub for medical science.
4.	(a) He threatened to report to the police if I didn't do what he said. (b) He suggested me that I should repair my gate. (c) He recommended me to spend a week in Pokhara. (d) He urged me to give up smoking. (e) He advised me to buy SAMSUNG mobile.
5.	(a) He told me he would inform him if he saw him. (b) He told me she had been feeling uneasy. (c) He told me Pandey had not been invited to the party. (d) He told me Krishna had his bicycle repaired. (e) He told me they did not play as much football as they used to.
6.	(a) He told me his father was ill. (b) He told me the price of petrol was going to go up. (c) He told me he had had his car serviced. (d) He told me he was reading the book I had lent him. (e) He told me they didn't play as much tennis as they used to.
7.	(a) She agreed to give me my bag back. (b) The boy's father promised to buy him a laptop if he had been good. (c) The neighbour threatened to report to the police if I hadn't done what he had said. (d) The doctor recommended me to spend a week in Bhedetar. (e) He advised me to paint the wall blue.
8.	(a) He told me (that) she would come back soon. (b) He told me (that) she had finished her job. (c) He told me (that) they had paid the dues. (d) He told me (that) they had learned Chinese. (e) He told me (that) he had completed his assignment.
9.	(a) He told me that the children were playing well. (b) He told me that he repaired his bike. (c) He told me that the workers looked as if they had not eaten for weeks. (d) He told me that I had not done all my assignments. (e) He told me that he had not been invited to the party.
10.	(a) He asked me if I had had my meal. (b) He told me that I could take as many books as I liked. (c) He told me that the rate of interest was going down. (d) He asked me if I had finished all my work. (e) He asked me if I had cleaned my room.
11.	(a) He told me that he would return soon. (b) He told me that he had finished his work. (c) He told me that she had not paid the rent. (d) He told me that he had been sick for the long time. (e) He told me that his mother always helped the poor.
12.	(a) He told me that he was from Pokhara. (b) He told me that his father was happy then. (c) He told me that she had been feeling well. (d) He told me that he was reading that book. (e) He told me that the bus fare was not decreasing.
13.	(a) The sales manager accused him of interfering in a private matter. (b) The salesman assured Mr. Lock that he was under no obligation to buy the drill if he did not like it. (c) The student explained that he did not want the book because its pages were torn. (d) The book seller admitted that the pages of the book had been torn- the student had been right all along. (e) The grocery

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	dealer warned him that if he didn't pay the previous balance within seven days, they would have to take legal action.
14.	(a) He/she assured Mr. Lock/him that he would be in absolutely no danger at all. (b) He agreed to give him. (c) He suggested that I should see a doctor (d) He/She begged (me) to help him/her. (e) He denied that he had taken his pen.
15.	(a) He threatened to report to the police. (b) He suggested that I should go to clinic if I could pay. (c) He advised me to try it again. (d) He recommended me to have my car serviced. (e) He once insisted on paying.
16.	(a) He threatened to report to the police if I didn't do what he said. (b) He suggested that I should start medicine if I couldn't bear the pain (c) He insisted on paying. (d) He recommended me to have my bike serviced. (e) He advised me to try once again.
17.	(a) He told me that he had had his hair cut. (b) He told me that he was reading that book I had lent him. (c) He told me that he hadn't been invited to the party. (d) He told me that the price of petroleum product was going to go up. (e) He told me that he would tell her when he saw her.
18.	(a) He threatened to report me to the police if I didn't do what he said (b) He begged me to help him. (c) He recommended me to spend a week in Rara. (d) He promised to buy me an ice-cream if I were good. (e) He suggested that I should paint the ceiling yellow.
19.	(a) Ram invited Shyam to stay for lunch. (b) Ranjeeta apologized for causing trouble. (c) Sita advised Gita to see a doctor. (d) Tashi offered to do the washing up.

Unit 7: Deductions and Explanation

1.	(a) He can't be from Cyprus. (b) He might have been reading. (c) Devkota might have written the poem. (d) She must have passed the entrance.
2.	(a) They must have arrived. (b) She can't be going to marry him. (c) He might have heard you. (d) She can't have forgotten my name. (e) He may have been delayed.
3.	(a) He can't have stolen the money. (b) She may not be at work. (c) He may have been delayed. (d) He might have finished his job. (e) She must be working hard.
4.	(a) A: He's got a lovely suntan…… B: ....so he must be sunbathing. (b) A: She is driving a Ferrari…… B: ....so she must be rich. (c) A: He speaks excellent Spanish…… B: .... so he can't be Nepali. (d) A: He isn't wearing a uniform…….. B: .... so he can't be going to his school. (e) A: I can hear music next door……. B: ....so they must be celebrating.
5.	(a) She can't be having lunch. (b) He may have been delayed. (c) You must be imagining things. (d) He must have been kidnapped. (e) She may be going to ring.
6.	(a) He must be sleeping. (b) He must have been at home. (c) She might not have got the invitation. (d) They can't have taken the bus. (e) She might be absent.
7.	(a) If he was a soldier, he would be wearing a uniform. (b) If he had not been to America, he would not have a US stamp in his passport. (c) If she had been enjoying herself, she wouldn't have left early. (d) If she didn't know English, she would not be listening to the BBC. (e) If he had lived in India, he would have understood the waiter who spoke to him in Hindi.
8.	(a) If it was not his birthday, he wouldn't get a lot of posts this morning. (b) If the table was an antique, it wouldn't only cost him Rs.400. (c) If he was not reading on bed, his bed room light wouldn't be on. (d) If she was not rich, she wouldn't be driving a Mercedes. (e) If she was not French, she wouldn't speak excellent French.
9.	(a) If they were not having an argument, they would not have shut the door. (b) If they were not working hard, they wouldn't have been tired. (c) If she had been working in the bank, I would have seen her there. (d) If she hadn't known English, she wouldn't have been listening to the CNN. (e) If they had gone anywhere, he would have closed the door.
10.	(a) If they didn't have some important business, they would not be rushing. (b) If they were not working hard, they wouldn't have been exhausted. (c) If he was working in the hospital, I would have seen him there. (d) If she was not feeling cold, she would have been trembling. (e) If he hadn't fractured his leg, he wouldn't have been using crutch for several days.
11.	(a) So he must have been sunbathing. (b) So she must have sold her Toyota. (c) So he must be a Spanish. (d) So he can't be a school student. (e) So they must be celebrating birthday party.
12.	(a) The snow must have melted. (b) He might have been tired. (c) They can't have been camping. (d) He might have been listening. (e) They must have stolen the money.
13.	(a) He must have passed the examination because he was working very hard. (b) He can't have taken a bath because he smells awful. (c) They must have been working all day because they look exhausted. (d) You must have seen the Himals because the weather was clear. (e) He must be talking on the phone because the line's engaged.
14.	(a) If the girl child hadn't been kidnapped, she would have been here. (b) If she hadn't known English, she wouldn't have been reading Sunday Times. (c) If he was teaching at college, I would have seen him dealing with the college students. (d) If his parents hadn't been here recently, the fire wouldn't have been in the hearth. (e) If the children had been enjoying recently, they wouldn't have left early.
15.	(a) She might hear me. (b) You must be tired. (c) They can't be busy. (d) He mayn't be listening. (e) They must have been present in the class.
16.	(a) He must be working. (b) She must be ill. (c) He can't smoke. (d) He may be listening. (e) He might have been tired.
17.	(a) The principal might watch you. (b) He may be telling truth. (c) You must be imagining things. (d) They must work honestly. (e) She can't be busy.
18.	(a) He might work hard. (b) They might be studying. (c) He must be honest. (d) She must have been at work. (e) They can't be working.
19.	(a) She must achieve the first position. (b) Nepal must have won the final match. (c) He may be sociable. (d) Many students might be flying abroad. (e) He must teach well.
20.	(a) They can't come. (b) He might be going to take me out. (c) He must have been drinking. (d) He may not be studying. (e) He can't be a Nepali.
21.	(a) My friends must have passed the entrance exam. (b) The umpire might have heard player's voice. (c) You must know the history of our country. (d) Ashok can't be involved in unlawful works (e) You can't have done anything wrong.
22.	(a) He must be working. (b) He might be going to ask me. (c) He can't be French. (d) They must have stolen the money. (e) He may have gone home.
23.	(a) She must have been studying hard. (b) They might be living in Pokhara. (c) We may be winning the game. (d) They can't be our enemies. (e) She mightn't have been writing a letter.
24.	(a) They might be going away. (b) You must be exhausted. (b) She may not have seen you. (d) He might have been tired. (e) They can't have been informed.
25.	(a) They must have gone out. (b) She may/might not have met her friends. (c) They may/might be visiting us. (d) You must have been unopposed. (e) She may/might not have been telling the truth.
26.	(a) You must have been very tired. (b) It can't have been very good. (c) I must have forgotten to turn it off. (d) They can't have known many people. (e) It must be very expensive.
27.	(a) She mightn't have heard you. (b) They must have left. (c) The election may be postponed. (d) There may be peace in Nepal. (e) The gardener can't have been serious.
28.	(a) She must be working. (b) It can't have been snowing. (c) She may have been delayed. (d) He may be telling the truth. (e) The snow must have melted.
29.	(a) (i) He must have migrated here recently. (ii) He can't be famous. (b) (i) They must be at home. (ii) He can't have gone out.
30.	(a) They must have arrived. (b) He may not have heard you. (c) He might have been delayed. (d) They might be going away.
31.	(a) They must have arrived. (b) She can't be having dinner. (c) He may have heard you. (d) He can't have forgotten my name. (e) He might have been delayed.

Unit 8: Advantages and Disadvantages

1.	(a) We might as well give it away. (b) There is no point in asking him English. (c) You ought not to take your children to see that film. (d) There is no point in selling it. (e) We might as well watch TV.
2.	(a) You oughtn't to take your children to see that film. (b) We might as well give it anyway. (c) There's no point in asking him English. (d) You ought to take a pull over. (e) We ought not to talk about it now.
3.	(a) There's no point in investing money in business. The market is down. (b) There's no point in buying electronic gadgets. They save our time. (c) It's not worth selling the old furniture. The new one is very expensive. (d) There's no point in buying new book case. There is not enough space. (e) There's no point in replacing old car with a new one. You are unlikely to take loan from bank.

4.	(a) The drug made it easier for them to relax and enjoy themselves more easily (b) Even the food shortage didn't discourage them from taking the drug (c) The economic crisis forced the government to take some decisive action (d) The new law encouraged them to take the drug even more (e) This allowed them to sit in the sun all day long
5.	(a) There is no point in walking (b) There is no point in asking him. (c) We might as well give it away (d) You ought not to take your children to see that film (e) You ought to get up early.
6.	(a) Being rich and famous enables people to spend their money as they like Being rich and famous discourages people from spending public life (b) Having a freezer enables people to buy much vegetable at once Having a freezer discourages people from buying daily fresh vegetables (c) Practicing English in groups enables people to learn by each other. Practicing English in groups discourages people from doing themselves. (d) Driving a motorbike on highways enables people to drive on speed. Driving a motorbike on highways discourages people from driving with skill. (e) Watching television enables people to spend their time easily. Watching television discourages people from being adventureous.
7.	(a) No, there is no point in investing it. The share market is down. (b) No, there is no point in getting into the trouble. We are in hurry. (c) No, there is no point in keeping an ice-cream for Mary. She doesn't like it. (d) No, there is no point in going to school today. Today is holiday. (e) No, there is no point in making a bookcase. We have an extra already.
8.	(a) There is no point in selling it. (b) There is no point in asking him. (c) You might as well take hot soup. (d) There is no point in arguing about it. (e) We ought not to use the mobile.
9.	(a) There is no point in arguing about these people's character. (b) We ought to take the example of Dil Sobha. (c) We ought not to talk about the news now. (d) We might as well work here. (e) You might as well take a pair of riding boots.
10.	(a) You ought not to take your children to see that film. (b) There is no point in selling it. (c) We might as well give it away. (d) There is no point in asking him. (e) We ought not to talk about it now.

Unit 9: Clarifying

1.	(a) Have you found out if the train has left? (b) Have you any idea if the election results have been announced yet? (c) Do you know if he was alone? (d) I am longing to know what color curtains they bought. (e) Do you know what golf balls are made of?
2.	(a) What are the juniors doing? (b) What do you like to read? (c) What is your relative suffering from? (d) Which size screw did he use? (e) Whose bicycle are you taking?
3.	(a) How long are you staying in Pokhara? (b) Which colour sweater did you buy? (c) Which size shoes do you take? (d) How many of you are there? (e) When did you perform worship?
4.	(a) Which language songs would you like to sing? (b) What time do you get up early in the morning? (c) Where was this book printed? (d) Whose house did they buy? (e) When was he born?
5.	(a) Which flavoured soup are we having today? (b) How was the weather like when you were in London? (c) How are you going to cook those eggs? (d) How many of you are there? (e) Who are you to Margaret?
6.	(a) types of crime (b) ways/ methods of cooking meat (c) brands of car (d) materials (e) ranks in army
7.	(a) Which flavoured soup are we having today? (b) How many of you are there? (c) Which size screw did you use? (d) How was the weather like when you were in Pokhara? (e) Where is the cinema from the station?
8.	(a) I wonder when you came back. (b) Do you know if that mobile phone costs high? (c) Have you any idea what time the film starts? (d) I'm longing to know if I returned your book. (e) I need to know if you are coming next week.
9.	(a) Can you remember what time you woke up this morning? (b) I often wonder what he does for living. (c) I'm longing to know when they are getting married. (d) I've forgotten what your brother's name is. (e) I wonder what time the film starts.
10.	(a) Do you remember if I locked the front door? (b) I wonder what time the film starts. (c) Have you found out if the train has left? (d) Do you know what golf balls are made of? (e) Do you know what colour curtains they bought?
11.	(a) Can you remember what time you woke up this morning? (b) Have you any idea how much normal cell phone costs these days? (c) I wonder what time the play starts. (d) Did you notice if he was alone in the hall? (e) I am longing to know when they are getting engaged.
12.	(a) Did you notice if he was alone? (b) Have you found out if the train has left? (c) I have no idea what time the concert starts. (d) need to know if you are coming tomorrow. (e) Do you remember locked the front door?
13.	(a) Did you notice if he went away? (b) Have you noticed if the has left? (c) I have not been informed what time the meet begins. (d) I want to know now if you are leaving for Pokh tomorrow? (e) Do you remember if I locked the gate?
14.	(a) Types of crime (b) Methods of cooking meat. (c) Brands of (d) Types of material (e) Rank of army
15.	(a) What flavoured soup are we having today? (b) What was weather like when you were in London? (c) How are you going cook those eggs? (d) How many of you are there? (e) Who are yo to Margaret?
16.	(a) What was the weather like when you were in Butwa (b) Whose bike are you planning to drive? (c) How many of you a there? (d) Who are you to Sita? (e) What have you done to my sweater?
17.	(a) Can you remember at what time you woke up this morning (b) Did you notice if he was alone? (c) I'm longing to know wh they are getting married? (d) Have you found out if the train h left? (e) Have you any idea how much touch-screen laptops co these days?
18.	(a) you had already eaten. (b) it was not going to rain. (c) that was $24 a week. (d) you wouldn't smoke. (e) that you had be interested to go with us.
19.	(a) How many of you are there? (b) Who are you to Rita (c) Which flavoured soup are you having today? (d) How was th weather when you were in London?
20.	(a) Have you decided yet when you are coming back from Jomso ? (b) I wanted to know if you ever found your lost book. (c) Th minister wants to know if hailstorm destroyed the crops. (d) D you notice if the lab boy got angry? (e) The CEO wants to kno what my parents are busy with.
21.	(a) How was the weather like when you were in Pokhara? (b) Ho far is Dhangadhi from here? (c) Whose car are you planning t use? (d) What size of screws did you use? (e) What has she don to her leg?
22.	(a) She asked if we would go for a walk. (b) He wanted to kno from me what else I would suggest for the trip. (c) She questione how it felt like to ride a cable car. (d) He repeated that he wa counting on my help.
23.	(a) It wasn't Marco Polo who discovered America. It wa Columbus. (b) It isn't the sun that causes the tides. It is the moo (c) It wasn't Italy where democracy started. It was in England
24.	(a) They asked if they would take sandwiches. (b) He wanted t know if he should buy some spare batteries. (c) He asked what felt like to be hypnotized. (d) She tried to persuade me to help her

Unit 10: Wishes and Regrets

1. Wishes

1.	(a) I wish someone would offer me a job. (b) I wish there was mechanic nearby. (c) I wish I could visit my friends. (d) I wish I ha sat on the shade. (e) If only I had travelled by air
2.	(a) I wish someone would provide me an umbrella. (b) I wish could score good marks. (c) I wish my mother would buy a new fo me. (d) I wish I could get the new one. (e) I wish I could tak shower.
3.	(a) I wish someone would offer me a job. (b) If only someone would take me to hospital. (c) I wish I was at home.
4.	(a) I wish someone would take me for a tour. (b) I wish I cou change my job. (c) If only I went abroad. (d) I wish my parent would be with me. (e) If only I had a beautiful wife.
5.	(a) I wish my parents would support me. (b) If only I visited so romantic places. (c) I wish I could convince myself. (c) If only m wife would love me. (d) I wish I passed my exam.
6.	(a) a. I wish the weather would change soon. b. I wish I could be at home. (b) a. I wish my friends would be with me. b. I wish I could call my mom home. (c) a. I wish someone would give me a lift. b. I wish I could mend it. (d) a. I wish someone would give me loan. b. I wish I could get the things on credit. (e) a. I wish someone would give me a lift. b. I wish I could possess a car.
7.	(a) I wish it would be a sunny day. (b) I wish my friends wo come to visit me. (c) I wish someone would give me a glass water. (d) I wish I could fix it. (e) I wish I could get a bank loan

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8.	(a) (i) I wish someone would accompany me. (ii) I wish I could go out. (iii) I wish my friends visited me. (b) (i) I wish the doctor would be here. (ii) I wish I could go to hospital (iii) I wish I got well soon. (c) (i) I wish the mechanic would be near by. (ii) I wish I could fix it. (iii) I wish I got a lift. (d) (i) I wish my father would come back from the U.K. (ii) I wish I could go abroad. (iii) I wish I was a billionare. (e) (i) I wish the teacher would help me. (ii) I wish I could do the solution. (iii) I wish I had attended the class.
9.	(a) (i) I wish I would get hot water. (ii) I wish I could get heater. (iii) I wish I lit a fire. (b) (i) I wish they would give me a good job. (ii) I wish I could go abroad. (iii) I wish I was rich. (c) (i) I wish a mechanic would make it. (ii) I wish I could get a lift. (iii) I wish I had a car. (d) (i) I wish they would reduce the rent. (ii) I wish I could make my house. (iii) I wish there were free houses. (e) (i) I wish the doctor would treat me. (ii) I wish I could get well soon. (iii) I wish I played out side.
10.	(a) (i) I wish they would switch on the fan. (ii) I wish I could go to the Himalaya. (iii) I wish I had an A/C in my room. (b) (i) I wish they would give me a job. (ii) I wish I could earn a lot. (iii) I wish I went abroad. (c) (i) I wish someone would repair it. (ii) I wish I could get a bike. (iii) I wish someone gave me a lift. (d) (i) I wish my parents would afford for a flat. (ii) I wish I could make my own house. (iii) I wish I had a large room. (e) (i) wish someone would call the doctor. (ii) I wish I could get medicine. (iii) I wish I got well soon.
11.	(a) I wish he would find it. (b) I wish I had a work. (c) I wish I were not in bed with flu. (d) I wish the bank would not ask me. (e) I wish I had recharged it in time.
12.	(a) (i) I wish I had not eaten the pork. (ii) I wish I had not forgotten the map.
13.	(a) I wish my friend would come. (b) I wish someone would bring me medicine. (c) I wish there was workshop nearby. (d) I wish I got a bank loan. (e) I wish I could bring the note from friend.
14.	(a) I wish you'd talk nothing rude about me. (b) I wish you'd be quick to get ready. (c) If only you didn't smoke. (d) I wish you would close the door. (e) If only I could know what you think.
15.	(i) I wish my friends would come to visit me. (ii) If only I had time to sleep. (iii) I wish I could return home.

2. Regrets

1.	(a) I wish I had turned off the gas. (b) I wish I had opened my own business.
2.	(a) I wish I had harvested in time. (b) If only I had travelled by air. (c) I shouldn't have eaten ice-cream. (d) I should have stayed in home only. (e) I shouldn't have gone for night show in theatre.
3.	(a) I wish I hadn't taken off the roof of the car. If I hadn't taken the roof of the car, I wouldn't have suffered from sunstroke. (b) I wish I hadn't travelled by ship. If I hadn't travelled by ship, I wouldn't have had seasick. (c) I wish I'd proposed her in time. If I'd proposed her in time, she wouldn't have refused to marry me. (d) I wish I had left the hotel early. If I had left the hotel early, I wouldn't have been stuck into the hotel room. (e) I wish I slept early last night. If I had slept early last night, I wouldn't have felt sort of sleep.
4.	(i) I wish I had not resigned the job. (ii) I should not have teased her. (iii) I should not have gone out.
5.	(a) I wish I had travelled by airplane. (b) I shouldn't have watched late night movie. (c) I wish I had proposed her later. (d) I wish I had kept it safe. (e) I wish I had repaired it in time.
6.	(a) I could have sent them message on time. I needn't have gone to the public booth. (b) I could have called a doctor. You needn't have gone to hospital alone. (c) I could have gone by bus. I needn't have walked, (d) I could have been economic while shopping. I needn't have carried all money along. (e) I could have taken light cotton clothes. I needn't have carried heavy sweaters and jackets.
7.	(a) I wish I had unplugged my television. If I had unplugged the television, the children wouldn't have watched and then they would have done their homework. (b) I wish I had not lost my passport. If I had not lost it, I would not have spent so many hours looking for it, then and I wouldn't have missed my plane.
8.	(i) If only I had written home to my parents. (ii) If only I had taken my motorbike back home.

Unit 11: Events in Sequence

1.	(a) As soon as they saw the vase, they liked it. (b) As soon as I dropped the chalk, it broke. (c) As soon as he had reached home, he started doing his assignment. (d) As soon as the Prime Minister had resigned, the president called the leader of opposition. (e) As soon as I had paid the bill, I left the restaurant.
2.	(a) As soon as I broke the vase, I burst into tears. (b) As soon as the thief opened the window, the bell rang. (c) As soon as the coordinator had entered the classroom, he started counselling the students. (d) As soon as the programme had been over, the driver started the bus. (e) As soon as I had finished reading the book, I returned it to the library.
3.	(a) As soon as she saw a snake, she screamed. (b) As soon as I had written a letter, I posted it straight away. (c) As soon as the news on television had finished, I went straight to bed. (d) As soon as the mother peeled the banana, she gave it to her baby. (e) As soon as she had brought an ice-cream, she started eating it.
4.	(a) When he had drunk coffee, he asked for another cup. (b) When I sat down, I read my letters. (c) When I heard the news, I was upset. (d) When he put his foot on the brake, nothing happened. (e) When the plane had taken off, the stewardess came up with the orange juice.
5.	(a) As soon as he had seen me, he ran way. (b) As soon as they saw the house, they fell in love with it. (c) As soon as I had written the letter, I posted it straight away. (d) As soon as he had got his exam results, he rang up his parents. (e) He got married again as soon as his wife had died.
6.	(a) As soon as I saw the house, I liked it. (b) As soon as I looked in the fridge, I found a glass of yoghurt. (c) As soon as I pressed the brake, the bike stopped. (d) As soon as he had broken the pot, he threw it away. (e)As soon as the thief had opened the window, he entered the room.
7.	(a) As soon as I broke the vase, I burst into tears. (b) As soon as the Prime Minister had been elected, his supporters cheered. (c) As soon as the thief opened the window, the bell rang. (d) As soon as the teacher had gone into the classroom, he started teaching. (e) As soon as the principal had entered into the hall, he started counseling the students.
8.	(a) As soon as my neighbour had peeled the banana, she gave it to the baby. (b) As soon as I looked into the fridge, I found some oranges. (c) As soon as he kicked the dog, it barked. (d) As soon as I had gone to the shop, I bought a carate of eggs. (e) As soon as I had paid the bill, I left the shop.
9.	(a) As soon as they saw the house they fell in love with it. (b) As soon as I had written the letter I posted it straight away. (c) As soon as the train passed the crossing barrier went up. (d) As soon as he had had his breakfast he left the house. (e) As soon as the television program had finished, I went straight to bed.
10.	(a) As soon as I had made the bed, I felt tired. (b) As soon as I pressed the brake, nothing happened (c) As soon as he pushed the puppy down, it cried. (d) As soon as I had checked the bill, I paid it. (e) As soon as my parents had seen the exam result, they congratulated me.
11.	(a) As soon as he put his foot on the brake, nothing happened. (b) As soon as he had peeled banana, he gave it to the baby. (c) As soon as he kicked the dog, it barked. (d) As soon as he had broken the glass, he picked up all the pieces and threw them away. (e) As soon as I had read the letter, I threw it into the wastepaper basket.
12.	(a) When I looked in the kitchen, I found some fried eggs. (b) When she had drunk the coffee, she asked for another cup. (c) When he put his foot on the brake, nothing happened. (d) When I read this autobiography, I discovered him as a man of multiple intelligent. (e) When he kicked the ball to the post, it got punctured.
13.	(a) As soon as I had filled in the form, I submitted it. (b) As soon as I had told him my problem, he offered me a help. (c) As soon as the concert had finished, I went to my place. (d) As soon as the

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	class had ended, he left the school. (e) As soon as he had got the gift, he called up his friends.
14.	(a) Very sensibly, he measured the room before he ordered the carpet. (b) Very sensibly, teacher didnot leave the classroom until he had checked his answer. (c) Very sensibly, they did not put it up for sale until they'd had their house decorated. (d) Very sensibly, he turned off the electric blanket before he got into the bed. (e) Very sensibly, he didn't tear off the envelope until he had checked the address.
15.	(a) a→ The mobile thief had only just stolen the mobile when the police caught him red-hand. b→ No sooner had the mobile thief stolen the mobile than the police caught him red-handed. (b) a→ The new film hall had only just begun when it was destroyed in blaze. b→ No sooner had the new film hall begun than it was destroyed in blaze. (c) a→ The principal had only just started when he resigned from the post. b→ No sooner had the principal started than he resigned from the post. (d) a→ The Sahara club player had only just started the game when he broke his leg. b→ No sooner had the Sahara club player started than he broke his leg. (e) a→ The plane had only just taken off when it was hijacked. b→ No sooner had the plane taken off than it was hijacked.
16.	(a) When she had peeled the banana, she gave it to the boy. (b) When I looked in the fridge, I found something. (c) When the security man had searched our hand baggage, we boarded the plane. (d) When he put his foot on the brake, nothing happened. (e)When I had paid my bill, I left the restaurant.
17.	(a) No sooner had Rita gone to bed than she heard a strange noise. (b) No sooner had the plane taken off than two hijackers walked into the cabin. (c) No sooner had the new cinema hall been opened than it was destroyed by fire. (d) No sooner had they come back from their honeymoon than they had a terrible quarrel. (e) No sooner had the washing machine been repaired than it broke down again.
18.	(a) He read the instructions before he switched on the machine. He didn't switch on the machine until he'd read the instructions. (b) He measured the room before he ordered the carpet. He didn't order the carpet until he'd measured the room. (c) He checked his answer before he left the exam room. He didn't leave the exam room until he'd checked his answer. (e) They had their house decorated before they put it up for sale. They didn't put the house for sale until they'd had it decorated. (e) He turned off the electric blanket before he got into the bed. He didn't get into the bed until he'd turned off the electric blanket.
19.	(a) No sooner had my grandfather retired than he had a heart attack. (b) No sooner had Sharma gone to bed than he heard a strange noise. (c) No sooner had the plane taken off than the three hijackers walked into the cabin. (d) No sooner had the new exhibition hall been opened than it was destroyed by fire. (e) No sooner had we had the washing machine repaired than it broke down again.
20.	(i) (a) We had only just gone to bed when my brother heard a strange noise. (b) No sooner had we gone to bed than my brother heard a strange noise. (ii) (a) I had only just sat down to watch my favourite programme when some friends turned up. (b) No sooner had I sat down to watch my favourite programme than some friends turned up. (iii) (a) The auditorium had only just been opened when it was destroyed by fire. (b) No sooner had the auditorium been opened than it was destroyed by fire. (iv) (a) We had only just had the machine repaired when it broke down again. (b) No sooner had we had the machine repaired than it broke down again. (v) (a) I had only just finished my exams when I got a job offer. (b) No sooner had I finished my exams than I got a job offer.
21.	(a) (i) Very wisely, he measured the room before he ordered the carpet. (ii) Very wisely, he didn't order the carpet until he'd measured the room. (b) (i) Sensibly, he checked his answers before he left the exam room. (ii) Sensibly, he did not leave the exam room until he had checked his answers.
22.	(a) When she had peeled the banana, she gave it to the baby. (b) When I looked in the fridge, I found some sausages. (c) When he kicked the dog, it barked. (d) When the plane had taken off, the stewardess came round with orange juice.
23.	(a) As soon as the chief guest arrived, the programme started. (b) No sooner had the thief opened the window than the police came. (c) When the police had searched the car, he found a gun in it. (d) As soon as the teacher had gone into the classroom, the students asked a lot of questions. (e) When I had made the bed, my husband came to sleep.

Unit 12: Comparison

1.	(a) Our teacher was not as old as I had imagined. (b) They did not help me as much as they could have. (c) The car is not as quiet as it used to be. (d) She wasn't as unfriendly as I had expected her to be. (e) I didn't enjoy the book as much as you said I would.
2.	(a) They didn't come as few people as they had been invited. (b) My teacher wasn't as old as I had imagined him to be. (c) He doesn't work as hard as his parents would like him to do. (d) They didn't help me as much as they could have. (e) I didn't enjoy the film as much as you said I would.
3.	(a) height (b) width (c) thickness (d) weight (e) speed
4.	(a) (i) Standard Bed is four times as expensive as Ordinary Bed. (ii)Ordinary Bed is a fourth the price of Standard Bed. (b) (i) Colour TV is almost four times as expensive as Black and White TV. (ii)Black and White TV is almost a fourth the price of Colour TV. (c) (i) Cotton Gloves are almost twice as expensive as Woolen Gloves. (ii)Woolen Gloves are almost half the price of Cotton Gloves. (d) (i) Steel Spoon is almost twice as expensive as Aluminum Spoon. (ii)Aluminum Spoon is almost half the price of Steel Spoon. (e) (i) Standard Jacket is almost three times as expensive as Local Jacket. (ii)Local Jacket is almost a third the price of Standard Jacket.
5.	(a) Pilot pen is about three times as expensive as Gel pen. - Gel pen is about a third the price of pilot pen. (b) Cotton pants are about two times as expensive as Jeans Pants. - Jeans pants is about half the price of cotton pants. (c) Leather gloves are about three times as expensive as woollen gloves. - Woollen gloves is about a third the price of leather gloves. (d) Colour T.V. is about the four times as expensive as Black and White TV. - Black and White TV is about a fourth the price of the colour TV. (e) Mustard oil is about two times as expensive as sunflower oil. - Sunflower oil is about half the price of the mustard oil.
6.	(a) Steel tray is about three times as expensive as Aluminium tray. - Aluminium tray is about a third the price of steel tray. (b) Foreign sweater is about two times as expensive as local sweater. - Local sweater is about a half the price of foreign sweater. (c) Colour T.V. is about three times as expensive as Black and White TV. - Black and White TV is about a third the price of the colour TV. (d) Kantipur is about two times as expensive as the Kathmandu Post. - The Kathmandu Post is about a half the price of Kantipur. (e) Basmati rice is about two times as expensive as local rice. - Local rice is about a half the price of 'Basmati' rice.
7.	(a) height (b) width (c) thickness (d) weight (e) speed
8.	(a) He doesn't work as hard as his parents would like him to do. He doesn't work harder than his parents would like him to do. (b) They didn't help me as much as I had expected. They helped me less than I had expected. (c) She was more furious than I had expected her to be. She was not as calm as I had expected her to be. (d) My principal madam was far younger than I had imagined. My principal madam was not quite as old as I had imagined. (e) I didn't enjoy the film as much as you had told me. I enjoyed the film less than you said I would.
9.	(a) (i) Kshitiz has obtained far more marks than Yash. (ii) Yash has not obtained nearly as much mark as Kshitiz. (b) (i) My shoes are a lot more expensive than yours. (ii) Your shoes are not nearly as expensive as mine. (c) (i) Kathmandu-Changunarayan road is not nearly as long as Kathmandu-Dhulikhel Road.

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	(ii) Kathmandu-Dhulikhel road is considerably longer than Kathmandu-Changunarayan Road (d) (i) Bhairawa is slightly hotter than Narayangarh (ii) Narayangarh is not nearly as hot as Bhairawa (e) (i) Madan's experience is a bit more than Hari's (ii) Hari's experience of teaching is not quite as much as Madan's.
10.	(a) The exam this year wasn't as easy as it usually is. (b) My landlady was not as old as I had imagined her to be. (c) He does not work as hard as his parents would like him to. (d) They did not help me as much as they could have done. (e) They did not come as few as I had invited
11.	(a) Double room costs about twice as much as single room. OR Single room costs about half the price of double room. (b) Cezanne's landscape in Province costs thrice as expensive as Rembrandt portrait of a merchant. OR Rembrandt portrait of a merchant costs a third the price of Cezanne's landscape in Province (c) The journey, from Dover to Boulogne by car ferry takes thrice as much time as by Hovercraft. OR The journey, from Dover to Boulogne by Hovercraft takes a third the item car ferry. (d) London-Glasgow journey by British Airways takes on fifth as much time as British Rail. OR London-Glasgow journey by British Airways costs almost twice as much as by British Rail. (e) Americans killed since 1900 in road accidents are five times as many as those killed in war.
12.	(a) Jane got far more marks than Paul in the exam. (b) My house is far cheaper than your house. (c) Today is quite hotter than it was yesterday. (d) Paul is slightly older than Jane. (e) Pokhara-Kathmandu highway is far longer than Banepa-Kathmandu highway.
13.	(i) (a) The exam this year was more difficult than it usually is. (b) The exam this year was not as easy as it usually is. (ii) (a) My landlady was younger than I had imagined her to be. (b) My landlady was not as old as I had imagined her to be. (iii) (a) He works less hard than his parents would like him to do. (b) He doesn't work as hard as his parents would like him to do. (iv) (a) I have managed to do less work today than I had hoped to do. (b) I couldn't do work today as much as I had hoped to do. (v) (a) They helped me less than they could have. (b) They didn't help me as much as they could have.
14.	(a) He drinks much more than he's supposed to. (b) You got up earlier than you needed to. (c) The room was actually much cheaper than I had thought it would be. (d) During that flight, I was much more frightened than I've ever been.

Unit 13: Processes

1.	(a) The balloon expands. (b) The cement sets. (c) The blood congeals. (d) The rice swells. (e) The sugar dissolves.
2.	(a) When you boil water, you pour into tea pot. (b) When you have turned off light, you change the bulb. (c) When you turn on gas, you light gas. (d) When you meet stranger, you shake hands. (e) When you have eaten meal, you pay the bill.
3.	(a) You should check the bills before you pay it. (b) You should check the ticket before you get into the bus. (c) You should clean the wound before you bandage it. (d) You should buy a gift before you go to a birthday party. (e) You should ask for permission before you get inside the class.
4.	(a) You shouldn't come out of the shop until you have paid the bill. (b) You shouldn't get in the house until you have taken off the shoes. (c) You shouldn't go to bed until you have brushed your teeth. (d) You shouldn't bathe the baby until you have tested the temperature of the water. (e) You shouldn't start driving the car until you have got driving license.
5.	changes in size- contract; solids becoming liquid- melt; liquid becoming solid- freeze; liquids becoming gas- evaporate; gases becoming liquid- condense
6.	(a) You shouldn't go out until you have closed your windows. (b) You shouldn't drive the car until you have got a driving license. (c) You shouldn't go to bed until you have brushed your teeth. (d) You shouldn't bathe the baby until you have tested the temperature of the water. (e) You shouldn't open other's gate until you have rung the door bell.
7.	(a) You should wash your hand before you eat. (b) You should close your windows before you go out. (c) You should have some driving lessons before you take your driving test. (d) You should clean your teeth before you go to bed. (e) You should test the temperature of the water before you bathe the baby.
8.	(a) When you meet stranger, you shake hands. (b) When you have eaten the meal, you pay bills. (c) When you boil the water, you pour in teapot. (d) When you have arrived the border, you show the passport

Unit 14: Prediction

1.	(a) The price of bread is sure to go up within a few weeks. (b) There is likely to be more fighting in the capital. (c) They are unlikely to move this summer. (d) In ten years' time, everyone is sure to have a digital watch. (e) A new teacher is sure to be appointed soon.
2.	(a) The price of petrol is sure to go up after Tihar. (b) A new principal is sure to be appointed soon. (c) There are likely to be all the Ministers at the meeting. (d) The farmers are certain to grow more crops this year. (e) The government is unlikely to increase the allowance.
3.	(a) The stationery could open this week. (b) A new CEO is sure to be appointed soon. (c) The price of edible oil is likely to go up again. (d) There definitely won't be much price hike of essential commodities this year. (e) There are unlikely to be many patients of heart problems.
4.	(a) The price of gas is likely to go up again in a few months. (b) Qur former principal is unlikely to be back. (b) A new chairman is sure to be appointed soon. (c) The letter is likely to arrive this week. (e) There isn't sure to be much food problem this year.
5.	(a) The textbooks could arrive this week. (b) A new manager is sure to be appointed soon (c) There definitely won't be much power cut this year. (d) There are unlikely to be many visitors this year. (e) The price of fuel is likely to increase in a few months.
6.	(a) The price of edible oil is sure to go up within few weeks. (b) There are sure to be few books left. (c) The school teacher is unlikely to go on a strike. (d) The new principal is unlikely to arrive. (e) There is likely to be more power cut next year.
7.	(a) He is unlikely to arrive. (b) By the end of this century, cars are likely to be obsolete. (c) In ten years' time, everyone is sure to have a smartphone. (d) A new chairman is sure to be appointed soon. (e) The price of petrol is sure to go up within this month.
8.	(a) The transport workers are unlikely to go on strike. (b) The vice-principal is unlikely to arrive. (c) The price of everyday needs is sure to go up if there is election for parliament. (d) The Nepalese government isn't sure to ban the students' union in Government College. (e) There is certain to be a few papaya trees in the garden
9.	(a) The price of bread is sure to go up within a few weeks. (b) The miners are unlikely to go on strike. (c) The government is unlikely to make its policy implemented easily. (d) A lot of people are likely to take part in the mass meeting. (e) In five years time every one is sure to have a laptop.
10.	(a) There are likely to be a lot of tourists there. (b) She is sure to be able to walk again soon. (c) There is unlikely to be much snow this winter. (d) A new chairperson is bound to be appointed soon. (e) New plants will never to grow on the wetland.
11.	(a) We can't have a picnic unless it is a nice day. (b) Don't leave the TV on unless you are watching it. (c) We can't do the job unless we get help. (d) I wouldn't buy the picture unless I liked it.
12.	(a) The price of bread is sure to go up within a few weeks. (b) He is unlikely to arrive. (c) They are unlikely to move out this summer. (d) Lots of people are likely to be at the meeting.

Unit 15: News

1.	(a) It is supposed to be unlucky to walk under ladder. (b) Maldives is supposed to be slowly sinking into the sea. (c) Dinosaurs are supposed to have lived for many years. (d) He is supposed to have been born in Lumbini Province.
2.	(a) Wild animals are supposed to eat spiders. (b) The universe is supposed to be getting hotter. (c) She is supposed to have been born in a flying plane. (d) They are supposed to have twelve children. (e) The earth is supposed to be round.
3.	(a) The sun is supposed to be becoming hotter. (b) She is supposed to have been born on board a ship. (c) Prices of every day needs are supposed to be decreasing. (d) She's is supposed to have been a lorry driver at one time. (e) Garlic is supposed to stop you catching a cold.
4.	(a) It is supposed to be unlucky to walk under a ladder. (b) She is supposed to have been a bookseller once. (c) Phoenix is supposed to have lived for three hundred years. (d) The universe is supposed to be expanding all the time. (e) Onion is supposed to be good for health.
5.	(a) It is supposed to be unlucky to walk under a ladder. (b) Garlic is supposed to stop you catching a cold. (c) He's supposed to have been born on board a ship. (d) The universe is supposed to be expanding all the time. (e) She is supposed to have completed her study.

6.	(a) The sun is supposed to be bigger than the earth. (b) He is supposed to be living in Birgunj. (c) She's supposed to have been killed one week ago. (d) It is supposed to rain on 15th of Ashadh. (e) Mr. Pandey is supposed to have ten children.
7.	(a) He is thought to have taken to America when he was seven by his parents. (b) He is rumoured to be living on a remote island. (c) He is believed to have been married five times. (d) He is thought to have had a serious heart attack recently. (e) He is estimated to be worth five billion dollar.
8.	(a) He is supposed to be selfish. (b) Hitler is supposed to have been killed himself. (c) There are supposed to be lots of beggars in the USA. (d) Maldives is supposed to be slowly sinking into the sea. (e) She is supposed to have been born on board a ship.
9.	(a) Methuselah is supposed to have lived for more than 300 years. (b) He is supposed to have been born on board a ship. (c) Venice is supposed to be slowly sinking into the sea. (d) Garlic is supposed to stop you catching cold. (e) Alsatians are supposed to make good pets.
10.	(a) I'm told that giving a lot of holidays is the problem of this college. (b) Apparantly hypnotized is the state in which you are interested in someone or something in such a way that you can think of nothing else. (c) People say that living in Hollywood is luxurious. (d) Alsatians are supposed to make good pets. (e) People say that "Balidan" is a social movie.
11.	(a) A dog is supposed to be a good pet. (b) I'm told our country is facing economic crisis. (c) Our prime minister is supposed to be a rebellious leader. (d) They say Nepali economy is improving nowadays. (e) I hear American Indians live traditional life.
12.	(a) Elephants are supposed to have long memories. (b) It is supposed to be unlucky to drive when cat crosses the road. (c) Lord Shiva is supposed to have had a garland of snake. (d) Garlic is supposed to stop you catching a cold. (e) Herbalists are supposed to have a control over the unseen forces.
13.	(a) The universe is supposed be expanding all the time. (b) Mina is supposed to have been born on board a ship. (c) The different programmes are supposed to be running at college. (d) Mrs. Jackson is supposed to have lived for more than two years. (e) The groundwater is supposed be running short in Kathmandu.
14.	(a) It is supposed to rain on the day of Teej. (b) It is supposed to be unlucky to walk under the ladder. (c) Garlic is supposed to stop you catching a cold. (d) The universe is supposed to be expanding all the time. (e) The businessmen are supposed to be hiding food stuff.
15.	(a) More than thirty million Americans are supposed to have been killed in 1915 and 1916. (b) King Cobra is supposed to be most dangerous. (c) Elephants are supposed to have a good memory. (d) Sneezing is supposed to be the sign of evil. (e) It is supposed to rain on the day of Shivaratri.
16.	(a) The earth is supposed to be round. (b) Elephants are supposed to have good memories. (c) It is supposed to be unlucky to sit under the ladder. (d) Birman is supposed to have been a lorry driver. (e) Consumption of yoghurt on the day of exam is supposed to bring good luck.
17.	(a) Elephants are supposed to have very long memories. (b) It is supposed to be good to take fruits after the meal. (c) Pokhara is supposed to be sinking every day. (d) Turmeric is supposed to be an antibiotic. (e) Millions of people are supposed to offer prayer every year at Pashupatinath.
18.	(a) Alsatians are supposed to make good pets. (b) The earth is supposed to be becoming hot. (c) People are supposed to be making good fortune by selling orange. (d) Horse is supposed to be more intelligent than other animals. (e) Birds are supposed to be used as messengers of god.
19.	(a) Onion is supposed to be good for health. (b) Sanu is supposed to have been insomniac. (c) There is supposed to be a large snake at Pashupatinath. (d) It is supposed to be unlucky to walk or drive when a cat crosses the road. (e) January is supposed to be a cold month of the year.
20.	(a) Garlic is supposed to stop you catching cold. (b) The universe is supposed to be collapsing by 2015. (c) Kathmandu is supposed to be getting over populated. (d) She is supposed to have been born in flying plane. (e) The students are supposed to waste their golden time just kidding.
21.	(a) Media men are supposed to earn a lot. (b) Teaching job is supposed to be highly honourable. (c) Political leaders are not supposed to be honest enough. (d) Market price is supposed to be uncontrolled. (e) The rebel's weapons are supposed to have come across the border by road.
22.	(a) The universe is supposed to be expanding all the time. (b) Venice is supposed to be slowly sinking into the sea. (c) It is supposed to be unlucky to walk under a ladder. (d) He is supposed to have been a lorry driver at one time. (e) She is supposed to have been an insomniac.
23.	(a) There's supposed to have been a robbery in the High Street. (b) A tiger is supposed to have been on the loose. (c) The universe is supposed to be expanding all the time. (d) she's supposed to have been born on board a ship. (e) Garlic is supposed to stop you catching a cold.
24.	(a) He's supposed to be terribly stingy. (b) He's supposed to be living in Paris. (c) He's supposed to have been a lorry driver at one time. (d) Marilyn Monroe is supposed to have been an insomniac. (e) Rajesh is supposed to have got married.
25.	(a) The earth is supposed to be round. (b) The environment of Kathmandu is supposed to be deteriorating every year. (c) Watching television is supposed to be a waste of time. (d) She is supposed to have been killed a week ago. (e) The man is supposed to have been in his late 80s.
26.	(a) Madhav is supposed to eat spiders. (b) The universe is supposed to be getting hotter. (c) The terrorists are supposed to have robbed a bank a few days ago. (d) She is supposed to have been born in flying plane. (e) Mr. Chaudhary is supposed to have 12 children.
27.	(a) It's supposed to be unlucky to walk under a ladder. (b) Garlic is supposed to stop you catching a cold. (c) The universe is supposed to be expanding all the time. (d) She is supposed to have been born in a flying plane. (e) Venice is supposed to be sinking slowly into the sea.
28.	(a) There is supposed to be a monster in Loch Ness (b) Garlic is supposed to stop you catching a cold (c) Marilyn Monroe is supposed to have been an insomniac (d) Methuselah is supposed to have lived for more than 300 years.

Unit 16: Revision

1.	(a) I was asked some difficult questions at the interview. (b) How much will you be paid? (c) Empty bottles must not be thrown away. (d) Have you been shown what to do? (e) Weren't you ever taught how to behave?
2.	(a) It took her two hours to solve if all the problems. (b) I found his speech impressive. (c) Meera said that she would do her work herself she had enough time. (d) He seems to have lived most of his life with his wife. (e) Have you ever been shouted at?
3.	(a) She was pulled down. (b) The house has been turned into offices. (c) The whole work will be finished by 6 o'clock. (d) The old house was being dismantled. (e) I was asked a lot of questions by the police.
4.	(a) You might as well go to picnic. (b) There is no point in complaining. (c) He is supposed to be stingy one. (d) If only I could read the sign. (e) I wish I was not so tired.
5.	(a) I wish I changed my job. (b)I did not look both sides before I crossed the road/ I crossed the road before I had looked both sides. (c) A credit card makes it easier to do shopping in a shopping mall if you don't have cash. (d) No, he isn't. It is Suraj who is coming to supper. (e) It takes one week to deliver a letter.
6.	(a) It took him 15 minutes to complete the race. (b) They found his behavior impressive. (c) Gopal told me that the earth moves round the sun. (d) He seems to be the inhabitant of Pokhara. (e) Have you ever been laughed at?
7.	(a) I wish he had borrowed the money from me. (b) The distance was so long that I could not complete in one day. (c) As soon as I had met my friend, I started telling her: a story. (d) She doesn't call me thinking that I'm always out of home. (e) My father prevented me from going to cinema.
8.	(a) He looks as if he loves her so much. (b) There's no point in asking him English. (c) If only I lived my whole life in Hollywood. (d). As soon as they had moved in, they gave a house warming party. (e) If there's one thing I can't stand it's people who drive carelessly.
9.	(a) It took her two hours to solve all the problems. (b) I found his speech very impressive. (c) Meera said that she would do her work herself if she had enough time. (d) He seems to have lived most of his life with his wife. (e) Have you ever been shouted at?
10.	(a) I wish he told the truth. (b)As soon as he had climbed the tree, he jumped off/of it. (c) The shirts were so cheap that I bought three at a time. (d) They have built a special fence to prevent the animals from getting in. (e) If you had been at home, I would have telephoned you.

11.	(a) I hate people twisted. (c) I ad people laughing at
12.	(a) She offered (c) She offered to (e) She offered m
13.	(a) Doing tests (b) John said tha him an hour to do (e) If there's one say 'thank you'.
14.	(a) All you have rectangle on th (c) I should not mains before I turned off the r friends with pe

11.	(a) I hate people interrupting me. (b) I hate having my arms twisted. (c) I admire having my English corrected? (d) I hate people laughing at me. (e) I hate people scratching my back.
12.	(a) She offered me a sandwich. (b) She offered me a drive. (c) She offered to let her carry it. (d) She offered me a help. (e) She offered me a seat or She offered to sit down.
13.	(a) Doing tests isn't nearly as interesting as having lessons. (b) John said that he would come if he had enough time. (c) It took him an hour to do all the shopping. (d) I found his speech impressive. (e) If there's one thing that gets on my nerves it's people who don't say 'thank you'.
14.	(a) All you have to do is to ensure that everything lies within the rectangle on the screen and click. (b) I wish I was on a holiday. (c) I should not have criticized his behaviour. (d) I didn't turn off the mains before I touched the wire. I touched the wire before I had turned off the mains. So I am in the hospital. (e) I generally make friends with people who doesn't let people down.
15.	(a) He has got a lovely suntan. (b) She is carrying a handbag. (c) He always wears a uniform while on duty. (d) My brother speaks excellent English.
16.	(a) A young couple bought the house. But they didn't live there long. (b) I have lost my purse. I can't find it anywhere. (c) I felt very tired. When I got home, I went straight to bed. (d) The house was very quiet when I got home. Everybody had gone to bed.
17.	The palace was built in 1827 and today it is regarded as the finest Victorian building in the country. A number of changes have been made since it was built, but the front of the building has not been changed.
18.	(a) I think they are going to declare war. (b) They've been mending the road since last week. (c) I find people who spit in the street offensive. (d) People who are always complaining depress me.

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अनिवार्य नेपाली

नयाँ पाठ्यक्रम- २०६७

पूर्णाङ्क: १०० | अध्यापन घण्टा: १२०

पाठ्य विषयवस्तु

एकाइ १	पाठ	**कविता: नेपालै नरहे** - माधव घिमिरे
	व्याकरण	(अ) नेपाली वर्ण (कथ्य र लेख्य) को पहिचान (आ) (क) स्वर (ख) व्यञ्जन उच्चार्य व्यञ्जन वर्णको वर्गीकरण (स्थान, प्रयत्न, घोषत्व र प्राणत्व)
	बोध	सामाजिक विषय (भाषा, जाति र संस्कृति) सम्बन्धी अनुच्छेदको बोध
	अभिव्यक्ति	- कविताको भावार्थलेखन, - सामाजिक/ सांस्कृतिक विषयमा अनुच्छेदलेखन
	पाठ्यभार	७ घण्टा
एकाइ २	पाठ	**कथा: छिमेकी** - गुरूप्रसाद मैनाली
	व्याकरण	(अ) नेपाली अक्षरको पहिचान (आ) नेपाली अक्षरका प्रकार (स्व, स्वव्य, व्यस्व, व्यस्वव्य व्यव्यस्व, व्यव्यस्वव्य व्यव्यव्यस्व) (इ) शब्दलाई अक्षरमा विभाजन
	बोध	वातावरण र स्वास्थ्यसम्बन्धी अनुच्छेदको बोध (प्रदूषण र मानवस्वास्थ्य विषयक) (अनुच्छेदको पठन विषयवस्तु तथा भाषा बोध)
	अभिव्यक्ति	-कथासार लेखन
	पाठ्यभार	७ घण्टा
एकाइ ३	पाठ	**निबन्ध: आइमाई साथी** - श्यामप्रसाद शर्मा
	व्याकरण	(अ) तत्सम र आगन्तुक शब्दको वर्णविन्यासका प्रमुख समस्या क्षेत्र र त्रुटिहरूको पहिचान तथा निराकरण (आ) शब्दवर्ग: नाम, सर्वनाम, विशेषण र क्रियाको पहिचान (इ) भाषिक त्रुटि निराकरणमा शब्दकोशको प्रयोग र अभ्यास
	बोध	निवन्धको अनुच्छेदवाट बोध र वुँदाटिपोट
	अभिव्यक्ति	लैङ्गिक समतासम्बन्धी अनुच्छेदलेखन
	पाठ्यभार	८ घण्टा
एकाइ ४	पाठ	**कथा: मधुमालतीको कथा** - रमेश विकल
	व्याकरण	(अ) लेख्य चिह्न र तिनको प्रयोग: पूर्णविराम, अर्धविराम, अल्पविराम, कोष्ठ, विकल्पवोधक, प्रश्नविराम, उद्गार, उद्धरण, विस्मयसूचक, निर्देशक र योजक चिह्नको पहिचान र प्रयोग (आ) शब्दवर्ग: नामयोगी, क्रियायोगी, संयोजक, विस्मयादिवोधक र निपातको पहिचान
	बोध	भूगोलसम्बन्धी अनुच्छेदको वोध र वुँदाटिपोट
	अभिव्यक्ति	- पात्रको परिचय लेखन - अनुच्छेदमा चिह्न प्रयोग
	पाठ्यभार	८ घण्टा
एकाइ ५	पाठ	**निबन्ध: भलादमी** - लक्ष्मीप्रसाद देवकोटा
	व्याकरण	नेपाली शब्दको पहिचान, प्रकार र कार्य (अ) शब्दको पहिचान (आ) शब्दको प्रकार (क) स्रोतको आधार- तत्सम, तद्भव, आगन्तुक र अनुकरणात्मक समेत. (ख) संरचनाको आधार-मूल र व्युत्पन्न (ग) रूपायनको आधार- विकारी र अविकारी
	बोध	निवन्धको मूल विचार र आशयको वोध
	अभिव्यक्ति	- निवन्धको मूलभाव/विचारको प्रस्तुति - निवन्धलेखन (सामाजिक, सांस्कृतिक विषयमा आधारित)
	पाठ्यभार	७ घण्टा
एकाइ ६	पाठ	**कविता: हर्कबहादुर** - दिनेश अधिकारी
	व्याकरण	क. उपसर्गद्वारा शब्दनिर्माण: (अ) अ, अन, कु, वि, वे, वद, गैर, ना (आ) अ, अन्, अधि, अनु, अभि, अति, अव, अप, उप, आ, उत्, दु, दुर, दुस्, नि, नि:, निर्, निस्, परा, परि, प्र, प्रति, वि, सम, सु (ख) द्वित्व प्रक्रियाद्वारा शब्दनिर्माण (पूर्ण, आंशिक र आपरिवर्तित द्वित्व)

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	बोध	शिक्षासम्बन्धी अनुच्छेदको बोध
	अभिव्यक्ति	निर्धारित अनुच्छेदको सङ्क्षेपीकरण
	पाठ्यभार	१० घण्टा
एकाइ ७	पाठ	**उपन्यास: एक चिहान (१ - १६ परिच्छेद) -हृदयचन्द्रसिंह प्रधान**
	व्याकरण	(क) प्रत्ययद्वारा शब्दनिर्माण: (अ) अक्कड, अत, अन्त, आइ, आइँ/याइँ, आउ, आली, आलु, आवट, आहा/याहा, इया, (आ) इयार, इलो, ई, उवा, ए, एली, ओ, ओट, औली/यौली, ती, पन/पना, ली, ले (इ) अक, अन, अनीय, इक, इत, ई, ईन/ईण, ईय, क, तर, तम, तव्य, ता, ति, त्व, मय, मान, वान, य (ख) समास: अव्ययीभाव, तत्पुरुष, कर्मधारय, द्विगु (विग्रह र समास दुवै) (उपन्यासको अंशवाट प्रत्यय लागेका व्युत्पन्न शब्दको खोजी गरी थप शब्दनिर्माण तथा निर्धारित अंश र अनुच्छेदवाट समस्त शब्दको खोजी
	बोध	निर्धारित अंशवाट वुँदाटिपोट र सङ्क्षेपीकरण
	अभिव्यक्ति	पात्र परिचयलेखन
	पाठ्यभार	१० घण्टा
एकाइ ८	पाठ	**निबन्ध: म फूल लिएर आउनेछु -सुधा त्रिपाठी**
	व्याकरण	(क) समास प्रक्रियाद्वारा शब्दनिर्माण- द्वन्द्व र वहुव्रीहि समास (विग्रह समेत) (ख) सन्धि र सन्धि भएका शब्दको पहिचान (ग) वाक्यको पहिचान र प्रयोग -उद्देश्य र उद्देश्य विस्तार, -विधेय र विधेय विस्तार -क्रियाका काल (भूत अभूत) -पक्ष: सामान्य, अपूर्ण, पूर्ण, अज्ञात, अभ्यस्त- क्रियाका भाव: सामान्य, आज्ञा, इच्छा, सम्भावना र सङ्केत
	बोध	निर्धारित अंशको पठन र विषयबोध (निर्धारित अंशको अनुच्छेदवाट वुँदाटिपोट गरी सङ्क्षेपीकरण)
	अभिव्यक्ति	- सरल वाक्य (उद्देश्य, उद्देश्य विस्तार, विधेय, विधेय विस्तार भएका) मा कुनै विषयवस्तु, घटना आदिको वर्णन -विभिन्न काल र पक्षको प्रयोग गरी अनुच्छेद लेखन- विभिन्न भावका क्रियाको प्रयोग गरी अनुच्छेद लेखन ।
	पाठ्यभार	१० घण्टा
एकाइ ९	पाठ	**कविता: मानुषी -पारिजात**
	व्याकरण	पदक्रम (क) सामान्य पदक्रम (ख) विशिष्ट पदक्रम (कविताका पङ्क्तिवाट सामान्य र विशिष्ट पदक्रमको अध्ययन
	बोध	वाणिज्य क्षेत्रसँग सम्वन्धित अनुच्छेदको वोध
	अभिव्यक्ति	-निर्धारित कविताको अध्ययनमा आधारित भई कुनै कृतिको पाठक प्रतिक्रियालेखन ।
	पाठ्यभार	६ घण्टा
एकाइ १०	पाठ	**कथा: रातभरि हुरी चल्यो -इन्द्रबहादुर राई**
	व्याकरण	(क) कारक र विभक्ति (अ) सरल र तिर्यक् कारक (आ) कारक कर्ता, कर्म, करण, सम्प्रदान, अपादान, अधिकरण (ख) कारकीय अर्थ, विभक्तिको प्रयोग र पहिचान (ग) ले, लाई, वाट, द्वारा, को, का, की, रो, रा, री, तथा नो, ना, नी को प्रयोग
	बोध	कानुन तथा प्रशासनसँग सम्वन्धित अनुच्छेदको वोध
	अभिव्यक्ति	-सरल र तिर्यक कारकको प्रयोग गरी कुनै विषय घटना आदिको वर्णन - विभिन्न कारकको प्रयोग गरी कुनै विषय घटना आदिको अनुच्छेद रचना - व्यक्तिगत विवरण (वायोडाटा) लेखन
	पाठ्यभार	६ घण्टा
एकाइ ११	पाठ	**कविता: मेरो देश - भूपी शेरचन**
	व्याकरण	(क) तद्भव र तत्सम शव्दको वर्णविन्यास (ख) निर्धारित अनुच्छेदवाट तत्सम र तद्भव शव्दहरूको पहिचान
	बोध	समाजशास्त्रसम्वन्धी अनुच्छेदको वोध
	अभिव्यक्ति	- पदपूर्तिसम्वन्धी विज्ञापनलेखन -व्यावसायिक विज्ञापनलेखन
	पाठ्यभार	७ घण्टा
एकाइ १२	पाठ	**निबन्ध: आलु - भैरव अर्याल**
	व्याकरण	(क) पदसङ्गति (अ) लिङ्ग (पुलिङ्ग, स्त्रीलिङ्ग) (आ) वचन (एकवचन, वहुवचन (इ) पुरुष (प्रथम, द्वितीय, तृतीय) (ई) आदर (आदर, अनादर) (ख) शब्दभण्डार प्राविधिक, पारिभाषिक शव्दको अध्ययन
	बोध	निवन्धको निर्धारित अनुच्छेदको वोध र प्रश्नोत्तर विज्ञान प्रविधिसम्वन्धी अनुच्छेदको वोध

	अभिव्यक्ति	चिट्ठी, वचन, पुरुष, आदर मिलाई सूचनालेखन
	पाठ्यभार	८ घण्टा
एकाइ १३	पाठ	**कथा: शत्रु** **-विश्वेश्वरप्रसाद कोइराला**
	व्याकरण	(क) सरल, संयुक्त र मिश्र वाक्यको पहिचान र प्रयोग (ख) निर्धारित कथावाट सरल, मिश्र र संयुक्त वाक्यको पहिचान
	बोध	सञ्चारसंग सम्बन्धित अनुच्छेदको बोध
	अभिव्यक्ति	- टिप्पणी लेखन / सम्पादकलाई चिठीलेखन
	पाठ्यभार	७ घण्टा
एकाइ १४	पाठ	**उपन्यास: एक चिहान (१७ - ३१ परिच्छेद)** **-हृदयचन्द्रसिंह प्रधान**
	व्याकरण	वाक्यान्तरण (क) संरचनागत (सरल, मिश्र, संयुक्त) (ख) वाच्यगत (कर्तृ, कर्म, भाव) (ग) कथन (प्रत्यक्ष, अप्रत्यक्ष) (घ) ध्रुवीयता (करण, अकरण) (ङ) वाक्यसंश्लेषण
	बोध	कृषि र वनसम्बन्धी अनुच्छेदको बोध
	अभिव्यक्ति	- निबन्ध (स्वास्थ्य, विज्ञान र प्रविधि नागरिक अधिकार र दायित्व, आर्थिक विकास आदि)
	पाठ्यभार	५ घण्टा
एकाइ १५	पाठ	**कथा: हारजित** **- भवानी भिक्षु**
	व्याकरण	वाक्यसंश्लेषण (सरल वाक्यहरूलाई मिश्र वा संयुक्त वाक्यमा संश्लेषण)
	बोध	कानुन, न्याय तथा मानवअधिकारसंग सम्बन्धित अनुच्छेदको बोध
	अभिव्यक्ति	प्रतिवेदनलेखन (गोष्ठी, भ्रमण, घटना आदिको)
	पाठ्यभार	१०
एकाइ १६	पाठ	**निबन्ध: खाद्य सङ्कट र जैविक विविधता** **-डा. तीर्थबहादुर श्रेष्ठ**
	व्याकरण	शब्दभण्डार (प्राविधिक तथा पारिभाषिक शब्द)
	बोध	ग्रामीण विकाससंग सम्बन्धित अनुच्छेदको बोध
	अभिव्यक्ति	विज्ञान र प्रविधिसंग सम्बन्धित अनुच्छेदलेखन (जैविक विविधता, वातावरण, पुनर्नवीकरणीय ऊर्जा, विद्युतीकरण, आर्थिक विकास)
	पाठ्यभार	१० घण्टा
एकाइ १७	पाठ	**नाटक: नालापानीमा** **-बालकृष्ण सम**
	व्याकरण	- क्रियाका भाव - उक्ति परिवर्तन - वर्ण र अक्षर
	बोध	भाषा र साहित्यसंग सम्बन्धित अनुच्छेदको बोध
	अभिव्यक्ति	व्यावहारिक लेखन (समवेदना, श्रद्धाञ्जली, वधाई, शुभकामना)
	पाठ्यभार	१०
एकाइ १८	पाठ	**कविता: कान्छी, भट्टी र देश** **- कृष्ण सेन 'इच्छुक'**
	व्याकरण	क्रियाका काल र पक्ष
	बोध	अनुच्छेदको बोध
	अभिव्यक्ति	पत्ररचना (निवेदन, व्यावसायिक, निमन्त्रणा) - विज्ञापन
	पाठ्यभार	६ घण्टा
एकाइ १९	पाठ	**नाटक: बौलाहाकाजीको सपना** **- विजय मल्ल**
	व्याकरण	वाक्यका प्रकार र वाक्यान्तरण
	बोध	समाजशास्त्रसम्बन्धी अनुच्छेदको बोध
	अभिव्यक्ति	टिप्पणी लेखन - कानुन र नागरिक अधिकार - सञ्चार माध्यम र जिम्मेवारी - जनता, जाति र भाषा
	पाठ्यभार	१० घण्टा

पाठ्यपुस्तक: सुवेदी, केशव र अन्य, सबैको नेपाली, ललितपुर: साझा प्रकाशन ।

सन्दर्भ पुस्तक:

१. घिमिरे, माधव, नेपाली नरहे, किन्नर किन्नरी, ललितपुर: साझा प्रकाशन ।
२. पारिजात, मानुषी, वैंसालु वर्तमान ।
३. शेरचन, भूपी, मेरो देश, घुम्ने मेचमाथि अन्धो मान्छे ।
४. अधिकारी, दिनेश, हर्कबहादुर, धरतीको गीत, काठमाडौं । साझा प्रकाशन ।

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५ इच्छुक, कृष्ण सेन, कान्छी भट्टी र देश, इच्छुक रचनावली भाग - २ ।
६ मैनाली, गुरुप्रसाद, छिमेकी, नासो, ललितपुर: साझा प्रकाशन ।
७ भिक्षु, भवानी: हारजित ।
८ कोइराला, विश्वेश्वरप्रसाद: शत्रु, दोषी चस्मा, काठमाडौं: साझा प्रकाशन ।
९ विकल, रमेश, मधुमालतीको कथा ।
१० राई, इन्द्रबहादुर (२०२७), रातभरि हुरी चल्यो, विपना कतिपय, श्याम ब्रदर्स दार्जिलिङ ।
११ देवकोटा, लक्ष्मीप्रसाद, भलादमी, लक्ष्मी निबन्ध सङ्ग्रह, ललितपुर: साझा प्रकाशन ।
१२ अशांत, भैरव, आत् ।
१३ शर्मा, श्यामप्रसाद, आइमाई साथी ।
१४ श्रेष्ठ, डा.तीर्थबहादुर (२०६५-२-३२), खाद्य सङ्कट र जैविक विविधता, हिमाल ।
१५ त्रिपाठी, सुधा (२०५३), म फूल लिएर आउनेछु, जीवनसूत्र र स्वप्नाभास, काठमाडौं: जिगीषा प्रकाशन ।
१६ सम, बालकृष्ण (२०२०), नालापानीमा, चार एकाङ्की, काठमाडौं: रोयल नेपाल एकेडेमी ।
१७ मल्ल, विजय (२०२८), बहुलाकाजीको सपना, ललितपुर: साझा प्रकाशन ।
१८ प्रधान, हृदयचन्द्रसिंह, एक चिहान ।
१९ पोखरेल, बालकृष्ण र अन्य बृहत् नेपाली शब्दकोश, काठमाडौं: नेपाल प्रज्ञा प्रतिष्ठान ।

नमुना प्रश्नपत्र- २०६८

१. कुनै एक प्रश्नको उत्तर दिनुहोस् : (५)

क. तल दिइएका वर्णहरूको उच्चारण स्थान र प्रयत्न छुट्याउनुहोस् :

ग, झ, व, ह, ल ।

उत्तर:

वर्ण	स्थान	प्रयत्न
ग	कण्ठ्य	स्पर्शी
झ	वर्त्स्य दन्तमूलीय	स्पर्श सङ्घर्षी
व	ओष्ठ्य	अन्तस्थ/अर्धस्वर
ह	स्वरयन्त्रमुखी: अतिकण्ठ्य	सङ्घर्षी
ल	वर्त्स्य दन्तमूलीय	पार्श्विक

ख. तल दिइएका शब्दको अक्षरसंरचना र सङ्ख्यासमेत देखाउनुहोस् :

स्याल, कमल, अन्याय, विशेषता, आज्ञाकारी

उत्तर: स्याल् (स्यˇआल्) - अक्षरसङ्ख्या: १, क.मल् (क्अ. म्अल्) - अक्षरसङ्ख्या: २ । अन्. न्या. य (अन्. न्यˇआ. य्अ) - अक्षरसङ्ख्या: ३ । बि. सेस्. ता (ब्इ. स्एस्. त्आ) - अक्षरसङ्ख्या: ३ । आग्. ग्याँ. का. री, (आग्. ग्यˇआँ. क्आ. रˇइ) - अक्षरसङ्ख्या: ४

२. शुद्ध गरी पुनर्लेखन गर्नुहोस् : (५)

जापान, भारत र नेपाल एशिया महादेशमा छन भन्नुहोस् त ; भूटान र बङ्गलादेश कुन् महादेशमा पर्छन् सत्ते कुरा के हो भने यि पनी यही महादेशका मुलुक हुन् ।

उत्तर: जापान, भारत र नेपाल एसिया महादेशमा छन् । भन्नुहोस् त; भुटान र बङ्गलादेश कुन महादेशमा पर्छन् ? सत्य कुरा के हो भने यी पनि यही महादेशका मुलुक हुन् ।

३. तलको अनुच्छेदमा रेखाङ्कन गरिएका शब्दको शब्दवर्ग पहिचान गरी लेख्नुहोस् । (३)

गाउमा एकंजना वृद्धा रहेछन् । एकदिन उनलाई भेट्न अर्का वृद्धा मान्छे आएछन् तर भेट हुन सकेनछ । गाउंलेहरूले कठै ! विचारले दुःख मात्र पाएं भनेछन् ।

उत्तर: बुढा- नामपद, उन- सर्वनाम, बुढा- विशेषण, तर- संयोजक, सकेनछ- क्रियापद, कठै !- विस्मयादिबोधक

४. तलको अनुच्छेदबाट दुई-दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)

एक किलो मासु उत्पादन गर्न दश किलो शाकाहारी भोजन खपत हुन्छ अर्थात् एक धनी मांसाहारी मान्छेले सागपात, दुध, दही, घिउ जस्ता खानेकुरामा मात्र निर्भर दश जना गरिब शाकाहारीको खाना हसुर्छ । के यो शोषण होइन ? ठन्डा दिमागले सोचौं त !

उत्तर: तत्सम: शाकाहारी, भोजन, आगन्तुक: किलो, गरिब

५. कुनै दुई प्रश्नको उत्तर दिनुहोस् । (२+३=६)

क. तलको अनुच्छेदबाट तीनओटा उपसर्ग व्युत्पन्न शब्द र तीनओटा प्रत्यय व्युत्पन्न शब्द पहिचान गरी लेख्नुहोस् ।

दिनभर काम गरेकाले हामी थकित भई चौतारीमा वसेर आराम गर्दै थियौं । जुनेली रात रमाइलो थियो । कसैको मनमा कुभावना तथा बदनियत थिएन । हामीले कसैलाई दुर्वाच्य बोलेका पनि थिएनौं तर अकस्मात् एउटा जंङ्याहा हाम्रो छेउमा आयो र हामीलाई आक्रमण गर्ने दुष्प्रयास गर्‍यो । पहिले त हामी छक्क पर्‍यौं । किन आक्रमण गर्न लागेको होला भनी जिज्ञासु नजरले हेर्‍यौं । तर प्रतिकारमा नउत्रिए घाइते हुने डर थियो । हामीले होसियार भएर आफ्नो बचाउ गर्ने निधो गर्‍यौं ।

उत्तर: उपसर्ग व्युत्पन्न शब्द:

कुभावना→कु+भावना, बदनियत→बद+नियत,
दुर्वाच्य→दुर्+वाच्य,
प्रत्यय व्युत्पन्न शब्द:
थकित→थाक्+इत, जुनेली→ जुन+एली,
रमाइलो→रम्+आइलो,

ख. तलको अनुच्छेदबाट तीन समस्त शब्द र तीन द्वित्व शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व शब्दमा दोहोरिएको अंश छुट्याउनुहोस् :

आफ्नो जन्मभूमिलाई चुपचाप विदेशीको कृपापात्र बनाउन खोज्नेहरूको देश कहिल्यै आत्मनिर्भर हुदैन । आल्तुफाल्तु कुरामा अनमोल समय बिताउने मुलुकले अग्र गति लिदैन । आपसी झैझगडाको जालो चटाचट काट्दै अविश्वासका खाडलहरू रातारात पुरेर जब धर्तीपुत्रहरू स्वावलम्बी बन्छन्

तब जनताको भाग्योदयका ढोकाहरू घच्याकघुरुक खुला हुन्छन् । कृषिक्रान्ति गरेर लहलह बाली झुलाउन सके, पर्यटन क्षेत्रका विकास गरेर नेपालीका हातमा विदेशी मुद्रा छनछन बज्ने व्यवस्था मिलाउन सके, विदेशी डाँडाकाँडामा पाइने अनमोल जडीबुटीले जनस्वास्थ्य र ऋण अर्थतन्त्र सबल पार्न सके यहाँ न बेरोजगारी रहन्छ न त गरिबी नै । यसका निम्ति केवल दूरदर्शी नेतृत्व र क्रियाशील युवाजोसको खाँचो छ ।

उत्तर:

समस्त शब्द	विग्रह	
जन्मभूमि	जन्मेको भूमि	
आत्मनिर्भर	आत्माले निर्भर	
कृषिक्रान्ति	कृषिको क्रान्ति	
द्वित्व शब्द	निर्माण प्रक्रिया	दोहोरिएको अंश
आल्तुफाल्तु	फाल्तु+फाल्तु	फाल्तु
घच्याकघुरुक	घच्याक+घच्याक	घच्याक
झैझगडा	झगडा+झगडा	झगडा

ग. तलको अनुच्छेदबाट छओटा सन्धियुक्त व्युत्पन्न शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् :

घरेलु अत्यावश्यक सरसामान किन्न मानिसहरू बजार जान्छन् । बजारको भिडभाडमा कहिलेकाहीं वयोवृद्ध तथा केटाकेटीहरूलाई अप्ठेरो पनि हुन्छ । यस्तै हुलमुलमा चोरीको विगविगी हुन्छ भने रक्स्याहाहरूले पनि बाटाघाटामा दुःख दिन्छन् । सडकपेटीका व्यापारीले सोझासाझा गाउँलेहरूलाई सक्कली माल भनी नक्कली माल बेचेर ठग्छन् ।

उत्तर:

सन्धियुक्त शब्द	सन्धिविच्छेद
घरेलु	घर + एलु
अत्यावश्यक	अति + आवश्यक
वयोवृद्ध	वयः + वृद्ध
रक्स्याहा	रक्सी + आहा
गाउँले	गाउँ + ले
सक्कली	सक्कल + ई

६. कुनै एक प्रश्नको उत्तर दिनुहोस् : (५)

क. तलको अनुच्छेदलाई पुलिङ्ग भए स्त्रीलिङ्ग र स्त्रीलिङ्ग भए पुलिङ्गमा परिवर्तन गरी वाक्य ढाँचा समेत मिलाई पुनर्लेखन गर्नुहोस् :

एकदिन एउटा युवक टुँडिखेलमा हिँडिरहेको रहेछ । एउटी युवतीले उसलाई बोलाइछ । युवती त्यो युवक जता जाने हो त्यतै जाने रहिछ । उसलाई त्यस युवकले चाहिं चिनेको रहेनछ । चिनजान पछि त्यस युवकले त्यस युवतीसँग भेट्दा सङ्कोच नमानी कुरा गर्न थालेछ ।

उत्तर: एकदिन एउटी युवती टुँडिखेलमा हिँडिरहेकी रहिछ । एउटा युवकले उसलाई बोलाएछ । युवक त्यो युवती जता जाने हो त्यतै जाने रहेछ । उसलाई त्यस युवतीले चाहिं चिनेकी रहिनछ । चिनजानपछि त्यस युवतीले त्यस युवकसँग भेट्दा सङ्कोच नमानी कुरा गर्न थालिछे ।

ख. वाक्य ढाँचासहित एकवचनलाई बहुवचनमा परिवर्तन गर्नुहोस् ।

म कक्षा ११ मा पढ्ने विद्यार्थी हुँ । कलेजमा मेरो एकजना मन मिल्दो साथी छ । साथी मलाई माया मात्र होइन सहयोग पनि गर्छ । म दिनहुँ बाटामा उसलाई भेट्छु । ऊ पनि सधैं मलाई भेट्ने प्रयास गर्छ ।

उत्तर: हामी कक्षा ११ मा पढ्ने विद्यार्थी हौं । कलेजमा हाम्रा धेरै मन मिल्दा साथीहरू छन् । साथीहरू हामीलाई माया मात्र होइन सहयोग पनि गर्छन् । हामी दिनहुँ बाटामा उनीहरूलाई भेट्छौं । उनीहरू पनि सधैं हामीलाई भेट्ने प्रयास गर्छन् ।

७. कुनै एक प्रश्नको उत्तर दिनुहोस् : (५)

क. ले, लाई, बाट, द्वारा, मा र देखि विभक्ति लागेका भिन्नभिन्न कारकको प्रयोग भएका तीनओटा वाक्यमा कुनै घटनाको वर्णन गर्नुहोस् ।

उत्तर: हामीले सडक दुर्घटना देख्यौं । गाडीको चालकलाई केही भएन पोखराबाट आएको बसले माइक्रोलाई ठक्कर दिएको थियो । एम्बुलेन्सका क्रमैसँग घाइतेलाई अस्पताल पुऱ्याइँदै थियो । सडकमा घाइते करादरहेका थिए । मैले पनि मनमनै अबदेखि कहिल्यै यस्तो दृश्य हेर्न नपरोस् भनें ।

ख. तलको अनुच्छेदका वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् ।

मेरो बहिनी पोखराको मणिपाल कलेजमा डाक्टरी पढ्छे । मेरी भाइ चाहिं सात कक्षामा पढ्छे । तपाईं पोखरा जानुहुन्छ? जाने भए हिंड् । म पनि बहिनी भेट्न पोखरा जाँदै छु । हामी दुवै सँगै जालास् ।

उत्तर: मेरी बहिनी पोखराको मणिपाल कलेजमा डाक्टरी पढ्छे । मेरो भाइचाहिं सात कक्षामा पढ्छ । तपाईं पोखरा जानुहुन्छ ? जाने भए हिंड्नुहोस् । म पनि बहिनी भेटन पोखरा जाँदै छु । हामी दुवै सँगै जाऔंला ।

८. कुनै दुई प्रश्नको उत्तर दिनुहोस् । (४+२=६)

क. तलका जटिल वाक्यहरूलाई आठओटा सरल वाक्यमा छुट्याउनुहोस् :

तपाईंलाई सूर्योदयको दृश्य हेर्ने मन छ भने नगरकोट जानुहोस् । नगरकोटमा सूर्योदय राम्ररी हेर्न पाइन्छ भने वरपरको दृश्य पनि देखिन्छ । जुन मान्छेले नगरकोटको भ्रमण गर्छ उसले सूर्योदयको दृश्य हत्तपत्त बिर्सदैन । नगरकोटकले पर्यटन व्यवसाय बढाएको छ र स्थानीय मानिसहरूका लागि आयआर्जनको बाटो पनि खुलाएको छ ।

उत्तर: तपाईंलाई सूर्योदयको दृश्य हेर्ने मन छ ? तपाई नगरकोट जानुहोस् । नगरकोटबाट सूर्योदयको दृश्य हेर्न पाइन्छ । नगरकोटबाट वरपरको दृश्य पनि प्रष्टसँग देखिन्छ । मानिसले नगरकोट भ्रमण गर्छ । मानिसले सूर्योदयको दृश्य हत्तपत्त बिर्सदैन । नगरकोटले पर्यटन व्यवसाय बढाएको छ । स्थानीय मानिसहरूका लागि आयआर्जनको महत्त्वपूर्ण स्रोत नगरकोट भएको छ ।

ख. आवश्यक कुरा थपघट गरेर तलका वाक्यहरूलाई वाच्यपरिवर्तन गरी पुनर्लेखन गर्नुहोस् ।

सप्ताहान्तमा साथीहरूसँग सहर गइन्छ । सहरमा सिनेमा हेरिन्छ । दुईचार दिन त्यहीं बसेर रमाइलो गरिन्छ । आफूलाई चाहिने सामान किनिन्छ । अर्को हप्तातिर मात्र घर फिरिन्छ । सहरका रमझमवारे घरमा बेलीविस्तार लगाएर सुनाइन्छ । सानो यात्रा वृत्तान्त लेखेर पत्रिकामा पनि छपाइन्छ । अर्को सप्ताहान्त कसरी मनाउने भन्ने विषयमा पुनः सोचिन्छ ।

उत्तर: म सप्ताहान्तमा साथीहरूसँग सहर जान्छु । सहरमा सिनेमा हेर्छु । दुई चार दिन त्यही बसेर रमाइलो गर्छु । चाहिने सामान किन्छु । अर्को हप्तातिर मात्र घर फिर्छु । सहरका रमझमबारे घरमा बेलीविस्तार लगाएर सुनाउँछु । सानो यात्रा वृतान्त लेखेर पत्रिकामा पनि छपाउँछु । अर्को सप्ताहान्त कसरी मनाउने भन्ने विषयमा पुनः सोच्छु ।

ग. तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् :

चराले आफ्नो गुँड आफैं बनाउँछ । मुसाले आफू बस्ने प्वाल आफै खन्छ । मूक प्राणीहरू आफ्नो आश्रयस्थल आफैं बनाउँछन् । चेतनशील मानव हामीले आफ्नो देश आफैं बनाउनुपर्छ ।

उत्तर: चरा र मुसा जस्ताका मूक प्राणीहरूले आफ्नो आश्रयस्थल आफैं बनाएर चेतनशील मानव हामीले आफ्नो देश आफैं बनाउनुपर्छ ।

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९. **तलका अनुच्छेद पढी सोधिएका प्रश्नहरूको उत्तर लेख्नुहोस् :**
(५×२=१०)

वातावरण भन्नाले त्यस्तो प्राकृतिक प्रक्रिया (कृत्रिम प्रक्रिया पनि) हो जसले कुनै पनि ठाउँको उन्मुक्त दृश्यको निर्माण गरेको हुन्छ। जस्तै: पसलको वातावरण भन्नासाथ बेच्न राखिएका सामानहरूको दृश्यका साथै बेच्ने तथा किन्ने मानिसहरूको तस्विर हाम्रो मस्तिष्कमा तयार हुन्छ। त्यसै गरी स्कुलको वातावरण भन्नाले पढ्ने, पढाउने शिक्षक तथा विद्यार्थी, कक्षाकोठाहरू, कुर्सी, टेबुल, कालो पाटी, किताब, कलम, खेल मैदान आदिको बोध हुन्छ। त्यस्तै गाउँको वातावरण भन्नाले साधारणत: थोरै मानिस, माटाले पोतेका थोरै घर, वरिपरी गाईभैंसी र भेडावाखा बाँधेको, हाँस, कुखुरा पालेको, दाउरा, घास तथा परालको थुप्रो, अलि पर खोला, इनार वा कुवा आदिको झलक र सहरी वातावरण भन्नासाथ चिल्ला सडक, उज्यालो बिजुली बत्ती, सुकिला लुगा लगाएका मानिस, मोटर गाडी गुडेको, उद्योग कलकारखाना र त्यसबाट निस्केको धुवाँको मुस्लो, राम्रा तथा अग्ला घरहरू आदिको झलकजस्ता कुरा बुझिन्छ।

यसरी 'वातावरण' शब्दको प्रयोग धेरै अर्थमा भए पनि यो खास गरी यस अन्तर्गत खोलानाला, हावापानी, माटो, ढल, ताल, सागर, महासागर, मरुभूमि, वन, जङ्गल, हिमाल आदि पर्दछन्। वातावरण खास गरी सजीव र निर्जीव दुई आधारभूत तत्त्वहरू मिली बनेको हुन्छ। निर्जीव तत्त्व भन्नाले घाम वा ऊर्जा, हावा, पानी, माटो तथा जीवलाई आवश्यक पर्ने तत्त्वहरू बुझिन्छन्। सजीव तत्त्व भन्नाले सूक्ष्म जीवाणुदेखि ठूलठूला जनावरका साथै बोटविरुवा जस्ता पृथ्वीका सम्पूर्ण प्राणी तथा वनस्पतिहरूलाई बुझिन्छ। निर्जीव तत्त्वहरूको निश्चित समानुपातिक संरचनाको आधारमा निश्चित वातावरण तयार भएको हुन्छ। त्यही वातावरणअनुसार सजीवहरूको सृष्टि हुन्छ। त्यसैकारण सजीव र उसको वरपरको वातावरण वा निर्जीव तत्त्वहरूबीच अदृश्य वा अप्रत्यक्ष किसिमको घनिष्ठ अन्तरसम्बन्ध भईरहन्छ। यही अन्तरसम्बन्धलाई पारिस्थितिक प्रणाली भनिन्छ। यस किसिमको पारिस्थितिक प्रणालीको अध्ययन गर्ने शास्त्रलाई पारिस्थितिकी शास्त्र भनिन्छ।

प्रश्नहरू:

क. वातावरण भनेको के हो ?
ख. गाउँ र सहरको वातावरणमा के फरक छ ?
ग. वातावरणका सजीव र निर्जीव तत्त्वहरू केके हुन् ?
घ. पारिस्थितिक प्रणालीले कस्तो अन्तरसम्बन्धको अध्ययन गर्दछ ?
ङ. 'समानुपातिक' र 'पारिस्थितिक प्रणाली' को अर्थ लेख्नुहोस्।

१०. **तलको अनुच्छेद पढी मुख्यमुख्य बुँदाटिपोट गर्नुहोस्।** (५)

कवि स्रष्टा हो, ऊ सृष्टि गर्छ। सय पङ्क्तिमा लेख्दा पनि जुन कुरा भन्न सकिदैन कविले त्यसलाई एकै पङ्क्तिमा अझ राम्ररी भन्न सक्छ। प्रभातका एकै किरणमा सारा रङ र रूपको कस्तो रमाइलो ढोका उघ्रन्छ। एकै धर्के प्रिया मुस्कानमा सम्पूर्ण प्रीति प्रकट हुन्छ। आमाको एउटै काखमा आशीर्वादका अनन्त फुलहरू फक्रिन्छन्। स्रष्टाको कलाको तेस्रो आँखाले अर्कै रूप र अर्कै अभिप्राय देख्दछ। एक जना अन्तरिक्ष यात्रीले भनेको थिए - यहाँबाट मैले सृष्टि सौन्दर्यको जो विचित्र रङ र आभा देखेको छु, त्यसको वर्णन म गर्न सक्दिन। यसका निम्ति त कवि नै चाहिन्छ। सृष्टिमा जे जति छ त्यति नै यति विचित्र छ कि त्यसको भाषा पाइदैन, परन्तु कविका विचित्र वाणीमा त्यसको महिमा मुखरित हुन्छ। वैशाखी रातमा कुहुकुहु गर्दै कोइली मानौं विस्मय र आश्चर्यमय भई पखेटा खोलेर उड्दै झैं उड्छे र वसन्तलाई बोलाउँछे। बिहानीपख सूर्यका किरणहरू जसरी छिरबिराएर आउन थाल्छन्, त्यसरी नै धोबिनी चरीका कलकण्ठबाट उसका चिरबिर वाणीहरू चिरविरिन थाल्छन्- जहाँ अरु एक शब्द पनि बोल्न सक्तैनन्, कवि त्यहाँ सहस्र सुन्दर, सहस्र सरल शब्द बोल्न सक्तछ।

११. **कुनै एक प्रश्नको उत्तर लेख्नुहोस्।** (५)

क. आफ्नो घरमा एउटा टेलिफोन लाइन जडान गरिदिन अनुरोध गर्दै स्थानीय दूर सञ्चार कार्यालयलाई सम्बोधन गरी एउटा निवेदन लेख्नुहोस्।

ख. झाडापखालाबाट बच्नका लागि अपनाउनुपर्ने स्वास्थ्यसम्बन्धी विषयलाई समेटी स्थानीय स्वास्थ्य केन्द्रले तयार पार्ने एउटा सूचना लेख्नुहोस्।

१२. आफ्नो विद्यालयमा सम्पन्न वार्षिकोत्सव कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको एउटा प्रतिवेदन तयार पार्नुहोस्। (५)

अथवा

'बढ्दो महँगी' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस्।

१३. **तल दिइएकामध्ये कुनै एक शीर्षकमा निबन्ध लेख्नुहोस्।** (१०)

क. मेरो पृथ्वी : मेरो देश
ख. नेपालको आर्थिक विकासमा पर्यटन उद्योगको भूमिका
ग. मेरो जीवनका लक्ष्य

१४. **'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् :** (१०)

"त्यसो भए डर लाग्दो कुरा छ बाबु ! अब कहिल्यै नबोलाउनु ती डाक्टरलाई फेरि। मलाई राम्रै थाहा छ उनी हृदयमा लेश पनि दया भएका मानिस होइनन्, आजसम्म टोलको कोही बिरामीलाई मुफतमा हेरि दिएका पनि छैनन्।" सशङ्कित भावमा अष्टनारानले भने।

वृद्ध, अनुभवी आफ्ना बाबुको यो कुरा सुनेर शिवनारानको हृदयमा पनि शङ्काको बीजारोपण भयो तापनि आपतमा काम दिएको हुनाले उनको गरिबीले त्यो शङ्कालाई जिउन दिएन। यसैले शिवनारनले आफ्ना पिताज्यू अष्टनारानलाई सम्झाएर भने - "डाक्टर गोदत्तप्रसाद सायद अगि खरावै थिए होलान्, तर पछि बदलिने मानिसहरू पनि त धेरै छन् बा ! कति दयालु मानिस पनि त पछि अनौठोसँग निर्दयी भएर गएका छन्।"

प्रश्नहरू:

क. माथिको प्रथम अनुच्छेदमा गोदत्तप्रसादको चरित्रबारे गरिएको आशङ्का कत्तिको उचित छ ? तर्क सहित लेख्नुहोस्। (५)

ख. माथिको दोस्रो अनुच्छेदमा व्यक्त गरिएको भनाइ अनुसार गोदत्तप्रसादमा परिवर्तन आएकै हो त? उपन्यासका आधारमा स्पष्ट पार्नुहोस्। (५)

१५. **कुनै २ प्रश्नको उत्तर दिनुहोस् :** (२×५=१०)

क. **तलको कवितांश पढी सोधिएका प्रश्नहरूको एक दुई वाक्यमा उत्तर दिनुहोस् :**

जहाँ हरिया हरिया पहाडका फरिया
अलिक तल सारेर
निर्मल, स्वच्छ र न्यायो घाममा
हिमालले सधैं ढाड सेकेको हुन्छ
म जति टाढा भए पनि त्यो मेरो देश
सधैं मेरो मनले
सपनामा पाइला टेकेको हुन्छ

प्रश्नहरू:

क. यस कवितांशमा कस्तो वातावरणको चित्रण छ ?

ख यस अंशमा 'हरियो फरिया' भनेर केलाई भनिएको छ र त्यसलाई फेरिया कसले लगाएको छ?

ग 'हिमालले सधैं ढाड सकेको हुन्छ' भन्नुको तात्पर्य के हो ?

घ मनले सपनामा पाइला टेक्नु भनेको के हो ?

ङ यस अंशमा भनिएको मुख्य कुरा के हो ?

ख तलको कथांश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् :

"यो सबै सङ्गत गुनाको फल । ठूलाबडाको सङ्गतको विष त महामारी फैले झैं पो फैलिन्छ त । यसले हामी जस्ताको त प्राणै धरधर छ । त्यो घरको हाबाबाट जति सक्यो परै राख भन्यो मान्दिनी तिमी ।" "यो क्या, छोटाहरूको छिमेक रे, हाम्रो दिदीआमालाई भन्या । यहांका छोटाहरूको सङ्गतले म बिग्रिए रे क्या, त्यसैले हामी घर सरेको ।"

प्रश्नहरू :

क माथिका भनाइ क-कसका हुन् ?

ख माथिका पहिलो र दोस्रो उद्धरणमा वक्ताको दृष्टिकोणमा के भिन्नता छ ?

ग 'ठूलाबडाको सङ्गतको विष त महामारी फैलिए झैं पो फैलिन्छ त !' भन्नुको तात्पर्य के हो ?

घ दिदीआमाको व्यवहारका कारण बाल्यप्रेममा बाधा पुगेको छ भन्ने कुरामा तपाईं सहमत हुनुहुन्छ ? हुनुहुन्छ भने किन ?

ङ छोटा र बडाको समाज नहुनुका लागि के हुनुपर्ला ?

ग तलको निबन्धांश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् :

"कस्तो विचित्रता, आलु खाए पनि मान्छे खाएको सकार्न सक्दैन । सायद यसैले होला 'खालु खाएर पेड धाक' लगाउने चलन चलेको । उसिनाको भात हो मसिनाको भुजा ज्युनार गरें भन्नेदेखि लिएर वर्ग शान्तिको अभियान चलाएको भन्नेसम्म दर्जादे धक्कुवाजहरू संसारमा पाइन्छन् । वास्तवमा यी सबै खाएर पेडाको धाक लगाउने हुन्, अर्थात् कर्मले नी नीचतालाई धाकले ढाक्नु आलुवादको धार्मिक पक्ष हो, बिसौं शताब्दीका प्रत्येक व्यक्तिले पालन गर्नै पर्छ ।"

प्रश्नहरू :

क मान्छेले आलु खाएर पनि खाएं भन्न नसक्नुको के हो ?

ख आलु खाएर पेडाको धाक लगाउनेहरू कस्ता हुन्छन् ?

ग आलुवादको धार्मिक पक्ष के हो ?

घ भैरव अर्यालको बिसौं शताब्दीका मान्छेलाई हेर्ने दृष्टिकोणप्रति तपाईंको के प्रतिक्रिया छ ?

ङ माथिको अनुच्छेदमा कसलाई व्यङ्ग्य गरिएको हो ?

१६. 'शत्रु' हुदै नभएको मान्छे हुन्छ कि हुंदैन ? 'शत्रु' कथाको आधारमा आफ्नो प्रतिक्रिया लेख्नुहोस् ।

शीर्षकमा आधारित प्रश्नहरू

खण्ड (क) व्याकरण (५+५+३+२+६+५+६+८=४० अङ्क)

एकाइ १: वर्ण र अक्षरको संरचनाको पहिचान (कुनै एक प्रश्न) (५ अङ्क)

१. २०७७ सेट H प्र. नं. १

क तलका वर्णहरूलाई प्रयत्न र उच्चारण स्थानका आधारमा चिनाउनुहोस् : (२)

ज, ह ।

ख तलका शब्दहरूको अक्षर संरचना लेखी अक्षर सङ्ख्या समेत देखाउनुहोस् : (२)

प्रचार, कूटनीतिज्ञ

२. २०७७ सेट I प्र. नं. १

क तलका वर्णहरूलाई **प्रयत्न र उच्चारण स्थान**का आधारमा चिनाउनुहोस् : (२)

ज, म ।

ख तलका शब्दहरूको **अक्षरसंरचना** लेखी **अक्षरसङ्ख्या** समेत देखाउनुहोस् : (२)

त्रिभुज, वटुवा ।

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १

क तलका वर्णहरूको उच्चारण स्थान र प्रयत्न छुट्याउनुहोस् : (५)

ग, झ, म, य, ह ।

ख तल दिइएका शब्दहरूको संरचना र सङ्ख्यासमेत देखाउनुहोस् : (५)

देश, विज्ञान, प्रतीक्षा, उपयोगी, पञ्चतन्त्र ।

४. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १

क तलका वर्णको घोषत्व र प्राणत्व चिनाउनुहोस् :

ख, छ, व, ल, स ।

ख तल दिइएका शब्दको अक्षर संरचना लेखी अक्षर सङ्ख्यासमेत देखाउनुहोस् :

कन्या, सम्पदा, अभिव्यक्ति, विशेषज्ञता, दश

५. २०७६ प्र.नं. १

क तलका वर्णहरूको घोषत्व र प्राणत्वका आधारमा चिनाउनुहोस् :

क, ज, भ, य, स ।

ख तलका शब्दहरूको अक्षर संरचना र अक्षर सङ्ख्या समेत लेख्नुहोस्

कांट, समाज, ज्ञानवान्, शोषणमूलक, पञ्चरत्न ।

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. १

क तल दिइएका वर्णहरूको प्राणत्व र उच्चारण स्थान छुट्याउनुहोस् :

ज, ठ, म, य, ह ।

ख तल दिइएका शब्दको अक्षर संरचना र सङ्ख्या समेत देखाउनुहोस् :

समान, नगरपालिका, सभ्यता, विज्ञान, आधुनिकता ।

७. २०७५ सेट A प्र. नं. १

क तलका वर्णहरूलाई घोषत्व र प्राणत्वका आधारमा चिनाउनुहोस् ।

ठ, म, प, स, ह ।

ख तल दिइएका शब्दहरूको अक्षर संरचना र सङ्ख्या देखाउनुहोस् ।

मुसुमुसु, आँत, सन्निपात, सम्मान, प्रतिभाशाली ।

८. २०७५ सेट B प्र. नं. १
क तलका वर्णहरूलाई उच्चारण प्रयत्न र प्राणत्वका आधारमा चिनाउनुहोस् : (५)
ख, ज, द, य, स ।
ख तलका शब्दहरूको अक्षर संरचना देखाई सङ्ख्या समेत देखाउनुहोस् : (५)
गास, सार्वभौम, सङ्घर्षशील, प्यारो, संविधान ।

९. २०७४ पूरक प्र. नं. १
क. तल दिइएका वर्णहरूको उच्चारण स्थान र प्रयत्न छुट्याउनुहोस् : (५)
घ, ज, म, य, ह ।
ख तल दिइएका शब्दको अक्षर संरचना र सङ्ख्या समेत देखाउनुहोस् : (५)
विज्ञ, शेष, अभिव्यञ्जना, झटपट, महिमा ।

१०. २०७४ प्र. नं. १
क तलका वर्णहरूलाई उच्चारण स्थान र प्रयत्नका आधारमा चिनाउनुहोस् : (५)
ग, छ, म, य, ह ।
ख तल दिइएका शब्दहरूको अक्षर संरचना लेखी अक्षर सङ्ख्यासमेत देखाउनुहोस् : (५)
काल, वटुवा, विशेषज्ञ, कानुन, रमणीयता ।

११. २०७३ पूरक प्र. नं. १
क तल दिइएका वर्णहरूको घोषत्व र प्राणत्व छुट्याउनुहोस् : (५)
प, झ, ध, ङ, स ।
ख. तल दिइएका शब्दको अक्षर संरचना र सङ्ख्या देखाउनुहोस् :
औचित्यपूर्ण, सिर्जनशील, इख, सत्य, महाकाली । (५)

१२. २०७३ प्र. नं. १
क. उच्चारण स्थान र प्रयत्नका आधारमा तलका वर्णहरूलाई चिनाउनुहोस् : (५)
ज, थ, म, य, ल ।
ख. तल दिइएका शब्दको अक्षर संरचना लेखी अक्षर सङ्ख्यासमेत देखाउनुहोस् : (५)
सूर्योदय, सामाजिक, तात्तातो, वैठक, ऋषि ।

१३. २०७२ पूरक प्र. नं. १
क. तल दिइएका वर्णहरूको उच्चारण स्थान र प्रयत्न चिनाउनुहोस्(५)
क, छ, ठ, य, ल ।
ख. तल दिइएका शब्दको अक्षर संरचना र सङ्ख्यासमेत देखाउनुहोस् : (५)
संविधान, झल्याकझुलुक, पञ्चामृत, शेष, नासो ।

१४. २०७२ प्र. नं. १
क. उच्चारण स्थान र प्रयत्नका आधारमा तलका वर्णहरूलाई चिनाउनुहोस् : (५)
घ, छ, व, य, ह ।
ख. तल दिइएका शब्दको अक्षर संरचना लेखी अक्षर सङ्ख्यासमेत देखाउनुहोस् : (५)
काम, शोषण, टेलिभिजन, पञ्चरत्न, उपनिवेशवाद ।

१५. २०७२ सेट E प्र. नं. १
क. तलको वर्णको उच्चारण स्थान र प्रयत्न चिनाउनुहोस् : (५)
ख, ज, व, ह, स ।
ख. तल दिइएका शब्दको अक्षर संरचना र सङ्ख्यासमेत देखाउनुहोस् : (५)
झकझल्को, जोस, इमान्दारी, ख्यालख्याल, अभिव्यक्ति ।

१६. २०७१ पूरक प्र. नं. १
क. तल दिइएका वर्णहरूको उच्चारण स्थान र प्रयत्न छुट्याउनुहोस् : (५)
ख, झ, ढ, व, ह
ख. तल दिइएका शब्दको अक्षर संरचना र सङ्ख्या देखाउनुहोस् :
हिमाली, शारीरिक, विद्यालय, विशेष, घाम । (५)

१७. २०७१ प्र. नं. १
क. तलका वर्णको घोषत्व र प्राणत्व चिनाउनुहोस् : (५)
क, घ, न, थ, स ।
ख. तल दिइएका शब्दको अक्षर संरचना र सङ्ख्या देखाउनुहोस् :
तिन, नेपाली, विशेषज्ञता, शब्द, सल्यान (५)

१८. २०७० प्र. नं. १
क. तलका वर्णहरूको घोषत्व र प्राणत्व छुट्याउनुहोस् : (५)
ज, थ, म, ल, ह
ख. तल दिइएका शब्दको अक्षर संरचना र सङ्ख्या देखाउनुहोस् :
एक, सहरीकरण, पुनर्जन्म, कन्या, छताछुल्ल (५)

१९. २०६९ प्र. नं. १
क. तल दिइएका वर्णहरूको उच्चारण स्थान र प्रयत्न चिनाउनुहोस् : (५)
घ, न, ध, ह, य
ख. तल दिइएका शब्दको अक्षर संरचना र सङ्ख्यासमेत देखाउनुहोस् : (५)
विशेष, सञ्चारिका, आँप, नगरपालिका, झलझली

एकाइ २: वर्णविन्यास चिह्न परिचय (५ अङ्क)

वर्णविन्यास मिलाई पुनर्लेखन गर्नुहोस् वा शुद्ध गरी पुनर्लेखन गर्नुहोस् : (५)

१. २०७७ सेट H प्र. नं. २ सौन्दर्यका मोहनीमा वग्नेहरू प्राय असभ्य, वर्वर आततायी र जङ्गली भइदिन्छन् । उनीहरू सुन्दर फुल देख्नासाथ तेसका निकट् पुगी टासिन चाहन्छन् ।

२. २०७७ सेट I प्र. नं. २ मान्छेले किन फूलको इर्ष्या गर्छ आफू फुलजस्तो सुन्दर जिन्दगी वांच्न किन खोज्दैन ।

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. २ दुःख र अनेकौ समश्याहरूसंग जुध्दै अनी अल्झिदै वांच्नुनै मान्छेको नियती हो सहज एवम सरल् ढङ्गले वांच्न उसले कसरी पाउंछ र एस यथार्थलाई वुझ्ने व्यक्तिले मात्र जिवन जिउन जान्दछ ।

४. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. २ जे सुकै होस म सधैं आलु खान्छु तर मलाइ सधैं आलु खान डर लाग्छ किन भने म पनि वीसौं सताब्दीकै आलु मान्छे जस्को कर्म हो आलु खानू तर धर्म हो आलु खाएर पेडाको धाक लगाउनु

५. २०७६ प्र.नं. २ अहिलेको खाद्य शङ्कट खडा गर्ने मुल कारण अर्थवजार हो एसको प्रमुख जड कृषी उपजलाई ऊर्जामा खपत गर्ने कार्यमा रहेको छ । हामी भने खेतवारी वाझै छोड्छौं ?

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. २ विद्यको सर्टिफिकेट कोठा को वाकसमा हुन्छ भलादमीको प्रमाणपत्र सधैं उसका सरिर उपर विज्ञापन जाहेरी गर्दछ । पोसाक मात्र पहीला पाष हो । तेसमा पनि रेसमी रूमालको फर्काइ र टोपीको कर्काइले पहिलो श्रेणीमा उत्तीर्ण भएको जनाउंछ ।

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७. २०७५ सेट A प्र न ३ सुसासन र विकास अहिले नेपाली जनताका चाहाना होइनन भनेर कसले भन्न सक्छ र त्यशको प्राप्तीका लागि नै यगौदेखि हामीले सपना देख्दै आएका छौ हरे शिव अब पनि के हुने हो भन्न सकिन्न ।

८. २०७५ सेट B प्र न ३ गरुले भने विश्वका वैग्यानिकहरू पनि आध्यात्मिक कुरा मा विस्वास गर्छन

९ २०७४ पुरक प्र न ३ मेरी जननि तिमीसंग यउटा कुरा सोध्छु नढाँटी भन है । म अचेल नराम्रा सप्ना देख्न थालेकी छु । तिमीमाथि भएको पिडाको सपना । तिमीसंग के ढाट्नु अब । मेरा सपनामा तिम्रा सम्पूर्ण रुखहरू ढलेछन् ।

१०. २०७४ प्र न ३ भाई विद्यालयबाट फर्केदै थियो उसको भेट बाटामा बहिनिसंग भयो । उनीहरू समयमै घर फर्के । उनीहरूले करेसामा ढकमक्क फूलेका सेता पहेला र राता पुष्पहरू हेरे । उनीहरू खुशी भए ।

११. २०७३ पुरक प्र न ३ तेसले भनेर म मान्दीनं कें वुवा मूमाले भने पनी मान्दिन । आखीर गौरी निस्चय गर्थी हामी दुवै हातेमाले गदै वगैचाककको डिलमा आयेर उभिन्थ्यौं ।

१२. २०७३ प्र न ३ फेरी निराषावादी मात्र वनेर के गर्ने ? वांचनु छ, जीवन विताउनु नइ छ नवदलिने येस समाजलाई एक धक्का दीएर वदल्न पछ । नत्र यतीका पढेको, गुनेको के फाइदा भो

१३. २०७२ पुरक प्र. न. ३ पुजा गरेको पर्सि पल्ट गुमानेकी श्वास्नी लडी विचरी भन्ने खुस्की थि, वाची तेसपछि धनजिते लाई समाते ।

१४. २०७२ प्र. न. ३ दुनियामा कोही पनि मित्र हुदैनन सवै शत्रु सवै वैरी नै हुन्छन् । कसले भन्छ अकारन नै कोहि शत्रु हुदैन माने, अकारण कोही कसइको शत्रु हूदैन तर झगडा को निहुं कति मजिले पाइन्छ ।

१५. २०७२ सेट E प्र. नं. ३ मान्छे लाई वैगुनी भन्नुपर्ने कारणै यहि हो ऊ गुणको पारख गर्नुको शाटो वेईज्जती गर्छन्

१६. २०७१ पूरक प्र. नं. ३ समुद्रपारी पुग्न सक्यो भने उनिहरूको जोर चल्दैन आमा भन्नु हुन्थियो । म आफनो सम्पूर्न इच्छासक्तिले मधुकर को घोडालाई छिटो छीटो अझ छिटो धकेल्न थाल्दथें ।

१७. २०७१ प्र. नं. ३ चाहिदैन हामीलाई कसैको छातासाता! भन्दै ती तरुनिले रिस, सङ्का, डर इत्यादि भावहरू मिसियेको जस्तो अनुहार लाइ तीखा आंखाले हेर्दै फटा फट आफनो वाटो लागिन ।

१८. २०७० प्र. नं. ३ एसरी दिनरातको पहिरो र हावाको डरमा वाँचेर दुइ एकर जमीनको माटो वर्समा दुई चोटी पल्टायेर जिविका गर्ने मेलो परिवारको हत्या हो

१९. २०६९ प्र. न. ३ प्रीय सूनखानी तिम्रा अरु छोरा छोरीको खवर के छ तिनिहरू तिम्रो वक्षस्थलको तातोले नपुगेर शम्सांभैदेखि वांतर्लभित्रको सिरकमा लपेटियर हिंड्छन रे ।

एकाइ ३: शब्दवर्ग (पदवर्ग) (३ अङ्क)

तलको अनुच्छेदमा रेखाङ्कन गरिएका पदहरूको पदवर्ग पहिचान गरी लेख्नुहोस् : (३)

१. २०७७ सेट H प्र. नं. ३ वासनाले हामी संसारसित जोडिएका हुन्छौं र अन्ततः अनिच्छावश नै मृत्युले हामीलाई यो स्थितिवाट तानेर लैजान्छ । हामी मर्न त मछौं तर मुक्त हुदैनौं ।

२. २०७७ सेट I प्र. नं. ३ प्रकृतिको आफ्नै नियम छ । जनचाहना अनुरूप नयां नेपालको निर्माण निश्चय हुनेछ । कानुनको पालन र अनुशासनले नै हामीलाई सुखी एवम् समृद्धिको यात्रामा अगि वढाउंछ ।

३. २०७६ रेडबुद्धि परीक्षा सेट A प्र. नं. ३ तिमी आफूभन्दा मान्छेको आदर गर्न सिक है । धत् ! आदरणीय व्यक्तित्वह अगाडि असभ्य भई लम्पसलम्पस हिड्न तिमीलाई रहा

४. २०७६ रेडबुद्धि परीक्षा सेट B प्र. नं. ३ यी मेरा पुस्तकहरू ज्ञान दिएका छन् । तसर्थ तिनीहरूलाई म जतन गर्छु । पुस्तकहरू हाम्रा भविष्य हुन् ।

५. २०७६ प्र.नं. ३ पाँच दिन भो दाइ । तिमीहरू दुवै जनेरा लडिहाल्यौ । गाई र वाछा भोकभोकै करायउन थाले । बिजाम सकिन अनि दौडेर आएं । तिम्रो असली दुइगाको मन म पाऊं ?

६. २०७५ रेडबुद्धि परीक्षा प्र.नं. ३ यस्तो एकाएकको उदारता खतरनाक छ, मलाई शङ्का लाग्छ भाइ । त्यही वाघीका अस्तित्वम्म दैत्य भइरहने मानिस आज एकाएक कसरी हुन सक्ला ? मलाई त असम्भव लाग्छ ।

७. २०७५ सेट A प्र. नं. ३ अझ खिस्रा हासि रहन तपाईलाई छैन ? मानिसको शोभा र सभ्यताको रक्षा गर्ने कुरा लाज त्यो लाज मानिसमा छैन भने त्यस नाङ्गो मानिसासित के लाग्छ र ?

८. २०७५ सेट B प्र. नं. ३ ऊ एक्कासी प्रश्न गरेर मनको खलवल्याइ दिन्थी तर मसंग रमाउन चाहन्नथी ।

९. २०७४ पूरक प्र. नं. ३ हर्षनारायणले पनि सवैको सल्लाहअनुसार पुतलीसंग विवाह गरं तर दाइजो भने केही ल्याएनन् । भने —"यस्तो पो हुनुपर्छ त विहे ।"

१०. २०७४ प्र. नं. ३ विचार गर्दा आलु पिंडालुभन्दा निकै वाठोटाठो अप टु डेट लाग्छ, त्यसैले यसलाई वुढो भन्न मेरो आत्मा जिब्रोले कदापि सक्तैन ।

११. २०७३ पूरक प्र. नं. ३ इतिहासले आज मलाई कहां ल्याएर पुऱ्या कुन्नि ! तिमी त मभन्दा धेरै अगि गइ सकेछौ ।

१२. २०७३ प्र. नं. ३ एउटा झगडामा सवभन्दा निर्दोष काम हो - त झगडाको मध्यस्थ हुनु तर कुनै पनि मध्यस्थ दुवै पक्ष समर्थक हुन सक्तैन । मध्यस्थले एउटा न एउटाको शत्रु हुने - कृष्ण रायले विउंझे भौं यो ज्ञान आर्जन गरे ।

१३. २०७२ पूरक प्र. नं. ३ भक्तेको हालखवर के छ नि ? काम गरे धेरै पसिना चुहाएर न्यायसित पैसा कमायौ तिमीहरूले ?

१४. २०७२ प्र. नं. ३ हातखुट्टा बलियो भएपछि काम भनेको पाइन्छ वा ! तर छोराछोरीका निम्ति वावु सधैं पाईरहिन्न सेवा गर्न पाएपछि त्यस्ता काम लाख आउंछन् ।

१५. २०७२ सेट E प्र. नं. ३ ओहो ! त्यसो भए त डरलाग्दो कुरा वावु ! अव कहिल्यै नवोलाउनु ती डाक्टरलाई फेरि ।

१६. २०७१ पूरक प्र. नं. ३ हेर, अंध्यारो रातमा एउटा मैनवत्तीले टाढासम्म ज्योति फाल्छ । यस दुष्ट संसारमा सानो सत्कार्य त्यसरी नै झल्कन्छ ।

१७. २०७१ प्र. नं. ३ मिठो कुराले सधैंभरि राम्रो गर्छ भन्ने छैन । खायो भने मिठाले पनि स्वास्थ्यमा हानि पुऱ्याउने हुंदा थोरै राम्रो हो ।

१८. २०७० प्र. नं. ३ अं, सम्झें । समाजको दुःखको अन्त न कागजी कोर्दैमा हुंदो रहेछ न वोल्दैमा मात्र । यसका लागि त समाज जरादेखि नै परिवर्तन गर्नुपर्छ ।

१९. २०६९ प्र. नं. ३ अरूको त के कुरा, आफ्नै पोष्य पुत्रमाथि पनि उनलाई भरोसा थिएन ।

एकाइ ४: शब्दशोधन (२ अङ्क)

१. २०७६ पौडबुद्धि परीक्षा सेट A प्र नं ४ तलको अनुच्छेदवाट दुई दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् (२)
सुविधाको खोजीमा ग्रामीण भेगबाट मानिसहरू सहरतिर आई वस्न थालपछि त्यस क्षेत्रमा बाँझो हुन पुगेको जमिनको उपयोग कसरी गर्न सकिन्छ भन्नेतर्फ सरकारले स्पष्ट नीति ल्याउनु जरुरी छ ।

२. २०७६ पौडबुद्धि परीक्षा सेट B प्र. नं. ४ तलको अनुच्छेदवाट दुई दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
त्यस्तै भाषाको देशमा लवजको दशा हुन्छ । कोही कोही शब्दहरू दुब्ला पातला भएका छन्, तिनीहरूको प्राचीन महत्त्व उडेको छ । रेसमका भलादमी काठमाडौंका गल्लीमा खुसयु उडाइ रहेछन् ।

३. २०७६ प्र.नं. ४ तलको अनुच्छेदवाट दुई दुईओटा तत्सम र तद्भव शब्दहरू खोजी लेख्नुहोस् : (२)
अत्यन्त गर्मी भएकाले छात्रछात्राहरू छाता ओढेर विद्यालय जाँदै छन् । उनीहरूको हातमा पाँच, पाँचओटा पुस्तक समेत छन् ।

४. २०७५ पौडबुद्धि परीक्षा प्र.नं. ४ तलको अनुच्छेदवाट दुई दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
तालुमा आलु फलेपछि बोक्ने भलादमी पनि ठालु हुन्छन् । जसको तालुमा आलु फल्छ, उसलाई तरकारीको समस्याले त के पिर्थ्यो र सरकारी नियम कानुनले पनि केही लछार्न सक्तैन । त्यसैले आलु परम भाग्यको प्रतीक हो र सौभाग्यको द्योतक हो ।

५. २०७५ सेट A प्र. नं. ४ तलको अनुच्छेदवाट दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् । (२)
तिनताक मेरो डेरा सहर नजिकै भए पनि इन्टरनेट, फोन नपुगेको विद्युत् र पुस्तकालय समेत नभएको गाउँमा थियो । विद्यालयका शिक्षकसँग चक र डस्टरसम्म थिएन ।

६. २०७५ सेट B प्र. नं. ४ तलका अनुच्छेदवाट दुई दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
विद्याको सर्टिफिकेट कोठाको वाकसमा हुन्छ । किताबको ज्ञान एकातिर हुन्छ भने भलादमीको प्रमाण विज्ञापनमा सीमित हुन्छ ।

७. २०७४ पूरक प्र. नं. ४ तलको अनुच्छेदवाट दुई दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
माध्यमिक तहका कक्षा ११ र १२ का विद्यार्थीले कलेज ड्रेसमा मोटरसाइकल चलाएमा कारवाही गर्ने कानुनी व्यवस्था भएपछि सडकमा जथाभावी सवारी साधन चलाउने र दुर्घटना हुने प्रवृत्तिमा कमी आएको छ । अभिभावकले पनि यस कार्यको स्वागत गरेका छन् ।

८. २०७४ प्र. नं. ४ तलको अनुच्छेदवाट दुई-दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
रेल, मोटर चढ्दा र होटल, रेस्टुराँहरूमा खाँदा, वस्ता वा भेट हुँदा कतिपय मानिसहरूसँगको क्षणिक मित्रता पनि चिरम्मरणीय विषय भएर हाम्रो स्मृति पटलमा अङ्कित हुन पुग्छ ।

९. २०७३ पूरक प्र. नं. ४ तलको अनुच्छेदवाट दुई-दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
त्यतातिर किन अनुसन्धानको दृष्टि वा ध्यान जाँदैन ? टुरिष्टले प्यान केक भनेर रेस्टुरां र लजमा फापर र कोदाको रोटी खाइरहेका छन् ।

१०. २०७३ प्र. नं. ४ तलको अनुच्छेदवाट दुई-दुईओटा तत्सस र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
सहरको तुलनामा ग्रामीण भेकतिरका प्रायः गरिव जनता आधुनिक सुविधावाट वञ्चित रहेका छन् । तसर्थ सरकारले यसतर्फ पनि चासो दिई ग्रामीण क्षेत्रको विकासका लागि आवश्यक कदम चाल्नुपर्ने देखिन्छ ।

११. २०७२ पूरक प्र. नं. ४ तलको अनुच्छेदवाट दुई-दुईओटा आगन्तुक र तत्सम शब्द खोजी लेख्नुहोस् : (२)
मानिसको पेटमा पर्नुपर्ने अन्न डिजल, पेट्रोलजस्ता ऊर्जा तथा इन्धन बनाउनमा प्रयोग हुन थालेको छ । अमेरिकीहरू आफूकहाँ उत्पादित २३ प्रतिशत मकै वायोफ्युल बनाउन खपत गरिरहेका छन् ।

१२. २०७२ प्र. नं. ४ तलको अनुच्छेदवाट दुई-दुईओटा तत्सम र तद्भव शब्द खोजी लेख्नुहोस् : (२)
असारमा रोपेर मङ्सिर महिनामा अन्नका रूपमा धान घरमा भित्र्याउँदा कृषकहरू हर्षले गद्गद् भएका देखिन्छन् ।

१३. २०७२ सेट E प्र. नं. ४ तलको अनुच्छेदवाट दुई-दुईओटा आगन्तुक र तत्सम शब्द खोजी लेख्नुहोस् : (२)
पुलाउ खाऊ, आऊ, टोप र टाई प्वान्टलुन लाऊ, तिम्रो परिवारलाई घर, आवास र मन्दिर दिन्छौं तिमी नजाऊ ।

१४. २०७१ पूरक प्र. नं. ४ तलको अनुच्छेदवाट दुई-दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
सहरवजारमा वसेर मात्र मानिसले प्रगति गर्न सक्छ भन्ने होइन । ग्रामीण क्षेत्रका मानिसले पनि राम्रो आम्दानी गरेर सुखद जीवन विताउने गरेका उदाहरणहरू प्रशस्त भेटिएका छन् ।

१५. २०७१ प्र. नं. ४ तलको अनुच्छेदवाट दुईओटा तत्सम र दुईओटा आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
विद्याको सर्टिफिकेट कोठाको वाकसमा हुन्छ । भलादमीको प्रमाण पत्र सधैं उसको शरीर उपर विज्ञापन जाहेरी गर्दछ ।

१६. २०७० प्र. नं. ४ तलको अनुच्छेदवाट दुई-दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
कम्प्युटर एक इलेक्ट्रोनिक यन्त्र हो जसले अत्यन्तै उच्च वेगमा प्रयोगमा कर्ताले दिएको निर्देशनअनुसार कार्य सम्पादन गरी नतिजा प्रस्तुत गर्न र डाटा भण्डारण गर्न सक्छ ।

१७. २०६९ प्र. नं. ४ तलको अनुच्छेदवाट दुई-दुईओटा तत्सम र आगन्तुक शब्द खोजी लेख्नुहोस् : (२)
टुरिस्टले प्यान केक भनेर खाइदिनाले रेस्टुरां र लजमा फापर र कोदाका रोटी लोकप्रिय हुन्छन्, तर आफैंले घरमा पकाएर कोदाको रोटी वा ढिँडो खाएमा अरुको शौचालयमा जान लज्जावोध हुन्छ ।

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एकाइ ५: शब्दनिर्माण (व्युत्पन्न) (कुनै दुई प्रश्न)

(२×३ = ६ अङ्क)

१. २०७७ सेट H प्र. नं. ४

क. तलको अनुच्छेदबाट तीनओटा समस्त शब्द र तीनओटा द्वित्व व्युत्पन्न शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व व्युत्पन्न शब्दको निर्माण प्रक्रिया देखाउनुहोस् (३)

गाउँ समाजमा कसैसंग पनि नभिल्ने, कसैलाई साह्रोगाह्रो पर्दा आँखाझ्यो पनि नटार्ने अनि ऐंगैरेसंग सम्बन्ध राख्ने मान्छेबाट कामसाम बन्ला भनी ठान्नु मूर्खता हुन जान्छ। त्यस्ता नरपशुबाट सहयोगको अपेक्षा गर्नुभन्दा आफूआफूबाटै भाग्योदयका लागि प्रयास गर्नु हाम्रा लागि उपयुक्त हुने देखिन्छ।

ख. तलको अनुच्छेदबाट छ ओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् (३)

विभिन्न जातजातिका मानिसको साझा कर्मथलोका रूपमा रहेको नेपाल सांस्कृतिक विविधताले भरिपूर्ण छ। खर्चवर्च नहुँदा सरसापटका भरमा चाडपर्व मनाउने प्रचलन त यहाँ प्राचीन समयदेखि नै चल्दै आएको छ। सानन्दका साथ रमाइलो गरी जीवन जिउने कला सिकेका हामी शुभ कार्यमा कुनै किसिमको झैझमेलामा पर्ने गरेका छैनौं।

२. २०७७ सेट I प्र. नं. ४

क. तल दिइएका उपसर्ग र प्रत्यय लगाई एक एक शब्द निर्माण गर्नुहोस् (३)

उपसर्ग : अन, निर, वे।

प्रत्यय : इंन, याइ, एलु।

ख. तलको अनुच्छेदबाट छ ओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)

सरकारले भव्यताका साथ उद्घाटन गरेको पर्यटन वर्ष विदेशी पर्यटकहरूलाई भित्र्याई राष्ट्र निर्माण गर्ने एउटा महत्त्वपूर्ण महोत्सव नै हो। यसलाई सफल तुल्याई आर्थिक समृद्धिका मार्गमा लम्कने अभियानलाई सबैले आआफ्नो क्षेत्रबाट सरसहयोग गर्नुपर्ने देखिन्छ। अझ बेरोजगार युवा युवतीले त कुनै राम्रो कामसाम गरेर आफ्नो भविष्य निर्माणको योजना बनाउने अवसरका रूपमा यसलाई लिनुपर्ने देखिन्छ।

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. ५

क. तलका उपसर्ग र प्रत्ययबाट एक एक शब्द बनाउनुहोस् (३)

उपसर्ग: अति, परि, कु।

प्रत्यय: अन्त, आउ, मय।

ख. तलको अनुच्छेदबाट तीनओटा समस्त शब्द र तीनओटा द्वित्व व्युत्पन्न शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व व्युत्पन्न शब्दको निर्माण प्रक्रिया देखाउनुहोस् (३)

वर्षभरका लागि अन्नबाली उब्जाउने किसानहरूले असारका बेला आल्तुफाल्तु काममा लाग्नुहुँदैन। उनीहरूले घरघरमा चौपायाहरू पनि पालेर घरखर्च चलाउनुका साथै आवश्यक सरसामानको व्यवस्था गर्नुपर्ने हुन्छ। त्यसैले गफसफ गरेर उनीहरूले समय खेर फाल्नुहुँदैन।

ग. तलको अनुच्छेदबाट छओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धिविच्छेद गर्नुहोस्: (३)

ढुङ्गेधारा नजिकैको सामुदायिक विद्यालयको पठन-पाठन उत्कृष्ट रहेको छ। गैरसरकारी संस्था तथा केही ठुलठुला परोपकारी चन्दादाताका सरसहयोगमा स्थापित उक्त विद्यालय विशेष गरी जेहेनदार छात्रछात्रालाई राष्ट्रको गरगहना छात्रवृत्ति प्रदान गरिएको छ। असहायको मरमद्धत गरिने पनि सङ्घसंस्था समाजमा सधैं प्रतिष्ठित रहने छ।

४. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. ५

क. तलको अनुच्छेदमा रेखाङ्कित शब्दहरूमध्ये उपसर्ग व्युत्पन्न शब्दमा लागेका उपसर्ग र प्रत्यय व्युत्पन्न शब्दमा लागेका प्रत्यय छुट्याउनुहोस् :

राजनैतिक अस्थिरताका कारण कलकारखाना खोल्ने रोजगारीका अवसर बढाउनेतर्फ सरकार, राजनीतिक दल एवम् उद्योग सञ्चालकको ध्यान पुग्न नसक्दा राम्रो शैक्षिक योग्यता भएका युवाहरू पनि रोजगारीको खोजीमा भौंतारिएका छन्।

ख. तलको अनुच्छेदबाट तीन समस्त शब्द र तीन द्वित्व व्युत्पन्न शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व व्युत्पन्न शब्दको निर्माण प्रक्रिया देखाउनुहोस् :

टोलका दाजुभाइको सरसल्लाह भएपछि हामी सबै वनभोज जाने तम्तयार भयौं। टोल टाठावाठा, बुढाबुढी, केटाकेटी र युवाहरू सहभागी भएको उक्त वनभोजमा खानासाना राम्रो प्रबन्ध थियो।

ग. तलको अनुच्छेदबाट छ ओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच गर्नुहोस् :

हिमालय नेपालको प्राकृतिक वरदान हो। हिमाली सौन्दर्यले पर्यटन व्यवसाय बढेको छ वैदेशिक मुद्रा आर्जनको यो नै राम्रो वैकल्पिक उपाय बनेको छ। बाटाको खरखाँचो सर-सामान खरखजाना बोकी गएका विवेक पर्यटकले हरक्षेत्रमा प्रदूषण गरेका छन्। प्रकृतिमाथि गरिने अत्याचार बढ्दै गएमा पछि यो प्रदूषणले जीवन शोकाकुल नबल्ला भन्न सकिन्न।

५. २०७६ प्र.नं. ५

क. तल दिइएका उपसर्ग र प्रत्यय लगाई एक-एक शब्द बनाउनुहोस्।

उपसर्ग : अन, सु, दुस्

प्रत्यय : ई, अक, एली

ख. तलको अनुच्छेदबाट तीन समस्त शब्द र तीन द्वित्व व्युत्पन्न शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व व्युत्पन्न शब्दको-निर्माण प्रक्रिया देखाउनुहोस् :

आ-आफ्नो क्षेत्रमा कर्तव्यनिष्ठ भएर समर्पित नरनारीले जीवनपथमा सफलताका सिँढीहरू फटाफट चढ्न सक्तछन्। झैझगडा र कलहसलहमा पलपल खेर फाल्नेहरूले अरूलाई परेका वेलामा मरमद्दतका माध्यमबाट परोपकार गर्न एवं आशीर्वचनको पञ्चामृत पान गर्न सक्तैनन्।

ग. तलको अनुच्छेदबाट छओटा सन्धियुक्त व्युत्पन्न शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् :

दिनरात काम गर्दा पनि सूर्योदय र सूर्यास्तपछि भातसात खान नपाएका पीताम्बर, जगदीश र चक्रपाणिले घर घर डुलेर माग्ने गरेको देख्दा अत्यन्त पीडा भयो। यस्तो विषम, विकट र कहालीलाग्दो दुरवस्थाको अन्त्य गर्न लागिपर्नु हामी सबैको कर्तव्य हो। सामाजिक अव्यवस्था सम्झँदा मेरो त खाँदा खाँदै खानासाना पनि मुखमा नगई हातैमा अडिन्छ।

६. २०७५ गेडवृद्धि परीक्षा प्र.नं. ५

क तलका उपसर्ग र प्रत्ययवाट एक-एक शब्द निर्माण गर्नुहोस् : (३)
उपसर्ग : सु, अधि, निर्
प्रत्यय : एली, इक, तम

ख तलको अनुच्छेदवाट तीनओटा समस्त शब्द खोजी विग्रह गर्नुहोस् र तीनओटा द्वित्व शब्द खोजी तिनको निर्माण प्रक्रिया देखाउनुहोस् (३)
जवसम्म प्रत्येक नागरिकमा कर्तव्यसर्तव्य भावना जाग्दैन तवसम्म जति जति प्रयास गरे पनि असल चरित्र निर्माण गर्न सकिदैन। देशभक्त नेपाली दाजुभाइले एकआपसमा सरसहयोगको भावना वोकेर गाउँगाउँमा पुगी सवैलाई आआफ्नो क्षेत्रवाट जाग्न प्रेरित गर्नुपर्छ।

ग तलको अनुच्छेदवाट ६ वटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)
विद्यार्थीहरू विद्यालयमा पढ्छन्। पर्यटकहरू हिमालयमा चढ्छन्। आधुनिक युगमा प्रत्येक नागरिकले यस्तै महत्त्वपूर्ण कार्य गरे देश विकसित हुन समय लाग्दैन। गणतान्त्रिक मुलुकले सर्वाङ्गीण विकासका लागि सदैव व्यावहारिक तथा जीवनोपयोगी ज्ञान प्रदान गर्ने उद्देश्य लिनुपर्दछ।

७. २०७५ सेट A प्र. नं. ५

क तलको अनुच्छेदवाट तीनओटा उपसर्ग व्युत्पन्न र तीनओटा प्रत्यय व्युत्पन्न शब्द पहिचान गरी लेख्नुहोस्। (३)
छिमेकी गाउँले महिला भए पनि उनी निर्भीक र निडर थिइन्। ग्रामीण परिवेशमा वसेर उपन्यास लेख्नु उनको अभीष्ट थियो। रोजगार मानवीय संरचनालाई दयालु र कर्तव्यनिष्ठ तुल्याएर उनले आफ्ना समुचित भाव गाम्भीर्यलाई प्रकट गर्थिन्।

ख. तलको अनुच्छेदवाट तीन-तीनओटा समास र द्वित्व व्युत्पन्न शब्द टिपी तीनको निर्माण प्रक्रिया देखाउनुहोस्। (३)
चार वजेको घण्टीसँगै ससाना वालवालिका आआफ्ना कापी किताव वोकेर गाउँघरतिर लागे। कक्षाकोठा शून्य भयो। शिक्षिकाले घरमा आमालाई मरमद्दत गर्न, छिमेकीलाई सरसहयोग गर्न र आल्तुफाल्तु कुरा नगर्न सिकाउनु भएको थियो। वाह्र सत्ताइस नवुझ्ने द्रव्यपिशाचको भाव नभएका चौपायालाई स्नेह गर्ने ती विद्यार्थी अवश्य पनि भोलिको समाजका कर्णधार हुनेछन्।

ग. तलको अनुच्छेदवाट छओटा सन्धियुक्त शब्दहरू छान्नुहोस्। (३)
पुस्तकालय विद्यार्थीको दोस्रो घर हो। घर घडेरी जम्मा गर्नु घरको वनोट र गंसोटमा ध्यान दिनु डकर्मी सिकर्मीको प्राकृतिक धर्म भएझैं पठन पाठनमा मनोभाव लाउनु चित्ताकर्षक रचना लेख्नु परोपकारका कुरा गर्नु विद्यार्थीका पहिचान हुन्। छुट्टी भएपछि गाउँको सिरानदेखि देखिने हिमालयको सौन्दर्य र चन्द्रोदयलाई नमस्कार गरी आध्यात्मिक जग वसाउनुपर्छ।

८. २०७५ सेट B प्र. नं. ५

क. तलका उपसर्ग र परसर्ग लगाई एक-एक शब्द वनाउनुहोस् :
उपसर्ग: अ, उद, कु परसर्ग: अनीय, त्व, पन

ख. तलको अनुच्छेदवाट तीन समस्त शब्द र तीन द्वित्व व्युत्पन्न शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व व्युत्पन्न शब्दको निर्माण प्रक्रिया देखाउनुहोस्
ससाना वालवालिकाले आफ्नो काम कर्तव्य पूरा गरेका छन्। ठूल्ठूला ऋषिमुनि पनि वनवास गएर चित्तशुद्धिमा रमाएका छन्। हरदिन लोभमा फस्ने मानिसले समाजमा घरैघर ठड्याएर कुटाकुट निम्त्याएको भेटिन्छ।

ग. तलको अनुच्छेदवाट छ ओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् :
उल्ले मलाई भन्यो, "विदेशवाट आएका पर्यटकहरू हाम्रो स्वागत, सत्कार तथा आतिथ्य पाएर अन्यन्त हर्षित हुँदै स्वदेश फर्कन्छन्।"

९. २०७४ पूरक प्र. नं. ५

क. तलको अनुच्छेदमा रेखाङ्कन गरिएका पदहरूको निर्माण प्रक्रिया देखाउनुहोस् : (३)
नेपालमा घरेलु उद्योग निरन्तर घटिरहेका छन्। मानवीय विकाससँगै भौतिक उपार्जन वढेको अवस्थामा जैविक संरक्षण र संवर्धन गर्नु आजको आवश्यकता हो। मातृत्व संरक्षण गरी वालवालिकाको भविष्य जोगाउनु र भएका सांस्कृतिक सम्पत्तिको पुस्तान्तरण महत्त्वपूर्ण हुन्छ।

ख. तलको अनुच्छेदवाट तीन समस्त शब्द र तीन द्वित्व व्युत्पन्न शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व व्युत्पन्न शब्दको निर्माण प्रक्रिया देखाउनुहोस् : (३)
सानातिना कुराको स्वार्थसिद्धिमा लागेर ठूल्ठूला राजनीतिक दलहरूले देशविदेशमा आफ्नो छवि विगार्नुहुँदैन। रातदिन जनहितमा लागेर एकआपसमा झैझगडा नगरी दलहरूले गाउँसहरका जनताको सेवा गर्नुपर्दछ। आआफ्नो पार्टीमा ससाना कुरा गर्नुभन्दा जनमतको सम्मान गर्नुपर्दछ।

ग. तलको अनुच्छेदवाट ६ ओटा सन्धियुक्त व्युत्पन्न शब्द पहिचान गरी तीनको सन्धिविच्छेद गर्नुहोस् : (३)
पुस्तकालयमा विद्यार्थीले परोपकारको भावना भएका महर्षिका कुरा सूर्योदयदेखि सूर्यास्तसम्म पढ्न पाउँछन्। अत्यावश्यक खँदिलो विषयलाई अध्ययनको विषय वनाउन सके वाङ्मयको गरिमा उच्च उच्छवासमा अभिव्यक्त हुने थियो।

१०. २०७४ प्र. नं. ५

क. तल दिइएका उपसर्ग र प्रत्यय लगाई एक-एक शब्द वनाउनुहोस् : (३)
उपसर्ग: सु, अन, वद प्रत्यय: ईय, ता, यौली।

ख. तलको अनुच्छेदवाट तीन समस्त शब्द र तीन द्वित्व व्युत्पन्न शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व व्युत्पन्न शब्दको निर्माण प्रक्रिया देखाउनुहोस् : (३)
घामछाया जस्तो जीवनमा सुखदुःख आलोपालो आई रहन्छन्। गगनचुम्वी महलमा वसे पनि, सगरमाथाको चुचुरोमा चढे पनि र मखिवुट्टे कपडाले जतिसुकै आइसाड सिँगारे पनि हामी पीताम्वर वन्न सक्तैनौं। न त खुरुखुरु आआफ्नो काम गर्न छाडेर मुख विगार्दैमा हात्तीसुँढे लम्वोदर नै वन्न सक्छौं।

ग. तल दिइएको अनुच्छेदवाट छओटा सन्धियुक्त व्युत्पन्न शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)
मनोरम नदीनाला र सरोवरहरू हेर्नका लागि प्रत्येक वर्ष थुप्रै विदेशी पर्यटकहरू नेपाल आउने गर्दछन्। उनीहरू यहां जातीय, धार्मिक, सांस्कृतिक र भाषिक विविधताका वीचमा सामाजिक सद्भाव र राष्ट्रिय एकताको जगमग ज्योति पाउँछन्। उनीहरू

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नृत्याङ्गनाका छमछम नाचहरू हेर्दै नेपालमै पुराणहरूमा वर्णित स्वर्गको झझल्को अनुभव गर्दछन् ।

११. २०७३ पूरक प्र नं ५

क तल दिइएका उपसर्ग र प्रत्यय लगाई एक एक शब्द बनाउनुहोस् (३)

उपसर्ग वि, सम्, अधि प्रत्यय ले, अनीय, ता ।

ख तलको अनुच्छेदबाट तीन समस्त शब्द र तीन द्वित्व शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व शब्दमा दोहोरिएको अंश छुट्याउनुहोस् (३)

साथीभाइसंग साझविहान झैझगडा गर्ने खराब बानीले गर्दा छरछिमेकमा उसको सम्बन्ध बिग्रेको छ । कुलदीपका रूपमा नबरत्न मानिएको व्यक्ति पिटपाट र गोदगादमा लागेर ससाना कुरामा लल भन्दै अल्झिने बानीले उसलाई दहीच्युरे, निर्लज्ज बनाएको छ ।

ग तलको अनुच्छेदबाट छओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)

अतीतको खँदिलो विषयलाई रमेशले आफ्नो मनोरथ पूरा गर्ने उद्देश्यले समेटेको छ । परोपकार सदैव गरौं, सूक्ति र हिमालयका सौन्दर्य वर्णित कुरा पुस्तकालयमा मात्र होइन हृदयमा सजाऊँ ।

१२. २०७३ प्र. नं. ५

क. तलको अनुच्छेदमा रेखाङ्कित शब्दहरूमध्ये उपसर्ग व्युत्पन्न शब्दमा लागेका उपसर्ग र प्रत्यय व्युत्पन्न शब्दमा लागेका प्रत्यय छुट्ट्याएर देखाउनुहोस् : (३)

अहिले नेपाली युवाहरूका लागि वैदेशिक रोजगारी आशाको केन्द्रविन्दु बनेको छ । देशको राजनीतिक अस्थिरता, शान्ति सुरक्षाको अभाव र बढ्दो बेरोजगारीले यस्तो परिस्थिति सिर्जनाका लागि उत्प्रेरकको भूमिका खेलेका छन् ।

ख. तलको अनुच्छेदबाट तीन समस्त शब्द र तीन द्वित्व शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व शब्दमा दोहोरिएको अंश छुट्ट्याउनुहोस् : (३)

सप्तर्षि उच्चमाध्यमिक विद्यालयका छात्रछात्राहरूले एकआपसमा सरसल्लाह गरेर त्रिवेणीमा वनभोजको आयोजना गरेका थिए । त्यहाँ तात्तातो खानेकुरा खाएपछि सबै जनाले आआफ्ना सुरमा नाचगान गरे अनि साँझतिर सबै घरघर फर्किए ।

ग. तलको अनुच्छेदबाट छओटा सन्धियुक्त व्युत्पन्न शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)

प्रत्येक वर्ष पौष शुक्लपूर्णिमाको दिन सप्तकोशीका किनारामा ठूलो मेला लाग्ने गर्दछ । मेलामा प्रायः त्यसै भेगका मधेसी र पहाडी समुदायका मानिसहरूको भिडभाड देख्न पाइन्छ । मेलाका हुलमुलमा युवायुवती र वृद्धवृद्धाहरू आफ्नै सुरमा रमाइरहेका भेटिन्छन् । त्यहाँ कोही अत्यावश्यक सामानहरू किन्न व्यस्त देखिन्छन् भने कोही वेसुरका गफ चुटिरहेका हुन्छन् । त्यहाँ प्रायः सोझासाझा मानिसहरू नै भेटिन्छन् तापनि त्यहाँ पकेटमार र रक्स्याहाहरूको आतङ्क पनि कम हुँदैन ।

१३. २०७२ पूरक प्र. नं. ५

क. तलको अनुच्छेदबाट छओटा उपसर्ग व्युत्पन्न र छओटा प्रत्यय व्युत्पन्न शब्द पहिचान गरी लेख्नुहोस् : (३)

कुलतमा लागेका मानिसको अकाल मृत्यु हुन सक्छ । सामाजिक विकासका क्रममा यसका लागि परिसंवाद हुनु आवश्यक छ । कुवाटोमा लाग्ने यस्ता मानिसको उपकार गर्न हामी सबै प्रतिवद्ध हुनपर्छ । यस्तो सुकार्य वुझक्कड मानिसले मात्र सक्छन् । मायालु भाव र रमाइलो वातावरण प्रदान गरेर मिल बढाएपछि यी मानिस सुध्रन्छन् गन्तव्यमा पुग्न हरेक मानिसल ममतामय वातावरण दिएर यिनलाई उत्कृष्ट र प्रगतिशिल विशिष्ट नागरिक बनाउन सकिन्छ ।

ख. तलको अनुच्छेदबाट तीन समस्त शब्द र तीन द्वित्व शब्द खो समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व शब्दमा दोहोरिएको अं छुट्ट्याउनुहोस् :

कञ्चनजङ्घाको सौन्दर्यमा पुग्दा पनि तिम्रै झझल्को आउँछ त्यसैले दुईचार दिनको आआफ्नो जीवनयात्रामा सुखदुःख आत्मसात् गर्दै ससाना कुरामा नअल्झी इष्टमित्रसंग मनमोह व्यवहार एवम् खानखाँचोमा सरसहयोग गरेर अमर बन्नुपर्दछ ।

ग. तलको अनुच्छेदबाट छओटा सन्धियुक्त शब्द पहिचान ग तिनको सन्धि विच्छेद गर्नुहोस् :

सूर्योदय नहुँदै मनकामना पुगेर मनोरथ पूरा हुने आशा ग सदैव परोपकारको भावनाले मानवलाई देवर्षितुल्य ठा हिमालयमा सूर्यास्त नहुँदै हामी घर फर्क्यौं ।

१४. २०७२ प्र. नं. ५

क. तलको अनुच्छेदबाट तीनओटा उपसर्ग व्युत्पन्न शब्द तीनओटा प्रत्यय व्युत्पन्न शब्द पहिचान गरी लेख्नुहोस् :

संविधानसभाको मुख्य दायित्व लोकतान्त्रिक संविधान निर्माण गरी मुलुकलाई सङ्क्रमणवाट मुक्त गराउनु नै हो । निर्वाचनम जनताले विश्वास गरेका राजनीतिक दलहरूले जनमतको उपेक्ष नगरी समयमै काम सम्पन्न गरेर आर्थिक क्रान्तिद्वारा नेपाली जनताको मन जित्नु जरुरी छ ।

ख. तलको अनुच्छेदबाट तीनओटा समस्त शब्द र तीनओटा द्वित्व शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व शब्दमा दोहोरिएको अंश छुट्याउनुहोस् :

गाउँठाउँमा वसेपछि कर्तव्यनिष्ठ भई समयसमयमा समाजका असहायहरूको हकहितमा लाग्ने सोचाइ राखेर सबैका सुखदुःखमा सारिक हुने कृष्ण राय सार्वजनिक सभासमारोहमा झल्याकझुलुक मात्र देखापर्थे । गाउँदेखि टाढाटाढासम्म ख्याति कमाएका यस्ता महापुरुषलाई घरवाहिर भेट्दा चौतारोमा उभिएर गाउँलेहरूले अदवसँग स्वागत गर्थे किनभने कृष्ण रायमा गाउँलेहरू देवताकै झझल्को पाउँथे ।

ग. तलको अनुच्छेदबाट छओटा सन्धियुक्त व्युत्पन्न शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् :

मनमोहक रमणीय हिमाल, पहाड, नदीनाला, वन्यजन्तु आदिले गर्दा नेपाल विदेशी पर्यटकहरूका लागि आकर्षक गन्तव्य वन्नपुगेको छ । खासगरी सूर्यको झलमल किरण पर्ने वितिकै जगमग हुने नेपालका गरगहनाका रूपमा रहेका हिमाच्छादित शिखरहरू टलक्क टल्केको देख्दा पर्यटकहरू स्वदेश फर्कन नै भुल्छन् होला भन्दा खासै अत्युक्ति हुँदैन ।

१५. २०७२ सेट E प्र. नं. ५

क. तल दिइएका उपसर्ग र प्रत्यय लगाई एक-एक शब्द वनाउनुहोस् : (३)

उपसर्ग: अन, अति, सु,

प्रत्यय: अन्त, इम, त्व

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ख. तलको अनुच्छेदवाट तीन समस्त शब्द र तीन द्वित्व शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व शब्दमा दोहोरिएको अंश छुट्याउनुहोस् (३)

मरमसला र गरगहनाको खोजीमा साँझविहान श्रम गर्ने श्रमजीवी मात्र होइन ससाना वालवालिकालाई मरमद्दत गर्ने, झैझगडा गर्ने नदिने कक्षाकोठाका छात्रछात्रा पनि यो राष्ट्रका असल नागरिक हुन् ।

ग. तलको अनुच्छेदवाट छओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)

प्राकृतिक सौन्दर्य, जैविक विविधता वोकेको नैतिक मूल्यमान्यताको धरोहर नेपालको सांस्कृतिक पहिचान परोपकार हो । समाज भँडुवा गफाडी वनेर होइन, सच्चरित्रवान्, सदाचारी, मनस्वी व्यक्तिलाई सरोवरवाट देखिने सूर्योदयको नमस्कार ।

१६. २०७१ पूरक प्र. नं. ५

क. तलको अनुच्छेदवाट तीनओटा उपसर्ग व्युत्पन्न शब्द र तीनओटा प्रत्यय व्युत्पन्न शब्द पहिचान गरी लेख्नुहोस् : (३)

दयालु व्यक्तिको अकाल मृत्यु भयो भन्ने कुरामा अनपत्यार हुनु स्वाभाविक नै हो । यद्यपि कसैको कुभलो नचिताई सदा सुकार्यमा लागेका त्यस्ता विशिष्ट व्यक्तिको मृत्युको खवर सुन्दा जो कोहीको मन दुखी हुने निश्चित छ ।

ख. तलको अनुच्छेदवाट तीन समस्त शब्द र तीन द्वित्व शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व शब्दमा दोहोरिएको अंश छुट्याउनुहोस् : (३)

तात्तातो भात खाएर हिँडेका पिताम्वर राजीवलोचन कलेज पुगेर मल्याकमुलुक गर्दै छिटोछिटो कक्षाकोठातिर लागे । पढाइसढाइ छाडेर सधैं कक्षामा नवसी अन्यत्र हिँड्ने गरेकाले यी दुवैलाई गुरुहरू विनाकामका विद्यार्थी भनी गाली गर्नुहुन्थ्यो ।

ग. तलको अनुच्छेदवाट छओटा सन्धियुक्त व्युत्पन्न शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)

देशको अव्यवस्थित वसोवासले जनताको अत्यावश्यक भौतिक वस्तुहरूको सहज आपूर्ति हुन सकेन । उनीहरूको उन्नति र भलाइमा ककसले कुन कुन क्षेत्रवाट जिम्मेवारी पूरा गर्नुपर्ने हो, यसवाट सोचिएन । आगामी दिनमा यी सवै कुराको सङ्गति मिलाउनै पर्छ । पछौटे सोचाइले समस्याको समाधान हुँदैन ।

१७. २०७१ प्र. नं. ५

क. तल दिइएका उपसर्ग र प्रत्यय लगाई एक-एक शब्द वनाउनुहोस् : (३)

उपसर्ग: वद, परा, कु प्रत्यय: ईय, ता, आलु

ख. तलको अनुच्छेदवाट तीन समस्त शब्द र तीन द्वित्व शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व शब्दमा दोहोरिएको अंश छुट्याउनुहोस् : (३)

देशहितका काममा लागेका पीताम्वर र चक्रपाणिले आआफ्नो कर्तव्य पूरा गर्दै देशविदेश जहाँ भए पनि एक अर्कामा सरसहयोग र सुखदुखमा साथ दिने गरेका छन् । उनीहरूले गरेको कामका वारेमा छरछिमेकका घरघरमा मुक्तकण्ठले प्रशंसा हुनेगरेको छ ।

ग. तलको अनुच्छेदवाट छओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)

नेपालको हिमाली सौन्दर्य, पहाडवाट हाम्फाल्ने नदीनाला, प्राकृतिक भूवनोट र पुरातात्त्विक महत्त्वका वस्तुहरूको अवलोकन गर्न पर्यटकहरू यहाँ आउने गर्छन् अनि नेपालीहरूको स्वागत, सत्कार र आतिथ्य पाएर सुखी हुँदै हाँसेलो अनुहार लगाएर आफ्नो मुलुक फर्कछन् भनेर कान्छ्यामाले उल्लाई भन्नुभयो ।

१८. २०७० प्र. नं. ५

क. तलको अनुच्छेदवाट तीनओटा उपसर्ग व्युत्पन्न शब्द र तीनओटा प्रत्यय व्युत्पन्न शब्द पहिचान गरी लेख्नुहोस् । (३)

प्रमुख राजनैतिक दलहरूले गैरजिम्मेवार वनेर देशलाई अनिर्णयको वन्दी वनाउनुहुँदैन । दलीय कर्तव्यलाई बुझेर सकेसम्म चाँडै नै निकास दिने काममा केन्द्रित हुनु जरुरी छ ।

ख. तलको अनुच्छेदवाट तीन समस्त शब्द र तीन द्वित्व शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व शब्दमा दोहोरिएको अंश छुट्ट्याउनुहोस् : (३)

सप्तकोसीका वगरमा वसेर वनभोज जानेवारे सरसल्लाह गर्न पुगेका नीलकण्ठ र गजाननले आआफ्ना वल्छीद्वारा थुप्रै माछा पनि मारे । यसो तरकारी सरकारीको खाँचो टर्ला भनेर घरमा ल्याई भोलिपल्ट पकाउन खोज्दा ती माछा त गल्याकगुलुक भइसकेछन् ।

ग. तलको अनुच्छेदवाट छओटा सन्धियुक्त व्युत्पन्न शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)

कहिल्यै असत्य नवोल्ने, अरुलाई राम्रो उपदेश दिने, पण्डित्याइँ गरी घरवार चलाउने समाजका वयोवृद्धहरूको सेवा सुश्रुषा गर्न सदैव तम्तयार हुने अनि गाउँसमाजका कसैको पनि खासखुस गरी नराम्रो कुरा नकाट्ने हाम्रा कान्छा वा समाजसेवीका रूपमा चिनिनुहुन्छ । उहाँ पत्नी तथा छोराछोरीहरूसँग सरसल्लाह गरेर मात्र घरायसी काम सम्पन्न गर्ने व्यावहारिक अभिभावकका रूपमा पनि चिनिँदै आउनुभएको छ ।

१९. २०६९ प्र. नं. ५

क. तल दिएका उपसर्ग र प्रत्यय प्रयोग गरी एक-एक शब्द वनाउनुहोस् : (३)

उपसर्ग: वे, सु, अप । प्रत्यय: ली, आइ, ईय ।

ख. तलको अनुच्छेदवाट तीन समस्त शब्द र तीन द्वित्व शब्द खोजी समस्त शब्दलाई विग्रह र द्वित्व शब्दमा दोहोरिएको अंश छुट्याउनुहोस् : (३)

नौगेडी लाएकी मृगनयनी सानीमाको रातोपिरो अनुहार देखेर भान्दाइले भने उहाँ जन्मदेखि नै मरमसला हालेर पकाएको खानेकुरा सपासप खानुहुन्न । आआफ्ना सरसामान मिलाएर दराजमा राख्नु र आफ्नो रूपको झकझल्को दिनु उहाँको पहिचान हो ।

ग. तलको अनुच्छेदवाट छओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् : (३)

हिमालको सौन्दर्यलाई नेपालीको भलाइमा लगाऔं । हिमालमा फोहर फाल्नाले हाम्रो कमाइ गुम्न सक्छ । त्यहाँ गएर आर्थिक उपार्जन गर्ने र गोरेटो वाटो हिँडेर थकाइसमेत नभनी यात्रा गर्ने भरियादाइले हिमालमा पर्यटकको स्वागत गर्दै छन् ।

एकाइ ६: शब्द रूपायन (कुनै एक प्रश्न) (५ अङ्क)

१. २०७७ सेट H प्र न ५

क वाक्य ढाँचासहित तलको अनुच्छेदका वाक्यलाई एक वचनमा परिवर्तन गरी लेख्नुहोस् (३)

हाम्रा सबै योजनाहरू पुरा हुनेछन् । हामी भ्रमणबाट अथाह ज्ञान आर्जन गर्नेछौं । हामी प्राप्त ज्ञानको उपयोग गर्न चुक्ने छैनौं ।

ख तलको अनुच्छेदका वाक्यलाई सम्भावनार्थमा परिवर्तन गरी लेख्नुहोस् (३)

यस वर्ष उनीहरू मनपर्ने अन्नवाली भित्र्याउने छन् । हामी सबैलाई केही राहत मिल्ने छ । यद्यपि चामलको मूल्य भने घट्ने छैन ।

२. २०७७ सेट । प्र न ५

क तलका अनुच्छेदका वाक्यलाई द्वितीय पुरूषमा परिवर्तन गर्नुहोस् :(३)

ऊ विज्ञान विषय पढ्दै छ । ऊ डाक्टर बन्न चाहन्छ । ऊ नियमित रूपमा विद्यालय जाने गरेको छ ।

ख तलको अनुच्छेदका वाक्यलाई आज्ञार्थमा परिवर्तन गर्नुहोस् : (३)

त पनि राम्रै काम गर्लास् । त वरालिएर हिंड्दैनस् । तैंले आफ्नो क्षमता देखाउने छस् । तं सत्मार्गमा लम्कने छस् ।

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. ६

क तलका वाक्यहरूलाई पुलिङ्ग भए स्त्रीलिङ्ग र स्त्रीलिङ्ग भए पुलिङ्गमा परिवर्तन गर्नुहोस् (५)

गायक गीत गाउनका लागि मञ्चतिर उक्लियो । उसका पछिपछि गायिका पनि मञ्चतिर लम्की । गायकले आफ्नो गीतद्वारा सबैलाई मन्त्रमुग्ध तुल्यायो । गायिका पनि के कम थिइ र ! उसले पनि सबैलाई नचाउँदै मिठो गीत गुनगुनाई ।

ख तलको अनुच्छेदका वाक्यहरूलाई उच्च आदरमा परितर्वन गर्नुहोस् (५)

श्याम बिहान सबेरै उठ्छ । ऊ धेरै बेरसम्म व्यायाम गर्छ । ऊ साथीहरूसंग घुम्न निस्कन्छ । ऊ पत्रपत्रिकाहरूमा सरसरती आंखा दौडाउंछ । ऊ खाना खाइसकेपछि नियमित काममा व्यस्त हुन्छ ।

४. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. ६

क तलको अनुच्छेदका वाक्यहरूलाई वहुवचनमा परिवर्तन गर्नुहोस् :

ऊ मेरा मामाको छोरो हो । ऊ खाइलाग्दो र रातोपिरो देखिन्छ । उसले भर्खरै कक्षा उत्तीर्ण गरेको छ । ऊ स्नातक पढ्न विदेश जाने तरखरमा छ । उसको साथी पनि त्यही चक्करमा छ ।

ख तलका वाक्यमा प्रयुक्त सामान्य वर्तमानको क्रियालाई अभ्यस्त भूतकालमा परिवर्तन गर्नुहोस् :

ऊ चित्रकला प्रदर्शनीमा जान्छ । ऊ चित्रकलामा रुचि राख्छ । साथीहरूले पनि उसको राम्रो मान्छन् । वुवाआमाले पनि उसको चित्र हेरेर सुझाव दिनुहुन्छ । ऊ महान् चित्रकार बन्न चाहन्छ ।

५. २०७६ प्र.नं. ६

क. तलका अनुच्छेदमा दिइएको पुलिङ्गी वाक्यहरूलाई वाक्य ढाँचासमेत मिलाई स्त्रीलिङ्गमा परिवर्तन गर्नुहोस् । (५)

मेरो वुवा आज वजार जानुभएको छ । भाइले आफूलाई खाने कुरा मगाएको छ । काकाले खेत खन्ने सामान लिएर आउन भन्नुभयो । भिनाजु आज नै हाम्रो घर आउँदै हुनुहुन्छ । वेलुका हजुरवुवासंग पनि भेटेर रमाउन पाइन्छ ।

ख. तलको अनुच्छेदमा दिइएका वाक्यहरूलाई वाक्य ढाँचा मिलाई आज्ञार्थमा परिवर्तन गर्नुहोस् :

तिमी नियमित कलेज जान्छौ । तिमीले पढाइ ले जोक ज्योति हो भन्ने वुझेका छौ । तिमीले आफ्नो व्यवहार सुधारेका छौ । तिमी अरूको विचारलाई सम्मान गर्छौ । ति भविष्यमा असल मान्छे वन्नेछौ ।

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. ६

क. वाक्य ढाँचासहित वहुवचनलाई एकवचनमा परिव गर्नुहोस् :

क्रिकेट खेलाडीहरूले उत्कृष्ट खेल प्रदर्शन गर्नेछन् । उनीहरू आफ्नो क्षमता देखाउनेछन् । खेल जितेपछि पुरस्कार प्र गर्नेछन् । उनीहरूले देशको नाम राख्ने छन् । रा उनीहरूलाई सम्मान गर्नेछ ।

ख. तलको अनुच्छेदलाई द्वितीय पुरुष मध्यम आदरमा परिव गर्नुहोस् ।

ऊ गीत रचना गर्छ । ऊ आफैंले गीत गाउँछ । उसमा गी गाउने क्षमता छ । उसले गीत गाएर सबैलाई आकर्षि तुल्याउँछ । ऊ देशको चर्चित गायक र गीतकार पनि हो ।

७. २०७५ सेट A प्र. नं. ६

क. तलको अनुच्छेदका वाक्यलाई वचन परिवर्तन गरी आवश्यक वाक्य ढाँचा मिलाई लेख्नुहोस् ।

तिमी वजार जाऊ । तिमी किताव किन । वजारमा भेटिएक साथीहरूसँग परिचय गर । उनीहरूको घर ठेगाना सोध । म मलाई असल कुरा सिकाओस् ।

ख. तलको अनुच्छेदका वाक्यलाई आवश्यक वाक्य ढाँचा परिवर्तनसहित लिङ्ग परिवर्तन गर्नुहोस् ।

तिमी त साह्रै राम्री छ्यौ । केटाले केटीसँग भनेछ । केटीले भनी राम्रो त ज्ञान हो चेतना हो । यो कुरा केटाले राम्ररी वुझेन केटीलाई जिस्क्याउने उसको उद्देश्य विफल भयो ।

८. २०७५ सेट B प्र. नं. ६

क. तलका वाक्यहरूलाई आवश्यक सुधारसहित पुलिङ्गमा परिवर्त गर्नुहोस् :

गुरु आमाले वहिनीलाई नियमित विद्यालय आउनुपर्छ भन्नुभयो काकीले पनि नियमित रुपमा पढाइ नभएको वताउनुभयो । रा केटी झोला वोकेर आउँदै थिई । दिदीले उसको पढाइप्रति ध्या दिएकी थिइन् । माइजू र आमा सामाजिक काममा लागेकाले दिदीको भूमिका वढेको थियो ।

ख. तलका अनुच्छेदका वाक्यहरूलाई प्रथम पुरुषमा परिवर्त गर्नुहोस् :

ऊ नेपाली हो । ऊ रारा पुगेकी छैन । ऊ कहिले त्यहाँ पु भन्ने विचारमा छ । उसले अहिलेसम्म त्यहाँ जाने अवस पाएकी छैन । ऊ रारामा पुगेर गौरवान्वित हुनेछ ।

९. २०७४ पूरक प्र. नं. ६

क. तलको अनुच्छेदमा एकवचनका वाक्यहरूलाई वाक्य ढाँचा समेत मिलाई वहुवचनमा परिवर्तन गर्नुहोस् :

मेरो साथी वनभोज गयो । उसले वनभोजमा गीत गायो । उस चुटकिला सुनायो । ऊ आफ्नो साथीसंग नाच्यो । उसकी के साथी वनभोज आइन ।

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ख. तलका वाक्यहरूलाई आवश्यक संशोधनसहित इच्छार्थमा परिवर्तन गर्नुहोस् : (५)
म राष्ट्रका लागि असल काम गर्छु। मलाई साथीहरू सहयोग गर्छन्। हामी उद्यमी बन्छौं। हामी देशलाई समृद्ध पार्छौं। देशविरोधी विचार हामीलाई आउँदैन।

१०. २०७४ प्र. नं. ६
क. तलको अनुच्छेदका वाक्यहरूलाई एकवचन भए बहुवचनमा र बहुवचन भए एकवचनमा परिवर्तन गरी वाक्यढाँचा समेत मिलाइ पुनर्लेखन गर्नुहोस् : (५)
हामी प्रत्येक दिन बिहान चाँडै उठ्छौं। हामी हातमुख धुन्छौं। हामी चिया पिएर पढ्न थाल्छौं। तिमी भने सधैं ढिलो उठ्छ्यौ। तिमी पढाइमा पछि पछ्र्यौं। (५)

ख. तलको अनुच्छेदका वाक्यहरूलाई आवश्यक सुधारसहित सामान्य आदरमा परिवर्तन गर्नुहोस्।
ऊ कक्षा १२ मा पढ्दै छ। ऊ अति नै परिश्रमी छ। ऊ अनुशासित छ। उसकी एक बहिनी पनि छे। ऊ बहिनीलाई पनि पढ्न लेख्न सिकाउँछ। (५)

११. २०७३ पूरक प्र. नं. ६
क. तलका वाक्यमा रहेका एकवचनलाई बहुवचनमा परिवर्तन गर्नुहोस् : (५)
ऊ इमान्दार कृषक हो। ऊ साँझबिहान नभनी काम गर्छ। उसले प्रशस्त अन्न फलाएको छ। त्यो अन्न मैले पनि प्रयोग गरेको छु। ती सबैलाई जीवन दिने कृषकलाई मेरो नमस्कार छ।

ख. तलका वाक्यलाई सामान्य भूत कालमा परिवर्तन गर्नुहोस् : (५)
यसपटक प्रशस्त हिमपात भएछ। हिमाली क्षेत्रमा खुसियाली छाएछ। कृषकहरू रमाएछन्। उनीहरूले इष्टदेवलाई पुजेछन्। यो कुरा पत्रिकामा छापिएछ।

१२. २०७३ प्र. नं. ६
क. तलको अनुच्छेदका वाक्यहरूलाई एकवचनमा परिवर्तन गर्नुहोस् : (५)
मेरा साथीहरू क्रिकेट खेलाडी हुन्। उनीहरूले स्कुल पढ्दादेखि नै क्रिकेट खेलको अभ्यास गरेका थिए। उनीहरू अहिले पनि निरन्तर अभ्यास गर्दै छन्। उनीहरूले अन्तर्राष्ट्रिय प्रतियोगितामा सहभागिता जनाउने छन्। उनीहरूले विश्वकप जित्ने योजना पनि बनाएका छन्।

ख. तलको अनुच्छेदका वाक्यहरूलाई आवश्यक सुधारसहित पूर्ण वर्तमान कालमा परिवर्तन गर्नुहोस् : (५)
शिवनारानले बाबुको काजक्रिया सम्पन्न गरे। उनले आमालाई आदर साथ पाले। उनले भाइहरूप्रति सधैं माया दर्साए। उनले नानीथकुंको विवाह गराइदिएर दाजुको दायित्व पूरा गरे। उनी सधैं कर्तव्य पथमा हिँडे।

१३. २०७२ पूरक प्र. नं. ६
क. तलका वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (५)
गौरी सारै फुर्तिलो छे। शङ्कर गरिब केटो हुन्। गौरी र शङ्कर साथी हो। उनीहरू सँगै खेल्छ। उनीहरू खेलेको अभिभावकलाई मन पर्नुभएको छैन।

ख. तलको अनुच्छेदमा प्रयुक्त सबै क्रियापदलाई सामान्य वर्तमान कालमा परिवर्तन गरी पुनर्लेखन गर्नुहोस्। (५)
म दिनहुँ स्कुल जान्थें। म स्कुल जाँदा कापी किताब लैजान्थें। म स्कुलमा नै खाजा खान्थें। म साथीहरूसँग खेल्थें। म अतिरिक्त क्रियाकलापमा भाग लिन्थें।

१४. २०७२ प्र. नं. ६
क. तलको अनुच्छेदका वाक्यहरूलाई आवश्यक सुधारसहित पुलिङ्ग भए स्त्रीलिङ्ग र स्त्रीलिङ्ग भए पुलिङ्गमा परिवर्तन गर्नुहोस् :(५)
ऊ विदेशमा बस्दै आएको छ। उसले त्यहाँ राम्रो आम्दानी हुने काम फेलापारेको छ। उसकी बहिनी पनि विदेशमै बस्छे। ऊ त्यहाँ विद्यावारिधि गर्दै छे। उसले पढाइ सकेर स्वदेश फर्कने सोचाइ बनाएकी छ।

ख. तलको अनुच्छेदका वाक्यहरूलाई आवश्यक सुधारसहित इच्छार्थमा परिवर्तन गर्नुहोस् : (५)
नेपालको चाँडै उन्नति हुन्छ। युवाहरूले स्वदेशमै काम पाउँछन्। जलविद्युत्को विकासमा देशले ठूलो फड्को मार्छ। नेपालीहरूलाई लोडसेडिङको समस्याले पिरोल्दैन। नेपालीहरू सुखी जीवन बिताउँछन्।

१५. २०७२ सेट E प्र. नं. ६
क. तलको अनुच्छेदका वाक्यहरूलाई वाक्य ढाँचासहित सामान्य भविष्यत् कालमा परिवर्तन गर्नुहोस् : (५)
म अमेरिका गएँ। मैले त्यहाँ विभिन्न ठाउँहरूको अवलोकन गरें। मैले विज्ञान र प्रविधिका क्षेत्रमा अमेरिकाले गरेको प्रगतिका विषयमा जानकारी लिएँ। मैले नेपाललाई पनि त्यस्तै विकसित गराउने लक्ष्य लिएँ। म नेपाल फर्कें।

ख. तलका वाक्यहरूलाई प्रथम पुरुषमा परिवर्तन गरी लेख्नुहोस् : (५)
तँ गाउँमा जन्मेको होस्। तँलाई तेरै गाउँ प्यारो छ। तैंले स्कुल शिक्षा गाउँमै पाएको होस्। तँ उच्च शिक्षाका लागि सहर पसेको होस्। तेरो मनमा गाउँकै वास छ।

१६. २०७१ पूरक प्र. नं. ६
क. वाक्य ढाँचासहित एकवचनलाई बहुवचनमा परिवर्तन गर्नुहोस् :(५)
मेरो साथी मूर्ति बनाउने काम गर्छ। ऊ त्यसबाट निकै पैसा कमाउँछ। ऊ आफूले बनाएको मूर्ति विदेशतिर पनि पठाउँछ। ऊ राम्रो आम्दानी गरेर सुखी जीवन बिताइ रहेको छ। उसले पेसा अँगालेर बाँच्ने अठोट लिएको छ।

ख. तल दिइएको अनुच्छेदलाई वाक्य ढाँचासहित अज्ञात भूत कालमा परिवर्तन गर्नुहोस् : (५)
मेरी बहिनी सबैरै उठ्छे। ऊ उठ्ने बित्तिकै हातमुख धोएर पढ्न बस्छे। ऊ शिक्षकहरूले दिएको गृहकार्य खुरूखुरु गर्छे। ऊ आमालाई घरधन्दाका काममा पनि सघाउँछे। ऊ आफैं तयारी गरेर विद्यालय जान्छे।

१७. २०७१ प्र. नं. ६
क. तलको अनुच्छेदका वाक्यलाई स्त्रीलिङ्गमा परिवर्तन गर्नुहोस् :(५)
ऊ ताराको छोरो हो। उसले प्रवेशिका प्रथम श्रेणीमा उत्तीर्ण गरेको छ। ऊ अहिले कक्षा एघारमा पढ्छ। यहाँ पनि ऊ कक्षामा ध्यान दिएर सिक्छ। ऊ सबैको प्यारो भएको छ।

ख. तलका वाक्यलाई उच्चआदरार्थीमा परिवर्तन गर्नुहोस् : (५)
तँ गाउँमा जन्मेको होस्। तँ त्यहाँको अन्नपानी खाएर हुर्के, बढेको होस्। अहिले पढ्नका लागि तँ सहरमा आएर बसेको छस्। गाउँलाई भने तैले बिर्सेका छैनस्। पढिसकेर तं गाउँकै सेवामा फर्कन्छस्।

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१८. २०७० प्र. नं. ६

क तलका वाक्यहरूलाई पुलिङ्ग भए स्त्रीलिङ्ग र स्त्रीलिङ्ग भए पुलिङ्गमा आवश्यक सुधारसहित पुनर्लेखन गर्नुहोस् (५)
गायक गीत रेकर्ड गर्नका लागि स्टुडियोतिर जादै थियो। उसको पछिपछि गायिका पनि आउँदै थिई। पहिले गायकले गीत गायो। त्यसपछि गायिकाले पनि एउटा मिठो गीत गाई। उसको मधुरस्वर सुनेर गायक दङ्ग पऱ्यो।

ख तलका वाक्यलाई आवश्यक परिवर्तनसहित तृतीय पुरुषमा बदल्नुहोस् (५)
म क्रान्तिकारी कवि हुँ। म आफ्ना कवितामा क्रान्तिको सन्देश दिन्छु। मैले जनताका पक्षमा मात्र कविता रचेको छु। मैले आफ्ना कविताकै माध्यमबाट समाज परिवर्तनको प्रयास गरेको छु। मैले यही कुरामा सन्तोष मानेको छु।

१९. २०६९ प्र. नं. ६

क तलको अनुच्छेदलाई पुलिङ्ग भए स्त्रीलिङ्ग र स्त्रीलिङ्ग भए पुलिङ्गमा परिवर्तन गरी वाक्य ढाँचा समेत मिलाई पुनर्लेखन गर्नुहोस् (५)
ऊ पोखरामा बस्छ। ऊ विद्यालयमा पढाउँछ। उसकी एउटी महिला साथी छे। ऊ संस्थानमा काम गर्छे। ऊ आफ्नी महिला साथीलाई वैदेशिक घुम्न जाने प्रस्ताव गर्छ।

ख वाक्य ढाँचासहित एकवचनलाई बहुवचन र बहुवचनलाई एकवचनमा परिवर्तन गर्नुहोस् : (५)
विद्यार्थीहरू दार्जिलिङ घुम्न गएका थिए। त्यहाँ विदेशी पर्यटक पनि आएको रहेछ। उसले दार्जिलिङभन्दा त नेपालै राम्रो छ भन्यो। विद्यार्थीहरू झसङ्ग भए। विद्यार्थीहरूले स्वदेशी पर्यटनलाई महत्त्व दिनुपर्ने कुरा बुझे।

एकाइ ७: वाक्य तत्त्व (कुनै एक प्रश्न) (६ अङ्क)

१. २०७७ सेट H प्र. नं. ६ तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (४)
तपाईं सहरमा बसेर के गर्दै छ ? साना भाइ त्यहाँ बसेर पढ्दै छ। मेरो बहिनी त पढाइमा मात्र होइन, अतिरिक्त क्रियाकलापमा पनि अव्वल छ। ठुलो माइजूले बहिनीलाई प्रेरणा दिएको थिइन्। भाइ बहिनीको सफलताबाट हामी खुसी भएको छ। उनीहरू जीवनमा सफलताको शिखर चुमोस्।

२. २०७७ सेट I प्र. नं. ६

क ले, लाई, द्वारा, बाट विभक्ति लागेका भिन्न भिन्न कारकको प्रयोग भएका चार वाक्यमा कुनै डरलाग्दो घटनाको वर्णन गर्नुहोस्। (४)

ख तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् (४)
बगैंचामा फूलहरू रोपिएको छ। यहाँ बस्नका लागि ठाउँहरू पनि बनाइएको छ। साँझ बिहान त्यहाँ मानिसहरू डुल्न जान्छ। सानो बहिनी पनि त्यहाँ जान मन गर्छ।

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. ७

क तलको अनुच्छेदका रेखाङ्कित पदहरूको कारक पहिचान गरी लेख्नुहोस्। (६)
आँगनमा जमेको पानी फाल्न फरुवाले भल काट्दै गरेको कालेको बाबुले बजारबाट लामो काँटी ल्याउनू भनेपछि कालेकी आमा डोकाले छोपेको भालेलाई हेर्दै दुधको दुइग्रो काँधमा बोकेर बजार पुगी। त्यहाँ पुग्दा उसलाई इसाराले बोलाउँदै बाबुनीले चिया पिउन आग्रह गरी।

ख तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् (६)
अर्जुन सहरमा पढ्दै थिए। उसको आमा बिरामी भयो। काकाले बहिनीले उसलाई फोन गऱ्यो। आफ्नो बहिनीको फोन आएपछि ऊ गाउँ फर्किए। उसले बिरामी आमालाई अस्पताल लगे। आमाको उपचार चल्दै छन्।

४. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. ७

क. ले, लाई, बाट, द्वारा, देखि र विभक्ति लागेका भिन्न भिन्न कारकको प्रयोग गरी छ वाक्यमा आफूलाई मनपर्ने साहित्यिकारको बयान गर्नुहोस्।

ख. तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् :
झुमा र जुना दिदी बहिनी हो। उनीहरू एउटै कलेजमा पढ्नुहुन्छ। त्यो दुवैले नाच सिक्छ। तपाईं पनि उनीहरूलाई चिन्छ। उनीहरू चित्रकलामा पनि रुचि राख्छ। त्यो जुम्ल्याहा हो।

५. २०७६ प्र.नं. ७

क. तलको अनुच्छेदमा रेखाङ्कन गरिएका पदहरूको कारक पहिचान गरी लेख्नुहोस् : (६)
प्रतापले कैचीले रिवन काट्यो। दाइले उसलाई मुक्तिनाथबाट उनीका लुगा ल्याइदिनु भएको छ। उसले आफ्ना किताबहरू दराजमा राखेको छ। आमाले उसलाई पत्रिका पढ्न लगाउनुभयो। बुवाले आरानबाट निकालेको कोदालीले बारी खन्नुभयो। उहाँहरू आफ्नो इज्जतका लागि अत्यन्त सजग हुनुहुन्छ।

ख. तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (६)
म हिजो घरबाट आयो। आमाले मेरा लागि ताजा तरकारी पठाइदिएको छ। आमा मलाई असाध्यै माया गर्छ। म पनि आमालाई धेरै सम्मान गर्छौं। आमासँग मेरो बहिनी पनि बस्छ। बहिनी अहिले दश कक्षामा पढ्छु।

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. ७

क. 'ले', 'लाई', 'बाट', 'देखि', 'मा', 'द्वारा' विभक्ति लागेका भिन्न भिन्न कारकको प्रयोग गरी आफूले देखेको कुनै घटनाको वर्णन गर्नुहोस्। (६)

ख. तलको अनुच्छेदका वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् (६)
एकपटक हामी वनभोज गयो। वनभोजमा रमाइलो गऱ्यो। साथीहरूले गीत गाई। मेरो बहिनी पनि गएको थियो। उसले अचार बनाए। सबैले खानपिन गरेर रमाइलो गऱ्यो।

७. २०७५ सेट A प्र. नं. ७

क. ले, लाई, देखि, बाट, मा, द्वारा, विभक्ति चिह्नको प्रयोग गरी ६ वाक्यमा आफ्नो पढाइसम्बन्धी बयान गर्नुहोस्। (६)

ख. तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस्। (६)
मेरी भाइ कक्षा १० मा पढ्छ। उसको दुई जना दाजु पनि छ। ऊ दाजु र भाइ दुवैलाई माया गर्छन्। दाजु उहाँलाई पढाइमा सहयोग गर्छ। भाइ उसले अह्राएको काम मान्नु हुन्छ। उनीहरू मिलेर बसेको छ।

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८. २०७५ सेट B प्र. नं. ७

क ले, लाई, वाट, द्वारा, देखि, मा विभक्ति लागेका भिन्न भिन्न कारकको प्रयोग गरी छ ओटा वाक्यमा आफूले देखेको रक्तदान कार्यक्रमको वर्णन गर्नुहोस् । (६)

ख तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् (६)

तिनीहरू विद्यार्थी हो । तिनीहरू कक्षा एघारमा पढ्छे । म पनि तिनीहरूसँगै पढ्नुहुन्छ । तिनीहरू अध्ययनशील छु । तिनीहरूले परीक्षामा धेरै अङ्क ल्याउने योजना बनाएकी छस् । तिनीहरूको योजना सफल बनेस् ।

९. २०७४ पूरक प्र. नं. ७

क 'ले', 'लाई', 'द्वारा', 'वाट', 'देखि', 'मा' विभक्ति चिह्न प्रयोग भएका ६ वटा वाक्यमा आफू सहभागी भएको कुनै अतिरिक्त क्रियाकलापको वर्णन गर्नुहोस् । (६)

ख तल दिइएका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (६)

मेरो बहिनीले कविता लेखेको छ । उहाँले कवितामा मानवीय सौन्दर्य पस्केकी छ । उनका कवितामा नेपालको तस्विर पाइन्छन् । मैले उनलाई प्रोत्साहन दिएको छ । उसको सृजनाले निरन्तरता पाउनुहुन्छ । हामी यसैमा खुशी हुन्छौं ।

१०. २०७४ प्र. नं. ७

क. तलको अनुच्छेदमा रेखाङ्कित पदहरूको कारक पहिचान गरी लेख्नुहोस् : (६)

म खेतमा काम गर्दै थिएँ । खेतालाहरू कोदालीले खेत खन्दै थिए । रोपाहारहरू छुपुछुपु धान रोप्न लागेका थिए । खेतका आलीमा एउटा कालो सर्प देखियो । त्यसले मुख 'आँ' गरेर टोकुला जस्तो गऱ्यो । मैले त्यसलाई लट्ठीले हिर्काएँ । सर्प मऱ्यो । मैले मरेको सर्पलाई खेतको आलीवाट पर लगेर एउटा खाल्डामा पुरें । आधा दिनदेखि डराएका खेतालाहरू अब ढुक्क भए । मैले उनीहरूलाई नास्ता खान दिएँ । उनीहरूले मलाई पानी दिए । हामी सबैले रमाउँदै फेरि काम गर्न थाल्यौं ।

ख. तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (६)

मेरी दाइ क्याम्पसमा पढाउनुहुन्छ । उनले विज्ञानमा स्नातकोत्तर गरेकी छन् । उहाँका साथीहरू पनि क्याम्पसमै पढाउँछ । भाउजूले दाइका साथीहरूलाई राम्ररी चिनेको छु । समय समयमा घरमै बोलाएर खाना खुवाउने भएकाले भाउजूसँग सबै खुसी छ । भाउजूको माया र सहयोग पाएकामा दाइ पनि मख्ख छ ।

११. २०७३ पूरक प्र. नं. ७

क ले, लाई, द्वारा, वाट, मा, देखि विभक्ति चिह्नको प्रयोग गरी विभिन्न कारकमा आफ्नी बहिनीको पढाइवारे वर्णन गर्नुहोस् । (६)

ख. तलका वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् । (६)

रिमा बजार गयो । उसले सामानहरू किने । बजारमा साथीले उसलाई भेटेछु । तपाईं त विदेश थिइस्, कहिले आइस् भनी प्रश्न गर्छन् । हामीहरू लामो समयपछिको भेटमा रमायो ।

१२. २०७३ प्र. नं. ७

क. तलको अनुच्छेदमा रेखाङ्कन गरिएका पदहरूको कारक पहिचान गरी लेख्नुहोस् : (६)

म घरबाट बाहिर निस्कें । मैले साथीलाई बोलाइँ तर ऊ आएन । म बसमा चढें । बस सडकमा गुड्दै थियो । बस रोकिएपछि मैले झ्यालबाट बाहिर हेरें । सडकको पेटीमा मानिसहरू जम्मा भएका थिए । केही मानिसहरू एकजना घाइतेलाई उठाउँदै थिए । कसैले उसलाई मोटरसाइकलबाट ठक्कर दिएको रहेछ । एकजनाले आफ्नो मोबाइलद्वारा एम्बुलेन्स बोलाइसकेका रहेछन् । सबैले घाइतेलाई उपचारार्थ अस्पताल पुऱ्याए । सबैले घाइतेका लागि सक्दो सहयोग जुटाए । हिजोदेखि पानी परेकाले बाटो चिप्लो हुन गई दुर्घटना भएको रहेछ ।

ख. तलको अनुच्छेदका वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (६)

उसको बहिनी "बौलाहा काजीको सपना" नाटक हेर्न गएकी छे । उसको भाइ पनि त्यहीं जाँदै छन् । कान्छो दिदी पनि जाने कुरा गर्नुहुन्थ्यो । तँ पनि जान्छौ ? जाने भए मसँगै हिँड । म पनि कोही बेरपछि त्यतै जान्छु ।

१३. २०७२ पूरक प्र. नं. ७

क. वाक्य ढाँचा सहित एकवचनलाई बहुवचन र बहुवचनलाई एकवचनमा परिवर्तन गर्नुहोस् : (६)

विद्यार्थी परीक्षा हलमा पस्यो । उसले आफ्नो बस्ने ठाउँ खोज्यो । निरीक्षकहरू आउनुभयो । उहाँहरूले विद्यार्थीलाई आआफ्नो ठाउँमा बस्न भन्नुभयो । निरीक्षकहरूले प्रश्न बाँड्नुभयो । विद्यार्थी खुशी भयो ।

ख. ले, लाई, देखि, द्वारा, वाट, मा विभक्तिको प्रयोग गरी आफ्नो परिवारको बयान गर्नुहोस् । (६)

१४. २०७२ प्र. नं. ७

क. तलको अनुच्छेदमा रेखाङ्कन गरिएका पदहरूको कारक पहिचान गरी लेख्नुहोस् : (६)

शिवरात्रिका दिन पशुपतिमा धेरै मानिसहरू शिवको दर्शन गर्न आएका थिए । पूजालाई ल्याएको फूल हातमा लिएर उभिएका मानिसहरूको पङ्क्ति गौशालादेखि मन्दिरसम्म देखिन्थ्यो । त्यहाँ कोही मानिस मोबाइलबाट कुराकानी गरिरहेका देखिन्थे भने कोही चाहिं भक्तजनलाई ठग्ने दाउमा पनि थिए । त्यहाँ प्रहरीहरूले गँजडीहरूलाई डन्डाले हिर्काउँदै लखेटेको दृश्य पनि देखिन्थ्यो । कोही सङ्घसंस्थाले श्रद्धालुहरूलाई निःशुल्क पिउने पानीको व्यवस्था पनि मिलाएका थिए ।

ख. तलको अनुच्छेदका वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (६)

मेरो भाउजू वैङ्कमा काम गर्नुहुन्छ । उनले व्यवस्थापनमा स्नातकोत्तर गरेकी छन् । उहाँका दुई जना साथी पनि वैङ्कमै काम गर्छ । ठूलो दिदीले भाउजूका ती दुई जना साथीलाई राम्ररी चिन्छु । दिनभर कार्यालयको काममा व्यस्त हुने भएकाले भाउजूलाई घरका सबैले सहयोग गरेको छ । सबैको माया र सहयोग पाएकोमा भाउजू मख्ख छ ।

१५. २०७२ सेट E प्र. नं. ७

क. तलको अनुच्छेदमा रेखाङ्कित गरिएका कारक पहिचान गरी लेख्नुहोस् : (६)

काकाले पोखरावाट वसद्वारा ल्याएका सुन्तला केही गाउँलेलाई बाँडी

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कती छुराछारीका लागि भनी घरमा राखुभएको रहेछ। भोलिपल्ट हेदा सबै सन्तला चोरने झोलामा राखेर लगेको पाउँदा उहां कुद भई उनलाई गाली गर्दै हइसइग भुईमा लड्नुभएछ। (६)

ख तलको वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् (६)
दिदी र बहिनी बीजमा माइत आइन्। उसले तीज रमाइलो गरी मनाए। बुवा खुसी भइन्। आमा हर्षले गद्गद भयो। चाडपर्वले नेपालीलाई एकै ठाउँमा जुटाउँछ। त्यसैले मलाई चाडपर्व मन पर्छ।

१६. २०७१ पुरक प्र. नं. ७
क तलको अनुच्छेदमा रेखाङ्कित शब्दको कारक पहिचान गर्नुहोस् (६)
चामेले गौथलीलाई लात्तीले पिठिउँमा हिकायो। पिटाइको चोट सहन नसकेपछि ऊ ओछ्यानमा पल्टी। त्यसपछि उसले दराजबाट लुगाफाटो झिकेर झोलामा हाली र छिमेकीलाई आफू माइत हिंडन लागेको जानकारी गराई। हलोले बारी जोतिरहेको चामेलाई पनि इसारले नै माइत हिंडेको जानकारी त गराई तर चामेले थाहा पाएन। घरदेखि पाँच घन्टा पैदल हिंडेपछि गौथली माइत पुगी।

ख तलको अनुच्छेदका वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् (६)
मेरो भाइ चकचके छन्। कल्पनाकी भाइ पनि चकचके छन्। उनीहरू एकै ठाउँमा भेला भए भने झगडा गरिहाल्छ। मेरो आमा ती दुवैलाई झगडा नगर्न सम्झाउँछे। जति सम्झाए पनि उनीहरू झगडा गर्न छाड्दैन। झगडा गर्नु केटाकेटीहरूको बानी नै हुन्।

१७. २०७१ प्र. नं. ७
क ले,लाई, बाट, द्वारा, मा र देखि विभक्ति लागेका भिन्नभिन्न कारकको प्रयोग भएका छओटा वाक्यमा आफ्नी आमाको वर्णन गर्नुहोस्। (६)

ख तलका वाक्यमा सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (६)
राजु र सुमित्रा दसैंमा घर आयो। उनीहरू बुबाआमालाई भेटनु पाउँदा धेरै खुसी हुनुभयो। मैले पनि उनीहरूलाई भेट्न पायो। मलाई भेटेर राजु र सुमित्रा खुसी भइन्। दसैंपछि उहाँहरू विदेश फर्के। उहिले त्योहरू विदेशमै बस्छ।

१८. २०७० प्र. नं. ७
क. ले, लाई, बाट, द्वारा, देखि र मा विभक्ति लागेका भिन्न भिन्न कारकको प्रयोग भएका छओटा वाक्यमा आफूले प्रत्यक्ष देखेको कुनै घटनाको वर्णन गर्नुहोस्। (६)

ख. तलको अनुच्छेदका वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (६)
मैले आमालाई ढोगिदियो। आमाले मलाई आशीर्वाद दिइन्। तिमीले पनि आमालाई ढोगिस् ? मेरो भाइले पनि ढोगे। आमाको आशीर्वाद हामी सन्तानलाई अवश्यै लाग्छन्। आमाको आशीर्वाद पाउनु सौभाग्यको कुरो हुन्।

१९. २०६९ प्र. नं. ७
क ले, लाई, बाट, द्वारा, मा र देखि विभक्ति लागेका भिन्नभिन्न कारक प्रयोग भएका छओटा वाक्यमा आफूले गरेको कुनै एउटा कार्यको वर्णन गर्नुहोस् : (६)

ख तलका वाक्यलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् :
मेरो बहिनी बुटवलमा बस्छ। मेरो भतिजीचाहिं विराटनगर बस्छे। तपाई बुटवल जान्छस् ? म पनि बहिनी भेट्न बुटवल जादै छु। हामी दुवै सँगै जाऊ।

एकाइ ८: वाक्यान्तरण (कुनै दुई प्रश्न) (२×४=८ अङ्क)

१. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. ८
क. तलका जटिल वाक्यहरूलाई आठओटा सरल वाक्यमा छुट्याउनुहोस् (४)
गाउँ-गाउँलाई सडक सञ्जालसँग जोड्न सक्नुपर्दछ अनि देशको विकास तीव्र गतिमा हुन्छ। जब गाउँमा यातायात पुग्छ, तब त्यहाँको उत्पादनले बजार पाउँछ। किसानहरू खेतीपातीमा तल्लीन हुन्छन् किनभने त्यसबाट राम्रो आम्दानी गर्न सकिन्छ। कृषि उत्पादन बढ्यो भने युवाहरू कृषितर्फ आकर्षित हुन्छन्।

ख. तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् (४)
गोलभेंडा आलुको ठिमाहा छोरो हो। एउटाको जन्म जराबाट अर्काको जन्म हाँगाबाट हुन्छ। यो तर्क हावा गफ मात्र हो यस्तो मलाई लाग्दछ।

ग. तलका वाक्यहरूलाई प्रत्यक्ष कथनमा परिवर्तन गर्नुहोस् (४)
रमेशले मलाई विद्यालय नजाने भनी सोध्यो। मैले आज आफ्नो विद्यालय जान नसक्ने कुरो बताएँ। उसले मलाई विद्यालय नजानुको कारण सोध्यो। मैले आज घरमा धेरै काम गर्नुपर्ने कुराको जानकारी उसलाई गराएँ।

२. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. ८
क. तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् (४)
फूल ढकमक्क फुल्यो। मौरी उड्दै आयो। मौरी फूलमाथि बस्यो। मौरीले टन्न चुस्यो।

ख. तलको अनुच्छेदका वाक्यमा आवश्यक थपघट सहित वाच्य परिवर्तन गरी पुनर्लेखन गर्नुहोस् : (४)
ऊ लुम्बिनी गयो। ऊ होटलमा बस्यो। उसले साथीहरूलाई भेट्यो। उनीहरूले बौद्धविहार भ्रमण गरे। गुरुले उपदेश दिनुभयो। सबैले उपदेशलाई कामीमा टिपे। ऊ बेलुका साथीहरूसँग विदा भयो। ऊ घर पुगेर प्रार्थना गर्न थाल्यो।

ग. तलका अनुच्छेदका वाक्यलाई कारण भए अकरण र अकरण भए करणमा परिवर्तन गर्नुहोस् : (४)
हरि मिहिनेत गरेर पढ्थ्यो। उसका साथीहरूले भने राम्री पढेनछन्। त्यसैले हरिले परीक्षामा सफलता पायो। अरू उसका साथीहरू परीक्षामा उत्तीर्ण भएनन्। अब हरि कलेज पढ्ला। उसका साथीहरू अब पढ्दैनन्। हरिको जीवन सफल बन्ला। उसका साथीहरूको जीवन सुखद नबन्ला।

३. २०७६ प्र.नं. ८
क. तलका आठओटा सरल वाक्यलाई चारओटा जटिल वाक्यमा परिवर्तन गर्नुहोस् : (४)
नेपालीहरू इमान्दार छन्। यो कुरा विदेशीहरू भन्दछन्। तपाई अरूबाट राम्रो व्यवहार चाहनुहुन्छ। तपाई अरूलाई त्यस्तो व्यवहार गर्नुहोस्। मलाई मेरो देशमा रोजगारी पाइने वातावरण चाहिएको छ। मेरो देशको उन्नतिमा नै मेरो भविष्य लुकेको छ। हाम्रा सपना साझा हुनुपर्दछ। हाम्रा सपना साकार पार्ने सम्भव छ।

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ख तलका वाक्यहरूलाई वाक्य ढाँचासमेत मिलाई वाक्य परिवर्तन गर्नुहोस् (४)

हरि विद्यालय जादै छ। ऊ विद्यालयमा बसबाट पुग्छ। विद्यालयले उत्कृष्ट विद्यार्थीहरूलाई पुरस्कार दिन्छ। हरिका बुबाआमा पनि खुसी हुनुहुन्छ। उसले राम्री पढेको छ। उसले नया किताब, कापी र कलम किनेको छ। ऊ प्रतापलाई समेत सहयोग गर्छ। ऊ परोपकारमा रमाउँछ।

ग तलका वाक्यहरूलाई प्रत्यक्ष कथनमा परिवर्तन गर्नुहोस् : (४)

- गुरुले केदारनाथ अनुशासित विद्यार्थी हो भनेर भन्नुभयो।
- विद्वानहरू मानिसमा मानवताको कमी हुँदै गएको धारणा व्यक्त गर्दछन्।
- घमन्डी मानिसहरू अत्यन्तै क्रूर हुन्छन् भनी हजुरबुवाले भन्नुभयो।
- देश विकासमा लाग्नुपर्ने विचार गुरुले व्यक्त गर्नुभयो।

४. २०७५ शैक्षबृद्धि परीक्षा प्र.नं. ८

क तलका चारओटा जटिल वाक्यलाई आठओटा सरल वाक्यमा परिवर्तन छुट्याउनुहोस्। (४)

जब वर्षायाम सुरु हुन्छ तब तराईमा महामारी रोगहरू देखा पर्न थाल्छन्। वर्षायाममा स्वास्थ्यलाई ख्याल गर्नुपर्छ भने खानपानमा समेत ध्यान दिनुपर्छ। घर वरपर पानी जम्न दिनुहुँदैन भने राति सुत्दा झुल टाँगेर सुत्नुपर्छ। मानिसहरू स्वास्थ्यप्रति सचेत हुन्छन् तर विभिन्न रोगहरूले सताइ रहन्छन्।

ख तलका वाक्यलाई करण भए अकरण र अकरण भए करणमा परिवर्तन गरी पुनर्लेखन गर्नुहोस्। (४)

सम्पदा सधैं विद्यालय जान्छे। उसलाई साथीहरू निकै मन पराउँछन्। ऊ पढ्नमा ध्यान दिन्छे। ऊ नयाँ कुरा जान्न खोज्छे। काम गरे सफल भइन्छ भन्ने कुरा उसले बुझेकी छ। उसको बानी देखेर बाबुआमा दुःखी छैनन्। उसलाई कत्ति गाली गर्दैनन्। ऊ बाबुआमाले भनेको मान्छे।

ग. तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् : (४)

मीमांसा असल र मिहिनेती विद्यार्थी हो। उसले बाबुआमाबाट अनुशासनको पाठ पढेकी छ। उसले नृत्य प्रतियोगितामा भाग लिई। उसले प्रथम पुरस्कार प्राप्त गरी।

५. २०७५ सेट A प्र. नं. ८

क तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस्।

विद्यार्थी मिहेनती छन्। विद्यार्थी व्यवस्थापन विषय पढ्छन्। उनीहरू पढाइ लेखाइमा अव्वल छन्। उनीहरू भविष्यमा आफ्नो विषयमा दक्ष बन्नेछन्।

ख आवश्यकताअनुसार थपघट गरेर तलका अनुच्छेदका वाक्यहरूको वाच्य परिवर्तन गर्नुहोस्।

जीवनमा हरेक किसिमका मानिसको साथ गरियो। सबैसित मिलेर बसियो। आफ्नै जीवनबाट धेरै कुरा सिकियो। जीवन सङ्घर्षलाई गुरु मानियो। मैले आज अनौठो अनुभूति गरेको छु। म भोलिका बारेमा सोच्दै छु। म समयसँग अत्यन्त डराउँथे। म सचेत बनी जीवनका पाइला अगाडि बढाउनेछु।

ग तलको अनुच्छेदका वाक्यलाई करण भए अकरण र अकरण भए करणमा परिवर्तन गर्नुहोस्।

धनजितले गुमानेलाई कुलामा पछारेन। गुमाने पनि बलशाली थिएन। दुबैले कत्ति पनि बाझाबाझ गरेनन्। धर्मानन्दले दुबैलाई उक्साएनन्। त्यसपछि उनीहरूका घरमा आवतजावत भयो। धनजितै विरामी पर्दा गुमाने गएन। त्यसपछि उनीहरूले पटक पटक झगडा गरे। दुबैले एक अर्कालाई दोषारोपण गरे।

६. २०७५ सेट B प्र. नं. ८

क. तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् :

रमेश मिहिनेती छ। ऊ चलाख विद्यार्थी हो। उसले परीक्षामा उच्च अङ्क ल्याएको छ। उसको भविष्य उज्वल छ।

ख. तलका वाक्यहरूको कथन परिवर्तन गर्नुहोस् :

श्यामले भन्यो, "उनीहरू काम गर्दैनन्।" मैले आज गर्मी कुनै कुरा बताएँ। हरिले आफूज्ञानी भएको कुरा बतायो। उहाँले भन्नुभयो, "अध्यक्षज्यू कार्यक्रम आरम्भ गर्नुहोस्।"

ग. तलका अनुच्छेदका वाक्यलाई करण भए अकरण र अकरण भए करणमा परिवर्तन गर्नुहोस् :

डोल्माको डाक्टर बन्ने चाहना छ। ऊ मिहिनेत गरेर पढ्छे। उसँग प्रशस्त पैसा पनि छैन। पैसा सदुपयोग गर्ने विचार उसँग छ। उसका आमाबुवा खुसी छन्। ऊ सधैं गृहकार्य गर्छे। उसलाई साथीहरूको वास्ता छ। उसको जीवन सुखी बन्छ।

७. २०७४ पूरक प्र. नं. ८

क. तलका चारवटा जटिल वाक्यलाई आठओटा सरल वाक्यमा परिवर्तन गर्नुहोस् : (४)

जब म जनकपुर गएँ तब मैले जनकपुरलाई नजिकबाट देखेँ। जनकपुरबासी मिहिनेती छन्, त्यसैले तिनीहरू लोकप्रिय छन्। जनकपुरमा स्वदेशी तथा विदेशी पर्यटकहरू आउँछन् किनभने जनकपुर नेपालको धार्मिक क्षेत्र हो। तपाईं त्यहाँ जानुहुन्छ भने त्यहाँको सौन्दर्य आफैं देख्नुहुनेछ।

ख. तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् : (४)

हामीले व्याकरण पढेका छौं। हामीले साहित्य पढेका छौं। हामीले बोध र अभिव्यक्ति पढेका छौं। हामीलाई परीक्षा दिन गाह्रो छैन।

ग. आवश्यक कुरा थपघट गरी तलका वाक्यहरूलाई वाच्य परिवर्तन गरी पुनर्लेखन गर्नुहोस् :

हामीले सबै पाठहरू पढ्यौं। हामीले सबै अभ्यास गरेका छौं। यसपटक किताब समयमै पाइएको थियो। केही दिन शैक्षिक भ्रमण गइयो। त्यहाँ खेलियो। रमाइलो गरियो। अबचाहिं हामी माथिल्लो कक्षामा पुगौंला। हाम्रो मित्रता नतोडियोस्।

८. २०७४ प्र. नं. ८

क. तलको अनुच्छेदका आठओटा सरल वाक्यलाई चारओटा जटिल वाक्यमा परिवर्तन गर्नुहोस् : (४)

म पहिलो पटक पोखरा गएँ। म अत्यन्तै रमाएँ। तपाईं प्राकृतिक सुन्दरतामा रमाउन चाहनुहुन्छ। तपाईं एक चोटि पोखरा पुग्नुहोस्। उसले पोखराको सराङ्कोटबाट सूर्योदयको दृश्यावलोकन गऱ्यो। उसले स्वर्गीय आनन्दको अनुभव गऱ्यो। पोखराले विभिन्न ताल, गुफा र हरियालीका कारणले लाखौं पर्यटकको मन जितेको छ। पोखराका स्थानीय मान्छेहरूका लागि स्वरोजगारको अवसर सिर्जना गरेको छ।

ख. वाच्यपरिवर्तन गर्नुहोस् : (४)

म त यसपटक दसैंमा घर जान्छु। म आमाबुवालाई भेट्छु। म उहाँहरूका हातबाट दसैंको टीका लगाउँछु। म आशीर्वाद थाप्छु। आमा मिठामिठा परिकारहरू बनाउनुहुन्छ। हामी आपसमा बाँडेर ती परिकारहरू खान्छौं। साना केटाकेटीहरू गाउँघर डुल्छन्। उनीहरू धेरै रमाउँछन्।

ग. तल दिइएका प्रत्यक्ष कथनका वाक्यहरूलाई अप्रत्यक्ष कथनमा परिवर्तन गर्नुहोस् : (४)

शिवनारायणले भने - "भइ गो, फर्किसक्नु भएको मानिसले किन फेरि दुःख गर्ने।"

"अब मैले तपाईलाई पाउन नसक्ने भएं।" रुँदै नानीथकुलेले भनिन्।
"हिड, जादै गर रञ्जना ! म आउँछु।" डाक्टर गोदत्तप्रसादले भने।
पुनर्नारान, हर्षनारान दुवै जनाले एकै स्वरमा भने- "ठिक छ, आमाले ठिक भन्नुभयो।"

९. २०७३ पूरक प्र. नं. ८
क तलका चारओटा जटिल वाक्यबाट आठओटा सरल वाक्य बनाउनुहोस् (४)
बिहानै उठी हातमुख धोएं। बिहानी भ्रमण सकेर पत्रिका पसलबाट पत्रिका किनें। बाटोमा दुध, पाउरोटी किनेर घर आइपुगें। सात बजेको समाचार सुनी खाना खाएं।

ख तलका अनुच्छेदका वाक्यहरूलाई करण भए अकरण, अकरण भए करणमा परिवर्तन गर्नुहोस् : (४)
तिमीले भनेको कुरा मिलेन। मेरो साथी त पढ्दै रहेछ। ऊ खेल्न गएको थिएन। तिमीले झुटो बोलेछौ। म तिमीसंग रिसाएं। म भन्न सक्तिन। उसको प्रयास सफल भएछ। ऊ आतिएको छैन।

ग तलका वाक्यलाई आवश्यक ढाँचा मिलाई प्रत्यक्ष कथनमा परिवर्तन गर्नुहोस् : (४)
कथालाई सानो आँखीझ्यालका रूपमा देवकोटाले परिभाषा गरेका छन्। उनले मानिस जातले होइन दिलले ठूलो हुने कुरा लेखेका छन्। सबै मानिस नै ईश्वर हुन् भन्ने विचार पनि देवकोटामा पाइन्छ। उनले ईश्वर बाहिर आँखाले खोजेर नभेटिने कुरा गरेका छन्।

१०. २०७३ प्र. नं. ८
क तलका चारओटा जटिल वाक्यहरूलाई आठओटा सरल वाक्यमा छुट्ट्याउनुहोस् : (४)
विद्यार्थीहरू राम्रो पठनपाठनका निम्ति निजी विद्यालयमा भर्ना भए तर उनीहरूले सोचे जस्तो पठनपाठन भएन। विद्यालय प्रशासनले सुधारका निम्ति प्रयास गऱ्यो तापनि समस्या यथावत नै रह्यो। जब अभिभावकहरूले यो समस्या थाहा पाए तब उनीहरूले धेरै विद्यार्थीहरूलाई विद्यालयबाट निकाले। विद्यार्थीहरू घट्दै गए भने निजी विद्यालय सङ्कटमा पर्ने निश्चित छ।

ख तलको अनुच्छेदका अप्रत्यक्ष कथनका वाक्यलाई प्रत्यक्ष कथनमा बदल्नुहोस् : (४)
सुयशले आज आफू कलेज नजाने कुरा बताएो। दाइले सुयशलाई कलेज नजानाका कारण सोध्नुभयो। सुयशले आफ्नो सन्चो नभएको कुरा दाइलाई बताएो। दाइले सुयशलाई आज घरमै बसेर आराम गर्न आग्रह गर्नुभयो।

ग तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् : (४)
मान्छेले जीवनमा कहिले रुनु पर्छ। कहिले हाँस्नु पर्छ। जीवनमा सुखदुःख चक्रझैं घुमेर आइरहन्छन्। यो स्वाभाविक प्रक्रिया हो।

११. २०७२ पूरक प्र. नं. ८
क तलका सरल वाक्यहरूलाई मिश्र वाक्यमा परिवर्तन गर्नुहोस् : (४)
अ. विद्यार्थीहरूले मेहनत गरेका छन्। उनीहरूले राम्रो अङ्क ल्याउने छन्।
आ. फूल फुलेको छ। भमरो बसेको छ।
इ. त्यो गोरुको सिङ छैन। त्यो गोरुको नाम तिखे हो।
ई देशको संविधान बन्छ। देशमा विकास हुन्छ।

ख आवश्यक कुरा थपघट गरी तलका वाक्यहरूको वाच्यपरिवर्तन गर्नुहोस् :
हामीले नेपाली पढेका छौं। परीक्षाको राम्रो तयारी गरिएको थ्यो। आफ्नै विद्यालयमा पटकपटक परीक्षा दिइएको छ। तैपनि परीक्षासंग डराउँदैनौं। केन्द्रमा राम्रो वातावरण पाएका छौं। तसर्थ अब परीक्षा दिइन्छ त्यसपछि साथीसंग घर गइन्छ।

ग तलका वाक्यलाई आठओटा सरल वाक्यमा विश्लेषण गर्नुहोस् : नेपाल बहुभाषिक देश हो र यसको स्वरूप बहुसांस्कृतिक छ। नेपालीको पहिचान भनेको हाम्रो सांस्कृतिक परम्परा हो। यसले नै हामीलाई एकतामा बाँधेको छ। हामी संस्कृतिक दृष्टिले सम्पन्न पनि छौं र हाम्रो उन्नति पनि यसैबाट हुन्छ। संस्कृतिको संरक्षण गर्नुपर्छ किनभने संस्कृति हाम्रो सम्पत्ति हो।

१२. २०७२ प्र. नं. ८
क. तलका सरल वाक्यबाट चारओटा जटिल वाक्य बनाउनुहोस्।(४)
पूर्णिमाले लोक सेवा पास गरी। उसले सरकारी नोकरी पाई। उसको पढाइ राम्रो थियो। ऊ सफल हुँदै गई। उसको आमा रामो छ। उसको परिवार राम्ररी चलेको छ। ऊ दिनरात काम गर्छे। ऊ कहिल्यै थाकें भन्दिन।

ख. तलको अनुच्छेदका वाक्यहरूलाई करण भए अकरण र अकरण भए करणमा परिवर्तन गर्नुहोस् : (४)
पेम्बाको जीवन सुखी छ। उसले दुःखकष्ट भेलेको छैन। उसको बाल्यकाल पनि सुखद थियो। उसले दुःखको अनुभव गरेन। उसले अरुलाई सहयोग गर्न सकेको छ। उसले अरुबाट सहयोग लिनुपरेको छैन। अहिलेसम्म उसको जीवन सुखमा बितेको छ। उसले आफ्नो भविष्यको चिन्ता लिनुपरेको छैन।

ग. तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् : (४)
तराईमा प्रशस्त मात्रामा अन्नवाली उब्जन्छ। तराईको माटो ज्यादै उर्वर छ। तराईमा सिँचाइको उचित व्यवस्था छ। तराई नेपालको अन्न भण्डार हो।

१३. २०७२ सेट E प्र. नं. ८
क. आवश्यक कुरा थपघट गरी तलका वाक्यहरूलाई वाच्यपरिवर्तन गरी पुनर्लेखन गर्नुहोस् : (४)
यसपटक विदामा वृद्धाश्रम गइन्छ। त्यहाँ वृद्धहरूको सेवा गरिन्छ। फलफूल बाँडिन्छ। कपडा वितरण गरिने छ। उनीहरूको सरसफाइमा ध्यान दिइने छ। यो कुरा प्रशासनमा भनिने छ। यसरी अरुलाई पनि समाजसेवा गर्न प्रेरित गरिने छ। यसैमा आनन्द पाइने छ।

ख. तल दिइएका आठओटा सरल वाक्यलाई चारओटा जटिल वाक्यमा परिवर्तन गर्नुहोस् : (४)
हावाहुरी चल्यो। पानी पऱ्यो। कृषक रमाए। खेततिर लागे। कृषकले खेत खने। उनीहरूले खेती लगाए। कृषकले मेहनत गर्छन्। त्यसको फल सबैले पाउँछन्।

ग. तलका वाक्यलाई प्रत्यक्ष कथनमा परिवर्तन गर्नुहोस् : (४)
जिल्लावासीहरूले मिलेर पिकनिक जाने कुराको सूचना आजको पत्रिकामा छापिएको बताए। ऊ नगए पनि आफू चाहिं वनभोज जाने कुरा रमाले रमेशसंग गरिन्। नेपालले विश्वक्रिकेटमा नाम राखोस् भनी प्रशंसकहरूले प्रार्थना गरे। नजाने गाउँको बाटो नसोध्नु भनी बुबाले मलाई सम्झाउनुभयो।

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१४. २०७१ पूरक प्र. नं. ८

क तलका जटिल वाक्यहरूलाई आठओटा सरल वाक्यमा छुट्याउनुहोस् : (४)

मेघ गर्जेर पानी पऱ्यो भने किसानहरू खुसीले दङ्ग पर्दछन् । जति पानी पर्छ त्यति अन्नवाली उब्जन्छ । जब किसानहरू आफूले उब्जाएको अन्न प्रशस्त मात्रामा बजारमा पुऱ्याउँछन् तब हामी बजारबाट सहज रूपमा अन्न किनेर ल्याउन सक्छौं । किसानहरूले दिनरात मिहिनेत गरेका छन्, तसर्थ हामीले आजसम्म खाद्यसङ्कटको सामना गर्नुपरेको छैन ।

ख आवश्यक कुरा थपघट गरेर तलका वाक्यहरूलाइ वाच्यपरिवर्तन गरी पुनर्लेखन गर्नुहोस् : (४)

नियमित रूपमा कलेज गइयो । एक दिन पनि कलेज छोडिएन । सधैं गृहकार्य गरेर बुझाइयो । परीक्षाको तयारी राम्रोसँग गरियो । कुरा नछुटाई उत्तर लेखियो । विशिष्ट श्रेणीमा उत्तीर्ण भइयो । गुरुहरूबाट स्यावासी पनि पाइयो । कुलको इज्जत समेत बढाइयो ।

ग. तलका प्रत्यक्ष कथनका वाक्यलाई अप्रत्यक्ष कथनमा परिवर्तन गर्नुहोस् : (४)

गुरुले भन्नुभयो - "विद्यार्थीको पहिचान नै उसको अनुशासन हो ।"

विद्यार्थीले भन्यो - "म अनुशासित हुने प्रयत्न गर्छु ।"

गुरुले भन्नुभयो - "स्यावास ।"

विद्यार्थीले भन्यो - "यो त मेरो कर्तव्य नै हो ।"

१५. २०७१ प्र. नं. ८

क. आवश्यक कुरा थपघट गरेर तलका वाक्यहरूलाई वाच्यपरिवर्तन गरी पुनर्लेखन गर्नुहोस् : (४)

परीक्षा सकेर पोखरा घुम्न गइन्छ । त्यहाँका रमणीय ठाउँहरूको अवलोकन गरिन्छ । साथीभाइसँग भेटघाट पनि गरिन्छ । फोटाहरू खिचिन्छ । साँझ नाचगान गरी रमाइलो मनाइन्छ । फर्कंदा मनकामनाको दर्शन पनि गरिन्छ । केबुलकार चढेर आनन्द लिइन्छ । भोलिपल्ट मात्र घर फर्किइन्छ ।

ख. तलका वाक्यहरूलाई करण भए अकरण र अकरण भए करणमा परिवर्तन गर्नुहोस् : (४)

सुयोग विदेश गयो । ऊ बुबाआमाले भनेको मान्छ । ऊ यहाँ बस्न चाहँदैन । विदेशको दुख उसलाई थाहा छैन । काम नगर्दा जहाँ पनि पैसा कमाइँदैन । पैसा नै सबै कुरा हो । पैसाभन्दा शान्ति महत्त्वपूर्ण कुरा होइन । यो कुरा उसलाई थाहा छ ।

ग. तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् : (४)

भाषाको देशमा लवजको दशा हुन्छ । शब्दहरू दुब्लापातला हुन्छन् । तिनीहरूको प्राचीन महत्त्व उड्छ । शब्दको अपभ्रंश हुन्छ ।

१६. २०७० प्र. नं. ८

क. तलका जटिल वाक्यहरूलाई आठओटा सरल वाक्यमा छुट्ट्याउनुहोस् : (४)

लोडसेडिङ घट्ने अवस्था भएन भने देशको आर्थिक उन्नति हुँदैन । जब देशमा आर्थिक मन्दी छाउँछ तब जनता गरिबीको मारमा पर्दै जान्छन् । सरकारले लोडसेडिङ हटाउन पहल गर्नुपर्दछ अनि विद्युत्गृहहरूको निर्माणकार्य निर्धारित समयमै पूरा गर्नुपर्दछ । सरकार लोडसेडिङ हटाउन सक्षम भयो भने देशको चौतर्फी विकास हुने कुरा निश्चित छ ।

ख. तलको अनुच्छेदका वाक्यहरूलाई कर्तृवाच्यमा परिवर्तन गरी पुनर्लेखन गर्नुहोस् : (४)

हिजो चौरमा भकुण्डो खेलियो । तरिका मिलाएर भकुण्डो हानियो । खेल पनि जितियो । प्रथम पुरस्कार पाइयो । त्यस अवसरमा खुसियाली मनाइयो । नाचगानका कार्यक्रमहरू सम्पन्न गरिए । बाजाहरू बजाइए । ट्रफी उचालेर नगर परिक्रमा पनि गरियो ।

ग. तलका वाक्यहरूलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् . (४)

यहाँबाट नजिकै एउटा जङ्गल छ । जङ्गलमा ठूल्ठूला रुखहरू छन् । त्यस जङ्गलमा ग्रामीण महिलाहरू सालको पात टिप्न जान्छन् । त्यहाँ गोठालाहरू गाईवाखा चराउन पनि जान्छन् ।

१७. २०६९ प्र. नं. ८

क. तलका वाक्यलाई एउटै वाक्यमा संश्लेषण गर्नुहोस् : (४)

हामी स्वतन्त्रताप्रेमी छौं । हामी इमान्दार छौं । हामी नेपाली हौं । हामी विश्वमा प्रख्यात छौं ।

ख. तलका वाक्यहरूलाई करण भए अकरणमा र अकरण भए करणमा परिवर्तन गर्नुहोस् : (४)

सम्झनाको इन्जिनियर बन्ने चाहना छ । उनी मिहेनत गरी पढ्छिन् । उनका धेरै साथी छैनन् । अतिरिक्त काममा उनी रुचि राख्दिनन् । अनुसन्धानमा सधैं संलग्न हुन्छिन् । प्रयोगशालाबाहिर बस्दिनन् । पाठ्यक्रमभन्दा बाहिरका पुस्तक पढ्दिनन् । उनको भविष्य उज्यालो देखिन्छ ।

ग. आवश्यक कुरा थपघट गरेर तलका वाक्यहरूलाई वाच्यपरिवर्तन गरी पुनर्लेखन गर्नुहोस् :

वर्षभरि पढियो । विद्यालयमा नियमित रूपमा गएँ । त्यहाँ असल साथीहरू भेटें । उनीहरूसँग गफगाफ गरें । अतिरिक्त क्रियाकलापमा भाग लिइयो । साथीहरूसँग घुमियो । पत्रपत्रिकाहरू पढिए । वर्षदिन रमाइलोसँग बितायौं ।

खण्ड (ख) बोध र अभिव्यक्ति (१०+५+५+५+१०=३५ अङ्क)

एकाइ १: बोध र शब्दभण्डार तथा बुँदाटिपोट र सङ्क्षेपीकरण (१०+५=१५ अङ्क)

क. बोध र शब्दभण्डार (१० अङ्क)

१. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. ९ तलको अनुच्छेद पढी अन्त्यमा सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (१०)

खगोल विज्ञान विश्व वैज्ञानिक इतिहासमा प्राचीन विज्ञानका रूपमा स्थापित छ । अहिले खगोल विज्ञानका क्षेत्रमा धेरै महत्वपूर्ण उपलब्धिहरू प्राप्त भइसकेका छन् । यसतर्फको वैज्ञानिक अध्ययन अहिले ज्ञात ब्रह्माण्डीय पिण्डभन्दा पनि अज्ञात ग्रह तथा पिण्डको रहस्य खोतल्न लक्षित भएको छ । स्पष्टतः अहिलेका खगोलविद्हरू ब्रह्माण्ड निर्माणको भौतिक तथा रासायनिक प्रक्रियाको अध्ययनमा जुटेका छन् । खगोल विज्ञानको इतिहास केलाउने हो भने हामीले प्राचीन सभ्यतासम्म पुग्नै पर्दछ । उत्पत्ति कालदेखि नै मानव जातिले ग्रह तथा आकाशीय पिण्डहरूका विषयमा जानकारी राख्न गरेका प्रयासलाई खगोल अध्ययनको पहिलो प्रहर मान्न सकिन्छ । ग्रहहरूको प्रक्रिया, जलवायु वा मौसम अनि मौसमको परिवर्तन यी प्राग्मानवका प्रारम्भिक जिज्ञासाहरू थिए । प्राचीन मिस्रका

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नागरिकहरूले प्रत्येक वर्ष बाढी आउनुपूर्व आकाशमा नक्षत्र एक निश्चित स्थितिमा हुन्छ भन्ने पत्ता लगाए। यो पर्यवेक्षण नै प्रमाणयुक्त खगोल अध्ययनको पहिलो पाइलो थियो। यो खोजपछि नै उनीहरूलाई नक्षत्रयुक्त आकाशको मानचित्र बनाउन सफलता मिल्यो। फलत मिस्रवासीहरू यसकै आधारमा पञ्चाङ्ग निर्माण गर्न सफल पनि भए र उनीहरूले नै एक वर्षमा ३६५ दिन हुन्छ भन्ने पत्ता लगाए। सूर्य तथा चन्द्र ग्रहणको भविष्यवाणी आजको आधुनिक खगोल विज्ञानमा सहज बनिसकेको छ। प्राचीन बेबिलोनवासीहरू ग्रह तथा नक्षत्रको अध्ययन गरी सूर्य तथा चन्द्र ग्रहणको भविष्यवाणी गर्न पहिलोपल्ट सफल भएका थिए। वर्षलाई महिना, सप्ताह, दिन, घण्टा र मिनेटमा बाँड्ने प्रक्रिया पनि बेबिलोनबाटै प्रारम्भ भएको हो। उनीहरूको सोचाइ थियो-आकाश ठुलो चाल्नी जस्तै छ जसमा असङ्ख्य छिद्रहरू छन् र यिनै छिद्रहरूबाट पृथ्वीमा वर्षा हुन्छ।

प्रश्नहरू:

क अहिलेका खगोलविद्हरूको अध्ययन केमा केन्द्रित छ ?

ख खगोल अध्ययनको पहिलो प्रहर केलाई मान्न सकिन्छ ?

ग प्रमाणयुक्त खगोल अध्ययनको पहिलो पाइलो के थियो ?

घ प्राचीन बेबिलोनवासीहरू पहिलोपल्ट के कुरामा सफल भए ?

ङ 'खगोलविद्' र 'पर्यवेक्षण' शब्दको अर्थ लेख्नुहोस्।

२. **२०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. ९** तलको अनुच्छेद पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस्: (१०)

जुन प्रकारले मानिसलाई बाँच्नका निम्ति भोजनको आवश्यकता पर्दछ, त्यस्तै बोटविरुवाका लागि पनि हुर्कन, फुल्न र फल लाग्न खाद्यपदार्थको आवश्यकता पर्दछ। बिरुवाका लागि यी खाद्यपदार्थहरू केही मात्रामा हावा र पानीबाट प्राप्त हुन्छ भने अधिकांश भाग माटोबाट प्राप्त हुन्छ। बोटबिरुवालाई माटोबाट खाद्य पदार्थ उपलब्ध गराउनका निमित्त माटोमा जुन पौष्टिक पदार्थ हालिन्छ त्यसैलाई मल भनिन्छ। यसैले मल भनेको त्यो पदार्थ हो जुन माटोमा मिलाउनाले माटाको उर्वराशक्तिमा वृद्धि र माटाको स्वरूप राम्रो हुन्छ र बिरुवालाई सजिलैसित आवश्यक पौष्टिक खाद्य पदार्थ उपलब्ध हुन्छ।

कुनै पनि बाली बिरुवाका लागि विभिन्न तत्त्वहरूको आवश्यकता पर्दछ। ती तत्त्वहरू कार्बन, हाइड्रोजन अक्सिजन, नाइट्रोजन, फस्फोरस, पोटास, क्याल्सियम, म्याग्नेसियम, सल्फर, म्याग्निज, बोरन, कपर, जिङ्क, आइरन, मोलिब्डेन तथा क्लोरिन हुन्। यी तत्त्वहरूमध्ये कार्बन, हाइड्रोजन र अक्सिजन बिरुवाले हावा तथा पानीबाट र अरू बाँकी तत्त्वहरू माटोबाट लिन्छन्। माटोबाट बन्ने यी सबै तत्त्वहरूलाई मुख्य खाद्यतत्त्व भनिन्छ। क्याल्सियम, म्याग्नेसियम र सल्फर बोटबिरुवाले माटोबाट कम लिने गर्दछन्। यी तत्त्वहरूलाई सहायक खाद्यतत्त्व हुन्। यिनीहरूलाई सूक्ष्म खाद्यतत्व भनिन्छ। हावा, पानी माटो, प्राङ्गारिक मल, रासायनिक मल आदि बोटबिरुवाका खाद्यतत्त्वका स्रोतहरू हुन्।

प्रश्नहरू:

क. बोटबिरुवाका लागि खाद्यपदार्थको आवश्यका किन पर्दछ ?

ख. बिरुवाहरूले खाद्यपदार्थ केबाट प्राप्त गर्दछन् ?

ग. माटोको उर्वराशक्ति कसरी बढ्छ ?

घ. खाद्यतत्त्वका स्रोतहरू के के हुन् ?

ङ. 'उर्वराशक्ति' र 'प्राङ्गारिक' शब्दको अर्थ लेख्नुहोस्।

३. **२०७६ प्र.नं. ९** तलको अनुच्छेद पढी अन्त्यमा सोधिए प्रश्नहरूको छोटो, छरितो उत्तर दिनुहोस्: (१

विज्ञानको रोचक र सर्वोपयोगी चमत्कार हामी बिजुली अनुभव गर्न सक्छौं। बिजुलीमा तीन किसिमका विद्युत् कणहरू हुन्छन् - ऋणात्मक कण, धनात्मक कण र तट कण। यिनकै संयोजनको वैज्ञानिक तालमेलबाट विद्युत् उत्पादन हुन्छ। विद्युत् ऊर्जाको उपयोग जस्तोसुकै काम लागि पनि गरिन्छ। बत्ती बाल्न, ताप पैदा गरी विभिन्न काम उपयोग गर्न, रेफ्रिजेरेटरको सहयोगले कुनै वस्तु चिस्या तान्न, ठेल्न, उचाल्न, पछार्न - जे गर्न पनि विद्युत शक्ति उपयोग गरिन्छ। रेडियो, टिभी, टेलिफोनलगायत विभि सञ्चार उपकरणमा समेत विद्युत् शक्तिको उपयोग हुने गर्द यसको उपभोग दिनानुदिन बढ्दै छ। यो अत्यावश्यक उपभो वस्तुका रूपमा चिनिन थालेको छ र प्रयोगमा आइरहेको छ तर हाम्रो देशमा पूंजी र प्राविधिक ज्ञानको न्यूनताका का विद्युत् उत्पादनको ठूलो सम्भावना भए पनि पर्याप्त विद्यु उत्पादन गर्न सकिएको छैन। हुन त पूंजी र प्राविधिक ज्ञान अपर्याप्तता भनेर पूरै पन्छिने अवस्थाचाहिं छैन। देश राजनीतिक अस्थिरता र विकासप्रतिको प्रतिवद्धताको कमी पनि अंशत: जिम्मेवार कारण मान्नुपर्ने हुन्छ। देशमा स नदीनाला छन् तर औंलामा गन्दा भ्याइने जलविद्युत् आयोज मात्र बनेका छन्। ती पनि विदेशी सहयोग र कृपामा बने छन्। आफ्नै पूँजी, प्रविधि, सीप र जनशक्तिको उपयोग गर्ने जलविद्युत् आयोजना गर्ने हो भने निश्चय नै त्यसबाट धेरै ला हुन्छ।

प्रश्नहरू:

क. विद्युत् ऊर्जा कसरी उत्पादन हुन्छ ?

ख. विद्युत् ऊर्जाको उपयोग कुन कुन काममा गर्न गरिएको छ

ग. नेपालमा पर्याप्त बिजुली उत्पादन गर्न नसक्नुको कारण के हो ?

घ. उपर्युक्त अनुच्छेदका लागि उपयुक्त शीर्षक के हुन सक्छ

ङ. 'प्रतिवद्धता' र 'उपभोग्य वस्तु' पद-पदावलीको अ लेख्नुहोस्।

४. **२०७५ ग्रेडवृद्धि परीक्षा प्र.नं. ९** तलको अनुच्छेद पढी सोधिएक प्रश्नहरूको उत्तर लेख्नुहोस्: (१०

आज विज्ञानबाट अनेक प्रविधिको विकास भइरहेको छ प्रविधिले गर्दा पनि विज्ञानको नयां नयां प्रादुर्भावलाई सहाय पुगि रहेछ। आजको विश्वको द्रूततर उन्नति प्रविधि कै परिणा हो। हाम्रो जस्तो विकासोन्मुख देशका निम्ति विज्ञानकै ठू उपादेयता छ र त्यो हो - प्राथमिक आवश्यकता पूर्ति, विकास पूर्वाधारको तयारी र समाजमा वैज्ञानिक दृष्टिको विकास प्रथमत: हामीले आफ्नै परम्परागत प्रविधिभित्रबाट पनि विज्ञानलाई उद्घाटित गर्नु छ र त्यसकै विकास गरेर हा प्राथमिक आवश्यकताको पूर्ति गर्नु छ। आफ्ना प्रविधिल संस्थागत रूपमा विकसित गर्दै र उन्नत प्रविधिलाई आयाति पनि गरेर हामीले विकासका पूर्वाधार तयार गर्नु छ। हा वैज्ञानिक शिक्षा आत्मतृप्तिका निमित्त नभई दक्ष जनशक्ति तया पार्न र समाजमा विकासका लागि अनुकूल दृष्टि तयार पार्न निम्ति हुनुपर्दछ। नेपाली प्रतिभाले विज्ञानमा केही नयां त पत्ता लगाउन सकेमा त्यो चाहिं विश्व मानवताकै पनि सम्प हुन जानेछ र विश्वको वैज्ञानिक मानचित्रमा नेपालको नामसमे

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अङ्कित हुनेछ। यसका लागि अहिलेको परम्परागत शिक्षा पद्धतिलाई परिवर्तन गरेर प्रयोगात्मक, व्यावहारिक र वैज्ञानिक शिक्षालाई लागु गर्न सके नेपालले शिक्षा क्षेत्रमा आशातीत सफलता प्राप्त गर्न सक्ने छ।

प्रश्नहरू:

क विज्ञान र प्रविधिबीच कस्तो सम्बन्ध देखाइएको छ ?

ख विकासोन्मुख देशमा विज्ञानको उपादेयता कसरी पहिल्याउन सकिन्छ ?

ग वैज्ञानिक शिक्षा कस्तो हुनुपर्दछ ?

घ के गरेमा नेपालले शिक्षा क्षेत्रमा आशातीत सफलता प्राप्त गर्न सक्छ ?

ङ 'आयातित' र 'पूर्वाधार' शब्दको अर्थ लेख्नुहोस्।

५. २०७५ सेट A प्र. नं. ९ तलको अनुच्छेद पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस्। (१०)

लोकतन्त्रमा सूचनाका माध्यमहरूको व्यवस्थापन कसले र कसरी गर्ने भन्ने विषयमा खास सैद्धान्तिक विवाद छैन तर व्यावहारिक प्रयोगमा भने विभिन्नता पाइएका छन्। लोकतान्त्रिक देशहरूमा समेत प्रसारण माध्यमको व्यवस्थापन सरकारका तर्फवाट हुने परिपाटी अझै पनि नभएको होइन तर छापा माध्यम भने प्रायः सरकारद्वारा सञ्चालन हुने गर्दैनन्। नेपालमा भने अहिले पनि छापा माध्यम सरकारले चलाइरहेको छ। लोकतन्त्रको पुनः स्थापना हुनुभन्दा पहिले सूचना प्रवाहको परिपाटी नियन्त्रणात्मक र निर्देशनमुखी थियो। अपेक्षाकृत स्वतन्त्र रूपमा सूचना दिन खोज्ने निजी क्षेत्रका माध्यमहरू समेत सरकारका तर्फवाट वारम्वार प्रताडित र प्रतिवन्धित हुने अवस्था थियो। लोकतन्त्रको स्थापनाले यस परिपाटीमा व्यापक र आधारभूत परिवर्तन ल्यायो। परिणामस्वरूप निजी क्षेत्रका सञ्चार माध्यमहरू माथिको नियन्त्रित परिपाटी समाप्त गरे पनि सरकारी संस्थाहरूवाट सूचनाको प्रवाह गर्ने परिपाटीमा अपेक्षा गरेअनुसारको गुणात्मक परिवर्तन भने आउन सकेको देखिँदैन। जे जति परिवर्तन देखिन्छ त्यो व्यवस्थित वैज्ञानिक सुधारका कारण नभएर व्यापक राजनीतिक परिवर्तनका कारण हुन पुगेको स्वभाविक परिणाम जस्तो मात्रै अनुभव हुन्छ।

प्रश्नहरू:

क. लोकतन्त्रमा सञ्चार माध्यमको व्यवस्थापन कसरी गर्नु उपयुक्त हुन्छ ?

ख. लोकतन्त्रको पुनः स्थापना हुनुभन्दा पहिले सूचना प्रवाहको परिपाटी कस्तो थियो ?

ग. लोकतन्त्रको सञ्चार क्षेत्रमा कस्तो परिवर्तन ल्यायो ?

घ. नेपालमा सरकारी स्तरवाट के कस्ता सञ्चार माध्यमहरू सञ्चालित छन् ?

ङ. 'नियन्त्रणात्मक' र 'छापा माध्यम'को अर्थ के हो ?

६. २०७५ सेट B प्र. नं. ९ तलको अनुच्छेद पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस्: (१०)

विश्व श्रम वजारमा घरेलु श्रम एउटा प्रमुख क्षेत्र वनेको छ। विकसित मुलुकहरूमा घरेलु श्रमलाई उच्च महत्त्व दिइएको पाइन्छ। यद्यपि यो त्यति सम्मानित पेसाका रुपमा स्थापित हुन सकेको छैन। घरेलु श्रमिकको उपस्थितिले महिलाहरूलाई घर वाहिरको पेसा र क्षेत्रमा सहभागी तथ क्रियाशील हुने कुरामा विश्वभर नै योगदान गरेको छ। नेपालका सन्दर्भमा पनि महिलालाई घर वाहिरको उत्पादन, सेवामूलक पेसा र अन्य क्षेत्रको काममा सहभागी गराउन घरेलु श्रमिकको विशेष भूमिका रहेको छ। यति भएर पनि स्वयम् घरेलु श्रमिकका रुपमा काम गर्ने महिला वा पुरुषले सम्मानपूर्वक वाँच्न पाएका छैनन्। हाम्रो समाज, राष्ट्र तथा परिवार त्यस्ता श्रमिकलाई इज्जत दिन हिच्किचाउँछन्। घरेलु श्रमिकका समस्या अनेकौं छन्।

प्रश्नहरू:

क. नेपालमा घरेलु श्रमको विशेष भूमिका रहनुको कारण के हो ?

ख. घरेलु श्रमिकलाई सम्मानपूर्वक वाँच्न रोक्ने कुरा के हो ?

ग. विकसित मुलुक र नेपालमा घरेलु श्रमको महत्त्व किन फरक परेको होला ?

घ. उपयुक्त अनुच्छेदको उपयुक्त शीर्षक के होला ?

ङ. 'क्रियाशील' र 'घरेलु' शब्दको अर्थ लेख्नुहोस्।

७. २०७४ पूरक प्र. नं. ९ तलको अनुच्छेद पढी सोधिएका प्रश्नहरूको उत्तर लेख्नुहोस्: (१०)

हिमाल र हिमनदी पग्लिनु अनि हिमालय क्षेत्रमा तापक्रम वृद्धि हुनुमा जलवायु परिवर्तन मात्रै कारण नभई जैविक इन्धनवाट निस्किएका कार्वनका मसिना कणको पनि उत्तिकै भूमिका छ। जलवायु परिवर्तनका सम्वन्धमा विभिन्न समय सन्दर्भमा विश्वव्यापी छलफल हुँदै जनचेतना फैलाउने कार्य भएका छन्। छलफलमा सहभागी वैज्ञानिकहरूले जैविक इन्धनवाट उत्पन्न मसिना कणको मात्राको तह वायुमण्डलको माथिल्लो तहसम्म वढेकाले हिमालय क्षेत्रमा अन्यत्रभन्दा पाँचगुणा तापक्रम वेढेको तथ्य सार्वजनिक गरेका छन्। नेपालमा वार्षिक शून्य दशमलव शून्य छ डिग्री सेल्सियसका दरले तापक्रम वृद्धि भइरहे पनि हिमाली क्षेत्रमा अझ वढी असर परेको तथ्याङ्क सार्वजनिक भएका छन्। विश्वमा पछिल्लो सय वर्षयता शून्य दशमलव ८ डिग्री सेल्सियस तापक्रम वढेको तथ्याङ्क सार्वजनिक भएको छ। अन्यत्रभन्दा हिमालय क्षेत्रमा वढी असर देखिएको हो। 'व्ल्याक कार्वन सट' को तह माथि सरेकाले हिमालय क्षेत्रमा वढी असर देखिएको हो। 'व्ल्याक कार्वन सट' को तह वायुमण्डलको पहिलेको भन्दा निकै माथिल्लो तहसम्म फैलिन गएकाले समग्र हिमालय क्षेत्रमा हिँउ पग्लिने क्रम वढेको हो। कोइला, दाउरा, गुइँठा र डढेलो लागेपछि उड्ने ससाना काला कण वायुमण्डलमा फैलिनुलाई 'व्ल्याक कार्वन सट' भन्ने गरिएको हो। वैज्ञानिकहरूले सगरमाथाको आधारशिविरका साथै अन्य हिमालय क्षेत्रको पाँच हजार मिटरभन्दा अग्लो स्थानमा मनिटरिङ स्टेसन राखी पछिल्लो अवस्थावारे अध्ययन गरेका थिए। अध्ययनले विश्वका अन्य स्थानमा भन्दा हिमालय क्षेत्रमा तापक्रम पाँचगुणासम्म वढेको निष्कर्ष निकालेको थियो।

प्रश्नहरू:

क. तापक्रम वृद्धि हुनुका कारण के हुन् ?

ख. हिमाली क्षेत्रमा पाँचगुणा वढी तापक्रम वढ्नाको कारण के हो ?

ग. 'व्ल्याक कार्वन सट' भनेको के हो ?

घ. नेपालमा तापक्रम वृद्धिको औसत दर कति छ ?

ङ. 'हिमनदी' र 'भयावह' शब्दको अर्थ लेख्नुहोस्।

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८. २०७४ प्र नं ९ तल दिइएको गद्यांश पढी अन्त्यमा सोधिएका प्रश्नहरूको उत्तर दिनुहोस् । (१०)

पृथ्वीको सतह र वायुमण्डलको तल्लो तहमा सूर्यबाट आएका विभिन्न विकिरण जम्मा हुन्छन् । यिनै विकिरणका कारण पृथ्वीको सतह तात्ने र चिसिने कार्य भई पृथ्वीको जीवमण्डलमा विभिन्न असर देखा पर्दछन् । त्यस असरलाई हरितगृहप्रभाव भनिन्छ । हरित गृह प्रभावको प्रत्यक्ष सम्बन्ध तापक्रमसँग रहेको छ । विकिरण थपिने क्रम बढ्दै गएकाले विगत केही वर्ष यता पृथ्वीको सतह बिस्तारै तात्दै गएको निष्कर्ष वैज्ञानिकहरूले निकालेका छन् । त्यसैका आधारमा नै सन् १९९५ लाई सबभन्दा तातो वर्षका रूपमा लिइन्छ । बितेको सय वर्षमा पृथ्वीको भूमध्यरेखीय क्षेत्रमा ०.४५° सेल्सियस र ध्रुवीय (आर्कटिक) क्षेत्रमा सन् १९६८ देखि यता ५° सेल्सियस तापक्रम बढेको कुरा वैज्ञानिक अनुसन्धानले प्रमाणित गरेको छ । वायुमण्डल विभिन्न ग्यासहरू मिलेर बनेको हुन्छ । वायुमण्डलमा आयतकनका हिसाबले सबभन्दा बढी नाइट्रोजन र अक्सिजन रहेका छन् भने धुलाको कण, जनबाष्प, मिथेन, ओजोन, कार्बनडाइअक्साइड, नाइट्रसअक्साइड आदि नगण्य मात्रा रहेका छन् । यी भन्ने जलबाष्प, मिथेन, ओजन, क्लोरोफ्लोरो कार्बन, कार्बन डाइअक्साइड, नाइट्रसअक्साइडले हरित गृह प्रभावमा प्रमुख भूमिका खेलेका हुन्छन् । यस ग्यासहरूलाई समग्रमा हरित गृह ग्यास (ग्रिन हाउस ग्यास) भनिन्छ । सूर्यबाट विभिन्न विकिरण आइरहेका हुन्छन् । तीमध्ये लघुतरङ्गका विकिरणहरू पृथ्वीका सतहमा आइपुगेपछि दीर्घतरङ्गी विकिरणमा बदलिन्छन् । ती दीर्घ तरङ्गका विकिरणहरू परावर्तित भएर अन्तरिक्षतर्फ नै फर्किने गर्दछन् तर वायुमण्डलमा रहेका विभिन्न ग्यासहरूमध्ये हरित गृह ग्यासहरू (कार्बनडाइअक्साइड, क्लोरोफ्लोरोकार्बन, नाइट्रसअक्साइड, जलवाष्प, मिथेन, ओजन आदिले ती दीर्घ तरङ्गका विकिरणलाई अन्तरिक्षतर्फ जान रोकी आफैंले सोसेर राख्दछन् । यसरी पृथ्वीमा दीर्घ तरङ्गका विकिरणहरू तापका रूपमा वायुमण्डलको तल्लो तहमा थुप्रिन्छन् र तिनले वायुमण्डललाई तातो पारिरहन्छन् । यिनै थुप्रिएका विकिरणहरूले वायुमण्डलमा पार्ने विभिन्न असर नै हरित गृह प्रभावका रूपमा देखिन्छ । यो साधारण तिरन्तर चलिरहने प्रक्रिया हो । यसलाई पृथ्वी तात्ने प्रक्रिया पनि भनिन्छ ।

प्रश्नहरू

क. हरित गृह प्रभाव भनेको के हो ?

ख. वैज्ञानिक अनुसन्धानबाट के कुरा प्रमाणित भएको छ ?

ग. हरित गृह प्रभावमा मुख्य भूमिका खेल्ने ग्यासहरू कुनकुन हुन् ?

घ. दीर्घ तरङ्गका विकिरणहरू वायुमण्डलको तल्लो तहमा थुप्रिनाको कारण के हो ?

ङ. 'अन्तरिक्ष' र 'विकिरण' शब्दको अर्थ लेख्नुहोस् ।

९. २०७३ पूरक प्र. नं. ९ तलको अनुच्छेद पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (१०)

शिक्षामा महिलाहरू पछि पर्नुमा आर्थिक तथा सामाजिक कारणहरू नै प्रमुख भए तापनि देशको भौगोलिक बनावट तथा विगतमा राजनैतिक कारण पनि रहेको थियो । शिक्षामा महिला सहभागिता कम हुनुका आर्थिक र सामाजिक कारणहरूका रूपमा आर्थिक विपन्नता, शैक्षिक चेतनाको कमी, परम्परागत सामाजिक धारणा, अन्धविश्वास तथा रुढिवाद, छिटो विवाह, घरायसी काममा महिलाको बढी संलग्नता आदिलाई लिन सकिन्छ । यस्तो अवस्थामा महिला शिक्षाको उपयुक्त विकासका लागि उल्लिखित कारणहरूलाई ध्यानमा राखेर योजना र कार्यक्रमहरू सञ्चालन गर्नुपर्दछ । खास गरी महिला शिक्षाप्रति रहेका नकारात्मक धारणा, अन्धविश्वास, सामाजिक भेदभाव हटाई शैक्षिक चेतनामा अभिवृद्धि गर्ने खालका कार्यक्रम सञ्चालन गरी सबैले पढ्न पाउने अधिकारको कदर गर्ने छोरीहरूलाई स्कुल पठाउने कार्यमा समाजलाई अभिप्रेरित गर्न आवश्यक छ । त्यसै गरी भौगोलिक दृष्टिले विकट र दुर्गम क्षेत्रहरूमा विद्यालय तथा अन्य शिक्षण संस्था खोल्ने कामलाई प्राथमिकता दिनु र विपन्न वर्गका लागि आयमूलक कार्यक्रम तथा उपयुक्त रोजगारीको अवसर सिर्जना गरिनु आवश्यक देखिन्छ ।

प्रश्नहरू:

क. शिक्षामा महिलाहरू पछि पर्नुका कारणहरू केके हुन् ?

ख. शिक्षामा महिला सहभागिता कसरी गराउन सकिन्छ ?

ग. महिला शिक्षाको उपयुक्त विकासका लागि के योजनाहरू आवश्यक हुन्छन् ?

घ. यस अनुच्छेदको उपयुक्त शीर्षक के हुन सक्छ ?

ङ. 'अभिवृद्धि' र 'अन्धविश्वास' शब्दको अर्थ लेख्नुहोस् ।

१०. २०७३ प्र. नं. ९ तलको अनुच्छेद पढी सोधिएका प्रश्नहरूको उ दिनुहोस् । (१

चुहिएको गाग्रामा पानी हाल्दै भर्ने प्रयास गर्नुलाई अस सम्झनुपर्दछ । प्वाल परेको गाग्रावाट पानी चुहिएर गागीभित्र पानी घट्दै गए झैं मानिसको शरीरवाट पानी खेर गई पा घट्छ र ऊ विरामी हुन्छ । यस्तो हुँदा पानीसँगै नुन र शरीर तागत पनि खेर जान्छ । यसरी पानी, नुन र तागत खेर ज प्रक्रियालाई जलवियोजन भनिन्छ । धेरै जलवियोजन भए मानिस मर्न सक्दछ । झाडापखाला हुँदा मर्ने मुख्यका जलवियोजन नै हो । नचुहिएको गाग्रामा पानी भर्‍यो भने रिसि पाउँदैन र भरिइरहन्छ । त्यस्तै औषधि पानी खुवाउँदै गर्‍यो झाडापखालावाट खेर गएको पानी र नुन आपूर्ति हुन्छ र विरा मृत्युवाट बच्दछ । तीनचार दिनसम्म औषधी पानी खुवाएर विरामीको झाडा पखाला आफैं निको हुन्छ । यसरी खेर गए नुन र पानी आपूर्ति गर्ने प्रक्रियालाई पुनर्जलीय उपचा भनिन्छ ।

पुनर्जलीय उपचारले विरामीको पखाला तत्कालै रोकिदैन त जलवियोजनलाई सुधार्छ र विरामीलाई मर्नवाट बचाउँछ औषधि पानीले पखाला थापिएन भनेर कति मानिसहरूले गुनाह गरेको सुनिन्छ तर सम्झनुपर्ने कुरा के छ भने झाडापखाल लागेको विरामीको मुख्य उपचार नै जलवियोजन हुन नहि रोगीको प्राण बचाउनु हो । पुनर्जलीय प्रक्रियाबा जलवियोजनको उपचार भएमा झाडा पखालाका धेरैजस विरामीहरू आफैं ठिक हुन्छन् । त्यसैले झाडापखाला लागेक विरामीका लागि पुनर्जलीय उपचार नै सबैभन्दा महत्वपू हुन्छ ।

विरामीलाई कसरी र कति पुनर्जलीय उपचार गर्ने भन्ने कु विरामीको अवस्था र वियोजनको स्थितिमा भर पर्ने हुँदा पहि विरामीको स्थितिको लेखाजोखा गर्नुपर्दछ र सोहीअनुसार उपच प्रणाली अपनाउनुपर्दछ । त्यसैले कस्तो विरामीलाई गाउँमा उपचार गर्ने हो, कस्तालाई स्वास्थ्यचौकी वा अस्पताल उपचारका लागि पठाउने हो वा कस्तालाई सामान्य उपचार

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उपाय सिकाए पुरदछ भन्ने कुरा विरामीको जलवियोजनको स्थितिमा भर पर्दछ ।

प्रश्नहरू :

क जलवियोजन भन्नाले के बुझिन्छ ?

ख पुनर्जलीय उपचारले के कुरामा सघाउ पुऱ्याउँछ ?

ग के भएमा झाडा पखालाका विरामीहरू आफैं ठिक हुन्छन् ?

घ. पुनर्जलीय उपचार केके कुरामा भर पर्दछ ?

ङ 'तागत' र 'आपूर्ति' शब्दको अर्थ लेख्नुहोस् ।

११. २०७२ पूरक प्र. नं. ९ तलको अनुच्छेद पढी सोधिएका प्रश्नको उत्तर दिनुहोस् । (१०)

आजको विश्वमा मानव जातिका लागि मानवअधिकार भन्ने कुरा अपरिहार्य विषय बन्न पुगेको छ । मानवअधिकारको अभावमा मान्छेको वैयक्तिक विकास सम्भव छैन । जब एउटा नागरिक आफ्ना अधिकारहरूबाट वञ्चित रहन्छ तब त्यसको असर समाज र राष्ट्रले समेत भोग्नुपर्ने हुन्छ । अर्थात् मानवअधिकार कुनै एउटा व्यक्ति वा कुनै एउटा राज्यको मात्र सरोकारको कुरा होइन । यसको सम्मानमा संसारका हरेक व्यक्ति, समाज, राज्य एवम् अन्तर्राष्ट्रकै सहयोग अत्यावश्यक हुन्छ तापनि आफ्नो मुलुकमा मानवअधिकारलाई सम्मान गर्ने परिपाटी कायम गर्ने कि नगर्ने भन्ने विषय भने त्यस मुलुकको राज्यव्यवस्था वा सरकारमै निर्भर गर्दछ । यस अर्थमा मानवअधिकारको सम्मान गर्न र त्यसलाई सुदृढ पार्न सरकारको नै सबैभन्दा महत्त्वपूर्ण भूमिका रहनु स्वाभाविक हो । जहाँ मानवअधिकारको सम्मान हुँदैन त्यहाँ प्रजातन्त्र पनि हुँदैन । जहाँ प्रजातन्त्र हुन्छ त्यहाँ मानवअधिकारको सम्मान गर्नु अनिवार्य हुन्छ । मानवअधिकारलाई गौण विषय ठानेर त्यसलाई बेवास्ता गरेर प्रजातन्त्रको कुरा गर्नु निरङ्कुशतालाई आत्मसात् गर्नु हो । संविधानमा मात्रै मानवअधिकारप्रति प्रतिबद्धता जाहेर गरेर वास्तविक रूपमा मानवअधिकारको सम्मान हुन सक्दैन । मानवअधिकारको सम्मानका लागि प्रजातान्त्रिक संविधानअनुसार स्थापित हुने सरकारको कार्यशैली पनि प्रजातान्त्रिक हुनुपर्दछ ।

प्रश्नहरू:

क. मानवअधिकार किन आवश्यक छ ?

ख. मानवअधिकारको सम्मान किन गर्नुपर्छ ?

ग. प्रजातन्त्र र मानवअधिकारका बिचमा कस्तो सम्बन्ध रहेको हुन्छ ?

घ. माथिको अनुच्छेदका लागि उपयुक्त शीर्षक के हुनसक्छ ?

ङ. 'अपरिहार्य' र 'निरङ्कुशता' शब्दको अर्थ के हो ?

१२. २०७२ प्र. नं. ९ तलका अनुच्छेदहरू पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (१०)

पानीमा फोहोर कसिङ्गर मिसियो भने प्रदूषित हुन्छ र हाम्रा लागि उपयोग गर्न उपयुक्त हुँदैन । पानी प्रदूषित हुनुमा धेरै कारणहरू हुन सक्छन् । हुन त सबभन्दा शुद्ध पानी वर्षाको मान्न सकिन्छ । जुन बेला बादल चिसिएर पानी बन्छ त्यस बेला पानी शुद्ध हुन्छ तर जब पानी आकाशबाट खस्न थाल्छ तब हावामा रहेका धुलाका कणहरू र ग्यासहरूसँग सम्पर्कमा आएर पानी दूषित हुन थाल्छ । खास गरेर उद्योगहरूबाट धुवाँ धेरै फालिने ठाँउमा पानी धुवाँका कणहरूसँग मिसिएर तेजाब बन्छ र अम्लीय वर्षा हुन्छ । अम्लीय वर्षाको पानी निर्मल देखिन्छ तर यसमा माछालगायत अन्य जीवहरू भने बाँच्न सक्दैनन् । अव्यवस्थित ढङ्गद्वारा ढल फाल्नाले पनि पानी प्रदूषित हुन्छ भन्ने कुराको उदाहरणका रूपमा काठमाडौं बरपर बग्ने टुकुचा, बिष्णुमती र बागमती खोलाहरूमा बगेको पानी नै देख्न सकिन्छ । ढलनिकासले गर्दा प्रदूषित भएको पानीमा रोगका किटाणुहरू व्यापक रूपमा फस्टाउने गर्दछन् । साथै त्यस्तो पानीमा झारहरू उम्रिए पनि पानीमा रहने माछा र अन्य जीवहरू नष्ट हुन्छन् । खेतबारीबाट बग्ने रासायनिक मल, कलकारखानाबाट बग्ने रासायनिक फोल एवम् सडक र बसबिसौनीहरूबाट बग्ने रासायनिक पदार्थहरू मिसिएको भलले पनि पानी प्रदूषित हुन्छ । रासायनिक पदार्थहरू मिसिएको पानी स्वास्थ्यको लागि हानिकारक हुन्छ । कलकारखानाबाट रसायनिक फोलहरू उपचार गरेर फाल्नुपर्दा खर्च लाग्न सक्छ तर त्यस्ता फोलहरूका कारणले पानी दूषित हुँदा त्यसबाट हुने सङ्कट आखिरमा मानिस आफैंले भोग्नुपर्ने हुन्छ । कतिपय मिलहरूमा यन्त्रहरूलाई चिसो पार्न पानीको प्रयोग गरिन्छ । त्यसबाट निकासमा पाइने पानी बाहिरको प्राकृतिक स्रोतबाट आएको पानीभन्दा अलि तातो हुन्छ । त्यसैले सामान्य तातो पानी खान र त्यस्तो पानीमा बस्न नसक्ने जीवाणु एवम् माछाहरू मर्न सक्छन् । पानीसँग सम्बन्धित अरु पनि समस्याहरू हुन सक्छन् । तीमध्ये खानेपानीको अभाव एउटा हो । पानीको परिमाण कम हुनु, भएको पानी दूषित हुनु र खेर जानु वास्तवमा समस्या नै हो । त्यसै गरी अर्को समस्या हो- बाढी । नदीमा पानीको बहाव धेरै हुन गई बरपरको घरखेतसम्म पानी बग्न सक्छ । यसको खास कारण हो- वर्षाको पानी जमिनभित्र रसाएर जानुभन्दा भलका रूपमा बग्नु । त्यसो हुनुको कारण जमिनमा हरियाली कम भई माटो सुक्खा र कडा हुनु हो ।

प्रश्नहरू:

क. अम्लीय वर्षा कसरी हुन्छ ?

ख. रसायन मिसिएको फोलले मानिस कसरी सङ्कटमा पर्छन् ?

ग. जमिन सुक्खा हुनुको कारण के हो ?

घ. पानीसँग सम्बन्धित समस्याहरू के के हुन् ?

ङ. 'अम्लीय' र 'किटाणु' शब्दको अर्थ लेख्नुहोस् ।

१३. २०७२ सेट E प्र. नं. ९ तलको गद्यांश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (१०)

वायुमण्डल विभिन्न ग्यासहरू मिली बनेको हुन्छ । वायुमण्डलमा आयतनका हिसाबले सबभन्दा बढी नाइट्रोजन र अक्सिजन रहेका छन् भने धुलाको कण, जलवाष्प, मिथेन, ओजोन, कार्बनडाइअक्साइड, नाइट्रसअक्साइडले हरित गृह प्रभावमा प्रमुख भूमिका खेलेका हुन्छन् । सूर्यबाट विभिन्न किरण आइरहेका हुन्छन् । तीमध्ये लघुतरङ्गका किरणहरू पृथ्वीका सतहमा आइपुगेपछि दीर्घतरङ्गी किरणमा बदलिन्छन् । ती दीर्घतरङ्गका किरणहरू परावर्तित भएर अन्तरिक्ष तर्फ नै फर्किने गर्दछन् तर वायुमण्डलमा रहेका विभिन्न ग्यासमध्ये हरित गृह ग्यासहरूले ती दीर्घतरङ्गका किरणलाई अन्तरिक्षतर्फ जान रोकी आफैंले सोसेर राख्दछन् । यसरी पृथ्वीमा दीर्घ तरङ्गका किरणहरू तापको रूपमा वायुमण्डलको तल्लो तहमा थुप्रिन्छन् र तिनले वायुमण्डललाई न्यानो पारी राख्छन् । यिनै थुप्रिएका किरणहरूले वायुमण्डलमा पार्ने विभिन्न असर नै हरित गृह प्रभावका रूपमा

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देखिन्छ। साधारणत यो निरन्तर रूपमा चलिरहने प्रक्रिया हो। जमलाई पृथ्वी तात्ने प्रक्रिया पनि भनिन्छ। औद्योगिकीकरण नै हरित गृह ग्यासको प्रमुख स्रोत हो।

प्रश्नहरू

क हरित गृहमा प्रभाव पार्ने तत्वहरू केके हुन्?
ख हरित गृह ग्यासको मुख्य कार्य के हो ?
ग पृथ्वी तात्नुको कारण के हो ?
घ माथिको अनुच्छेदका लागि उपयुक्त शीर्षक के हुन सक्छ ?
ङ 'पराबर्तित र 'बिकिरण' शब्दको अर्थ लेख्नुहोस्।

१४. २०७१ पुरक प्र नं ९ तलको अनुच्छेद पढी सोधिएका प्रश्नहरूको (१०)
उत्तर दिनुहोस्

झापाका राजवंशी समाजको धर्म र देवीदेवतासम्बन्धी धारणा आफ्नै प्रकारको पाइन्छ। उनीहरू प्राकृतिक अलौकिक अदृष्य शक्तिका रूपमा धर्ममा विश्वास गर्छन्। मानिसको जन्ममृत्यु हुनु, गरिब हुनु, धनी हुनु, धन सम्पत्ति कमाउनु, सुन्दर हुनु, कुरूप तथा अपाङ्ग हुनु, चिताएको कुरा पुग्नु वा नपुग्नु, छोराछोरी दुखी हुनु, छोराछोरी भएर पनि नवाँच्नु, विरामी हुनु, अकालमा मर्नु, दुर्घटनामा पर्नु, अन्नवाली नोक्सान हुनु, आगलागी हुनु, चोरी हुनु जस्ता कुरा भाग्य र दैवका खेल हुन् भन्ने विश्वास राजवंशीहरूमा पाइन्छ। वास्तवमा अलौकिक शक्तिहरूमाथिको आस्था नै धर्मको प्रमुख लक्षण हो। धर्म भन्नु नै मानिसहरूको नीति, आदर्श, नैतिकता, आत्मा, ईश्वर तथा अदृष्य शक्तिमाथिको विश्वास राख्नु हो। ब्रह्माण्ड तथा जीवनको सृष्टि, मृत्यु र त्यसपछिको रहस्यका साथै जीवनलाई पूर्ण बनाउने कुराका रूपमा वा मानिसका मानसिक जिज्ञासाका परिणामस्वरूप धर्मको उत्पत्ति भएको हो। अर्को अर्थमा आफूभन्दा शक्तिशाली प्रकृत्तिमाथिको निर्भरताले गर्दा मानिसहरू प्राकृतिक शक्तिमा अदृष्य अलौकिक गुणहरू हुन्छन् भन्ने कुरामा विश्वास गर्छन्। राजवंशी समाजमा पनि आफ्नो अज्ञानताले कपोलकल्पित शक्तिहरूलाई सन्तुष्ट राख्न सकिएन भने तिनीहरूले दुख, यातना र विपत् ल्याउन सक्छन् भन्ने विश्वासले जरो गाडेको छ। त्यसैले राजवंशीहरू कपोल कल्पित दैवी शक्तिलाई सन्तुष्ट पारियो र तिनको पूजाआजा गरियो भने आफूलाई मद्दत हुन्छ भन्ने कुरामा विश्वास गरी त्यस्ता शक्तिको पूजा, पाठ, प्रार्थना, आराधना, स्तुति गर्ने जस्ता धार्मिक क्रियाकलाप सम्पन्न गर्छन्। राजवंशीहरू अर्काको परोपकार गर्नु, आफ्नो मर्यादाभित्र बस्नु, अरूलाई दुःख पीडा नदिनु, पाहुनाको सत्कार गर्नु आदिलाई धर्म मान्दछन्। यसै गरी उनीहरू असत्य वा झूटो कुरा गर्नु, सत्यमा नबस्नु, अर्काको सम्पत्ति हड्प्नु, चोरी डकैती गर्नु, छल्नु जस्ता सामाजिक मान्यताभन्दा वाहिरका कार्य गर्नु पाप हो भन्दछन्।

प्रश्नहरू:

क. राजवंशीहरू कस्ताकस्ता कुरालाई दैवको खेल ठान्दछन् ?
ख. राजवंशीहरूका समाजमा प्रचलित मान्यताअनुसार धर्मको उत्पत्ति कसरी भएको हो ?
ग. राजवंशीहरू कस्तो दैवीशक्तिको पूजा गर्दछन् ?
घ. राजवंशीहरूका समुदायमा कस्ता कार्य गर्नुलाई पाप मानिन्छ ?
ङ. अदृष्य र अलौकिक शब्दको अर्थ लेख्नुहोस्।

१५. २०७१ प्र. नं. ९ तलको गद्यांश पढी सोधिएका प्रश्नको उ
लेख्नुहोस् :

रसायनशास्त्रको विकासका प्रारम्भिक चरणहरूमा सैद्धान्ति
एवम् प्रयोगात्मक व्याख्या गर्ने क्रममा अनेकौं रासायनि
प्रयोगहरू गरिए। प्रारम्भमा रासायनिक विधा अभ्यास
मानिसहरू आधारभूत धातु, जस्तै फलामलाई सुवर्ण धात
परिवर्तन गर्ने प्रयासमा लागेका थिए। त्यसैगरी मानिस
अजम्बरीबुटीको खोजीमा पनि लागेका थिए। तर यी
प्रयासहरू पूर्णत: सफल हुन सकेनन् तापनि त्यसै खेर
गएनन्। यी साध्यहरूको उपलब्धि गराउने कार्यमा स
मानिसहरूले त्यस अवधिमा अँगालेका साधनहरूको माध्यम
रसायनविधालाई नयाँ मोडमा दिनमा निकै सफल
फलस्वरूप नयाँ पदार्थहरूको आविष्कार हुन सक्यो।
पदार्थहरू थिए - मदिरा, खनिज, अम्ल (तेजाव), अ
लवणहरू। रसायनशास्त्र आधुनिक समाजमा क्रान्तिक
परिवर्तन ल्याउनमा निकै सहायक सिद्ध भएको छ। रासायनि
विधाको अभावमा कृषि, औषधी, जनस्वास्थ्य, उद्योगध
यातायात, युद्धसामग्री र खानीसम्बन्धी अनेकौं वस्तुहरू
उत्पादन र विकास प्राय: असम्भव हुन आउँछ। मलह
कीटनाशक औषधीहरू, झारपात नाश गर्ने रसायनहरूज
कृषिसम्बन्धी सामग्रीहरूको प्रयोगबाट कृषि उत्पादनमा अभूत
वृद्धि हुँदै गइ रहेको छ भने उता विभिन्न प्रकारका रोगहरू
निदानका लागि शुद्ध रसायन विधामा आधारित सुरक्षित ए
असरदार औषधीहरू आविष्कार भएका छन्। जनस्वास्थ्य
लागि अतिमहत्त्वपूर्ण मानिएका पानी र खाद्य पदार्थहरू
गुणात्मकता वृद्धि गर्नमा समेत रसायनशास्त्रको अतुलनी
योगदान रहिआएको छ। रसायनशास्त्रकै विकासबाट विभि
उपभोग्य सामग्रीहरू, विलासिताका सामानहरू र
सामग्रीहरूको आविष्कार भएको हो। आजको युगमा दैनि
प्रयोगमा ल्याइने विभिन्न वस्तुहरू रासायनिक प्रविधि
कारणबाट मात्र सम्भव हुन गएका छन् र साँच्चै भन्ने हो
आधुनिक उद्योगहरूको विकास र संवर्धनमा समेत रासायनि
प्रविधि नै मेरुदण्डको रूपमा स्थापित भएको छ।

प्रश्नहरू:

क. प्रारम्भमा रासायनिक विधा अभ्यास गर्ने मानिसहरू के
खोजीमा लागेका थिए ?
ख. रसायनशास्त्रको योगदान के कुरामा छ ?
ग. रासायनिक विधा नहुँदा के हुन सक्दैन ?
घ. रासायनिक प्रविधिलाई केको मेरुदण्ड भनिन्छ ?
ङ. अजम्मरी बुटी र रासायन विधा पदावलीको अर्थ लेख्नुहोस्

१६. २०७० प्र. नं. ९ तलको अनुच्छेद पढी सोधिएका प्रश्नको उ
लेख्नुहोस् :

तपाईंको जीवनमा समस्याहरू छन्। तपाईंले गर्ने व्यवसा
रोजगारी र व्यक्तिको जीवनमा पनि निकै अप्ठ्यारा
आइपर्छन। विमान दुर्घटना हुन्छ। भूकम्प, बाढी र पहि
सम्पत्ति नष्ट गर्छन्। आगलागीका कारण धनजनको क्षति हु
मोटर र रेलहरू दुर्घटनामा पर्छन। यी समस्याले हाम्रो जी
सधैं अप्ठ्यारामा छ। हामीले आर्जन गरेको सम्पत्ति पनि स
र सुरक्षित छैन। हामी हरेक ठाउँमा जोखिमयुक्त जीवन बाँ
छौं। बिरामी हुँदा उपचार गर्ने पैसा छैन, छोराछ
पढाउनुपर्‍यो- ऋण वा सापटी खोज्ने ठाउँ छैन। आफू
भइयो, परिवार र छोराछोरीको जीवनाधार छैन। त्यस
कसरी हल गर्ने भन्ने उपाय पनि छैन। अब कसरी यसबाट
पाउने ?

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यी सबै हाम्रो जीवनका जोखिमका अवस्था हुन् । जोखिम भनेको जीवनमा आइपर्ने समस्या हो र अझ सामान्य भाषामा तपाईंको जीवनमा आइपर्ने बाधा र अप्ठ्यारो हो । अझ जोखिमलाई हानिकै अर्थमा पनि बुझ्नु पर्दैन तर बिमाको भाषामा यति मात्र भनेर जोखिमको अर्थ पूर्ण हुन सक्तैन । बिमामा जोखिम भनेको तपाईंको जीवनमा, व्यवसायमा, सवारी साधनमा केही हुन्छ भने पछि त्यसका बारेमा शङ्काका उत्पन्न हुने र त्यसबाट मुक्त हुने अवस्था पनि हो । यसलाई जोखिमबाट मुक्तिको अवस्था पनि भनिन्छ । अर्को शब्दमा यो आर्थिक सङ्कट निम्त्याउने अवस्था हो र त्यसलाई मानिसले बीमाका माध्यमबाट अन्त्य गर्दछ । अझ जोखिमलाई परिभाषित गर्दा तपाईंले आशा गरेभन्दा फरक नतिजा देखाउने अवस्थाका सन्दर्भबाट पनि हेर्न सकिन्छ । उदाहरणका लागि तपाईं आफ्नो व्यवसायबाट नाफा कमाउँछु भनेर सोचिरहेको समयमा आगलागी भयो । यो तपाईंले आशा गरेभन्दा फरक अवस्था हो वा जोखिम हो । अझ आफ्नो बच्चाको पढाइ खर्च जुटाउँदै गर्दा तपाईं निकै ठूलो दुर्घटना वा रोगको सिकार हुनुभयो । यस्तो अवस्था दुर्भाग्यवश हुन्छ र यो एउटा अप्रिय घटना हो । त्यसैले जोखिम हानिनोक्सानीको सम्भावनालाई अन्त्य गर्ने उपायको खोजी पनि हो र खतरापूर्ण अवस्थाको संयोजन पनि हो ।

प्रश्नहरू:

क. हाम्रो जीवन किन सधैं अप्ठ्यारोमा छ ?

ख. हाम्रो जीवनमा जोखिमका अवस्था केके हुन सक्छन् ?

ग. बीमामा 'जोखिम' भनेको के हो ?

घ. मानिसले बिमाका माध्यमबाट केकुराको अन्त्य गर्छ ?

ङ. 'जोखिम' र 'दुर्भाग्यवश' शब्दको अर्थ लेख्नुहोस् ।

ख. बुँदाटिपोट र सङ्क्षेपीकरण (५ अङ्क)

१. **२०७७ सेट H प्र. नं. ७** तलको अनुच्छेद पढी मुख्य मुख्य चार बुँदा टिपोट गर्नुहोस् : (४)

साहित्य के हो ? थाहै नपाई साहित्यसँग मानिसको साइनो बस्दो रहेछ । केही थाहा पाउन थालेदेखि नै साहित्य मानिसलाई मन पर्न पनि थाल्दो रहेछ । यसरी साहित्य प्रिय लागिरहे पनि साहित्यको पहिचान र पारख गर्नुचाहिँ त्यति सहज र सुगम नरही चुनौतीपूर्ण नै रहँदै आएको छ । साहित्य छ र हुन्छ भनि हामी त्यसलाई केही चिन्दछौं र त्यसको प्रयोग वा उपयोग समेत गरिरहेका हुन्छौं तापनि त्यो के हो वा कस्तो हुन्छ र त्यसका के कस्ता विविध प्रकार देखिन आएका छन् भनी सोधनी गर्न लाग्नासाथ अनेक कठिनाइसँग हाम्रो जम्काभेट हुन थाल्दछ । यस्ता जिज्ञासाले साहित्यका जुन तत्त्व मिमांसातर्फ हामीलाई डोऱ्याउँछन् त्यो नै साहित्यको शास्त्र हो । वनस्पतिहरू छन् र नै वनस्पति शास्त्रको अपेक्षा भई त्यसको उठान र विकास भए जस्तै साहित्य हामीसँग भएकाले नै हामीलाई साहित्यको शास्त्र पनि चाहिने हुन्छ । शास्त्र त्यही हो, जसले साहित्यको पर्याप्त पहिचान र सही पारखका क्रममा समालोचना कर्मी वा समालोचकलाई पनि सघाउँछ । त्यसैले साहित्य शास्त्र वा साहित्य सिद्धान्तको अर्को नाउँ समालोचना सिद्धान्त पनि हो । कुनै भाषाको कुनै स्रष्टाका खास कृति वा कृतित्व बारेको समालोचना प्रायोगिक वा व्यावहारिक समालोचना हो भने साहित्यको स्वरूप, हेतु प्रकार, प्रयोजन आदि सम्बन्धी तत्त्व मिमांसाचाहिँ सैद्धान्तिक समालोचना हो, जसले सिद्धान्ततः साहित्यलाई चिनाउनुका साथै त्यसको समालोचनात्मक पारखका निम्ति सैद्धान्तिक मार्ग दर्शनमार्फत् एकल वा बहुल उपयुक्त पद्धति समेत प्रदान गरी सघाउने गर्दछ ।

२. **२०७७ सेट I प्र. नं. ७** तलको अनुच्छेदलाई एकतृतीयांशमा सङ्क्षेपीकरण गर्नुहोस् : (४)

प्राचीन समयदेखि नै पुच्छ्रेतारालाई पृथ्वी र पृथ्वीवासीहरूमा आउने अनिष्टताका पूर्व सूचक र विपत्तिका द्योतक आकाशीय पिण्डका रूपमा हेर्ने गरिएको पाइन्छ । यो अवधारणा अझै पनि विभिन्न समाजमा विद्यमान छ । विश्वमा धेरै अगिदेखि नै मानवले पुच्छ्रेताराहरूको अवलोकन गर्दै आइरहेको ज्ञात भए तापनि सन् १७०५ मा हेलीको वृहत् अनुसन्धानको परिणामस्वरुप नै पुच्छ्रेताराहरू अनिष्टताका पूर्व सूचक होइनन् र यिनीहरू पनि सौर मण्डलमा अवस्थित अन्य पिण्डहरूजस्तै सामान्य पिण्ड छन्, त्यसैले सूर्यलाई एउटा निश्चित अवधिमा परिभ्रमण गर्ने पिण्डहरूका रूपमा पुच्छ्रेतारालाई लिन थालियो । यसरी पुच्छ्रेताराका बारेमा जे-जस्ता अनुश्रुतिहरू रहेका भए पनि वैज्ञानिक विकासको क्रमसँगै यी भनाइहरू अन्धविश्वासमा परिणत भइसकेका छन् । वास्तवमा पुच्छ्रेतारा कुनै विशिष्ट आकार नभएको हिमकण एवम् विविध ग्याँसहरू तथा अवाष्पशील पदार्थहरूको ठोस कणहरूको समूहद्वारा संरचित एउटा फोहोर हिमपिण्ड नै हो भन्ने तथ्य प्रमाणित भइसकेको छ । आफ्नो कक्षमा परिभ्रमण गर्ने क्रममा सूर्यदेखि निकै दूरीमा रहँदा ब्रह्माण्डको शून्यताको चिसोमा जमेको पुच्छ्रेतारा शिर र पुच्छरविहीन प्रकाशयुक्त एउटा जगमगाउँदो विन्दुका रूपमा देखिन्छ । तर सूर्यको समीपमा आइपुग्दा यसको सतह तात्न पुगी यसमा निहित हिमराशि, ग्याँसहरू एवम् विद्युतीय कणहरू वाष्पका रूपमा पग्लन्छन् । त्यसपछि यसको शिर मात्र दृष्टिगोचर हुन थाल्दछ र सूर्यको विकिरण र सौर आँधीका चापले गर्दा वाष्पित हिमकण तथा ग्याँसहरू सूर्यको दिशातिर फैलिन थाल्दछन् ।

३. **२०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १०** तल दिइएको विवरणका आधारमा निर्धारित ढाँचामा व्यक्तिगत विवरण लेख्नुहोस् : (५)

सरोज पराजुलीको जन्म वेलका नगरपालिका - ५, उदयपुरमा भएको थियो । २०५० साल भदौ १५ गते जन्मेका उनी पिता विष्णुप्रसाद पराजुली र माता तुलसादेवी पराजुलीको एक्ला सन्तान हुन् । हिन्दू धर्म मान्ने नेपाली नागरिक सरोज अझै अविवाहित छन् । वेलका नगरपालिका-५, वक्साहा, उदयपुर स्थायी घर भएका उनी हाल कोसी गाउँपालिका-३, कुश... सुनसरीमा अस्थायी रूपमा बस्दै आएका छन् । उनले २०६६ सालमा एस.एल.सी. र २०७१ सालमा उच्च माध्यमिक तह उत्तीर्ण गरेका छन् २०७२ सालमा पाठ्यक्रम विकास केन्द्रबाट सञ्चालित १० महिने नेपाली भाषा शिक्षण तालिम लिएका उनीसँग २०७३ सालदेखि हालसम्म प्राथमिक तहमा नेपाली विषय पढाउँदै आएको अनुभव छ । कम्प्युटरसम्बन्धी सबै आधारभूत जानकारी उनले हासिल गरेका छन् ।

४. **२०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १०** तलको अनुच्छेद पढी एकतृतीयांश शब्दमा सङ्क्षेपीकरण गर्नुहोस् : (५)

फेसबुक जस्ता सामाजिक सञ्जालका साइटले धेरैका बिछोडिएका र टाढिएका साथीभाइहरूसँग भेट गराइदिएको छ र यसैका कारण कतिको भर्खर सुरु भएको वैवाहिक जीवन र परिवारबाट बिछोड गराउने अवस्था पनि निम्त्याएको छ । सूचना प्रविधिको सही उपयोग गर्नु र फाइदा उठाउनु पर्नेमा

आफ्नै चेलीबेटी र निर्दोष युवायुवतीको चरित्रहत्या गर्ने जस्ता अपराध पनि भएका देखिन्छन् । यसतर्फ सबैले सोच्नुपर्ने हुन्छ । नेपालमा लागू गरिएको साइबर अपराधसम्बन्धी कानुनद्वारा अपराधीहरू पत्ता लगाई कारवाही गर्नुपर्दछ । सञ्चारको पहुँचको दुरुपयोग गर्ने अपराधीलाई न्यायको कठघरामा उभ्याउनुपर्दछ । विकासोन्मुख र साधनस्रोतको कमी भएको हाम्रो जस्तो मुलुकमा यो काम कम चुनौतीको विषय होइन तापनि यसतर्फ समयमै ध्यान जानु जरुरी छ । यस्ता अपराध निराकरण गर्नका लागि र निर्दोषलाई न्याय प्रदान गर्नका लागि सामाजिक सञ्जाल प्रयोगकर्ताहरू आफू सजग हुनुपर्ने त छदै छ, सरकारले पनि साइबर अपराधसम्बन्धी कानुनलाई मजबुत र आधुनिक बनाई साधन स्रोतसम्पन्न गराउनु आवश्यक देखिन्छ ।

५. २०७६ प्र.नं. १० तलको अनुच्छेदबाट मुख्य मुख्य कुरा नछुटाई पाँचओटा बुँदा टिप्नुहोस् : (५)

पृथ्वीको उत्पत्ति करिब ४ अर्ब ५० करोड वर्षअघि भएको अनुमान गरिन्छ भने पृथ्वीमा पहिलो जीवको उत्पत्ति करिब ३ अर्ब ५० करोड वर्षअघि भएको मानिन्छ । पृथ्वीमा पहिलो जीवको उत्पत्ति भएको करिब १० करोड वर्षपछि हरित कण अर्थात् क्लोरोफिल भन्ने रङद्रव्य (पिग्मेन्ट) युक्त एक कोषीय जीवको विकास भयो । यसैलाई हामी हाल वनस्पति भन्छौं । यिनै हरित कणले गर्दा वनस्पति हरियो रङका भएका हुन् । हरित कणको महत्वाट वनस्पतिले फोटोसिन्थेसिस भनिने जैविक प्रक्रियाद्वारा सौर ऊर्जालाई मानिसलगायत पृथ्वीका सम्पूर्ण प्राणी जगत्ले वाँच्न उपयोग गर्ने रासायनिक ऊर्जामा परिणत गर्छ । तसर्थ पृथ्वीका सम्पूर्ण प्राणीको अस्तित्व अन्ततः वनस्पति र तिनमा निहित फोटोसिन्थेसिस प्रक्रियामा भर पर्छ । समयक्रममा एक कोषीय हरित कणयुक्त जीववाट फूल फुल्ने र फूल नफुल्ने जातका विविध प्रजातिका वहुकोषीय वनस्पतिको विकास भएको हो । सवै प्रकारका वनस्पतिमध्ये फूल फुल्ने जातको वनस्पति सवैभन्दा विकसित, ठूलो र प्रधान समूहभित्र पर्दछ । यो लगभग १२ करोड वर्षअघि देखा परेको थियो ।

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. १० तलको अनुच्छेदलाई एक तृतीयांशमा सङ्क्षेपीकरण गर्नुहोस् : (५)

देशको विकासमा युवाशक्तिको महत्त्वपूर्ण भूमिका रहन्छ । युवाहरू देशका कर्णधार हुन् । युवाहरूलाई शिक्षादीक्षा प्रदान गरी सवल तुल्याएर उनीहरूलाई राष्ट्रनिर्माणको जिम्मेवारी सुम्पनु आवश्यक छ । देशमा रहेको युवाशक्ति सवल नेतृत्व र दिशानिर्देशको अभावमा त्यसै खेर गइ रहेकाले स्पष्ट नीतिको आवश्यकता महसुस भएको छ । वर्तमान समयमा देखा परेको विकृतिले युवाशक्तिलाई समेत प्रभाव पारेको छ र उनीहरू अन्धो वनेर विकृतिकै दलदलमा फसिरहेका छन् । मादक पदार्थ सेवन, मद्यपान, धुम्रपानजस्ता कुलत तथा दुर्व्यसनमा फसेर युवाशक्तिले आफ्नो समयलाई त्यसै वर्वाद पारिराखेको तथ्य हाम्रा सामु प्रष्ट छ । यसप्रकार कुलतमा फसेर कुवाटोमा हिँडेका युवावर्गलाई सही मार्गमा ल्याउनु हामी सबैको जिम्मेवारी पनि हो । यसका लागि स्पष्ट नीति वनाएर युवाहरूलाई राष्ट्र निर्माणको मूल धारमा ल्याउनु आवश्यक छ ।

७. २०७५ सेट A प्र. नं. १० तलको अनुच्छेदबाट मुख्य मुख्य ५ वटा बुँदाटिपोट गर्नुहोस् । (५)

लोकतन्त्रमा सूचनाका माध्यमहरूको व्यवस्थापन कसले र कसरी गर्ने भन्ने विषयमा खास सैद्धान्तिक विवाद छैन तर व्यावहारिक प्रयोगमा भने विभिन्नता पाइएका छन् । लोकतान्त्रिक देशमा समेत प्रसारण माध्यमको व्यवस्थापन सरकारको तर्फबाट परिपाटी अझै पनि नभएको होइन तर छापा माध्यम भने सरकारद्वारा सञ्चालन हुने गर्दैनन् । नेपालमा भने अहिले छापा माध्यम सरकारले चलाइरहेको छ । लोकतन्त्रको स्थापना हुनुभन्दा पहिले सूचना प्रवाहको परिपाटी नियन्त्रण र निर्देशनमुखी थियो । अपेक्षाकृत स्वतन्त्र रूपमा सूचना खोज्ने निजी क्षेत्रका माध्यमहरू समेत सरकारका तर्फ वारम्वार प्रताडित र प्रतिवन्धित हुने अवस्था छि लोकतन्त्रको स्थापनाले यस परिपाटीमा व्यापक र आधा परिवर्तन ल्यायो । परिणामस्वरूप निजी क्षेत्रका स माध्यमहरू माथिको नियन्त्रित परिपाटी समाप्त गरी सरकारी संस्थाहरूवाट सूचनाको प्रवाह गर्ने परिपाटीमा गरेअनुसारको गुणात्मक परिवर्तन भने आउन सकेको देखि जे जति परिवर्तन देखिन्छ त्यो व्यवस्थित वैज्ञानिक सुधा कारण नभएर व्यापक राजनीतिक परिवर्तनका कारण हुन पु स्वभाविक परिणाम जस्तो मात्रै अनुभव हुन्छ ।

८. २०७५ सेट B प्र. नं. १० तलको अनुच्छेद पढी मुख्य मुख्य बुँदा टिप्नुहोस् :

प्रत्येक समाजका आआफ्नै मूल्य मान्यताहरू र व्यवहार रहेका हुन्छन् । विभिन्न व्यवहारमध्ये मानव जीवन नकारात्मक असर पार्ने व्यवहारलाई विकृति भन्न सकि समाजमा विद्यमान अनेक विकृतिहरूमध्ये एउटा गम्भीर वि लागू पदार्थको दुर्व्यसन हो । यस्तो दुर्व्यसनले नेपाली युवतीहरूको जीवन वर्वाद पारिरहेको छ । मुलुकको स जनशक्ति गुमाई रहेको छ भने अनेक परिवारलाई कष्ट रहेको छ । विभिन्न परिवारका सदस्यहरू लागू पदा कुलतमा फसेर जीवन र मृत्युको दोसाँधमा पुगेका छन् । मा पार्क, वगैंचा, रेस्टुराँ आदि सार्वजनिक स्थलमा युवायुवती नसामा झुमिरहेका हुन्छन् । यसो हुनुमा परिवारले आ सन्तानको क्रियाकलाप तथा वानी वेहोरामाथि निगरानी नसक्नु हो भने अर्कातर्फ प्रयोगकर्ता आफ्नो जीवनप्रति स हुन नसक्नु हो । लागु पदार्थको कुलतवाट मुक्त गराउन सकि भने त्यसले व्यक्ति, परिवार तथा समाजलाई नै नष्ट सक्छ । तसर्थ सबैले सामूहिक प्रयत्नवाट दुर्व्यसनलाई वहिष्क गर्ने अवस्था निर्माण गर्नुपर्दछ ।

९. २०७४ पूरक प्र. नं. १० तलको अनुच्छेद पढी मुख्य मुख्य बुँदाटिपोट गर्नुहोस् :

नेपालमा अपार जलस्रोत छ, तर त्यसको केही अंश पनि उपयो हुन सकेको छैन । राजधानीलगायत कैयन ठूला सहर गाउँहरूमा समेत खानेपानीको अभावमा वस्तीहरू काकाकुल परिणत हुँदै गइरहेका छन् । नेपालमा कतिपय वि विजुलीवत्तीवाट वञ्चित रहेका छन् । ब्राजिलपछि दोस्रो ध राष्ट्र मानिने नेपालमा जलस्रोतको दोहनका दिशामा पाइ वढ्न नसक्नु मुटु चिमोट्ने विषय भएको छ । एकाइ शताव्दीको विकास यात्रामा लम्किरहेका अन्य देशसँग मि मिलाउन जलस्रोत नेपालका लागि वरदान हुन सक्ने यथार्थ तापनि अपेक्षाकृत दिशामा सामयिक कदम सधैं आकाशको फ वन्दै आएको छ । निश्चय नै मुलुकको अर्थतन्त्र केही कमजो छ, सरकारी प्रयासले मात्र जलशक्ति सदुपयोग गर्न नसकिए तर जनता, निजीक्षेत्र र राज्यको दिगो प्रतिवद्धता भए जलस्रोतमार्फत् राष्ट्रले कायापलट गर्ने कुरामा कसैमा विम नहोला ।

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१०. २०७४ प्र. नं. १० तलको अनुच्छेदलाई एकतृतीयांश शब्दमा सङ्क्षेपीकरण गर्नुहोस् : (५)

हाम्रा वरिपरि रहेका सवैथरीका वोटविरुवा, रुख, लहरा, घाँसपात आदिलाई बुझाउने साझा नाउँ वनस्पति हो । संसारमा फूल फुल्ने र नफुल्ने गरी दुई प्रकारका वनस्पतिहरू छन् । नेपालमा पनि यी दुवै थरि वनस्पति पाइन्छन् । नेपाल भौगोलिक विविधता भएको देश हुनाले यहाँ फरकफरक किसिमको हावापानी छ र सोहीअनुसार यहाँ विभिन्न किसिमका वनस्पति पाइन्छन् । नेपालका तराई, भावर, दुन र चुरे क्षेत्रमा उपोष्ण प्रदेशीय सदाबहार जङ्गल छ । समुद्री सतहदेखि एक हजार दुई सय मिटरसम्मको उचाइमा रहेको जङ्गल नै उपोष्ण प्रदेशीय सदा बहार जङ्गल हो । यो ज्यादै घना हुन्छ । एक हजार दुई सय मिटरभन्दा माथि करिब दुई हजार एक सय मिटरसम्मको उचाइमा उम्रने रुखवाट वनेको जङ्गलगलाई समशीतोष्ण पतझर जङ्गल भनिन्छ । यो पहाडी जङ्गल हो । यो त्यति वाक्लो हुदैन । समुद्री सतहवाट तीन हजार मिटरभन्दा उच्च भागमा पाइने वनस्पतिलाई हिमाली वनस्पति भनिन्छ । यस्ता वनस्पति रहने ठाउँको तापक्रम वर्षभरि नै शून्य डिग्री सेल्सियसभन्दा पनि न्यून हुन्छ ।

११. २०७३ पूरक प्र. नं. १० तलको अनुच्छेदवाट मुख्यमुख्य पाँच बुँदाटिपोट गर्नुहोस् : (५)

'विश्वको सर्वोच्च शिखर सगरमाथा र नेपालको पहिचान तथा विशेषता' हामीले सुन्दै आएका छौं । यहाँ रारा, फोक्सुन्डो, च्छोरोल्पा, दुधपोखरीजस्ता सयौं रमणीय र महत्त्वपूर्ण हिमतालहरू रहेका छन् । यी हिमतालहरूले धेरै मात्रामा पानी सञ्चय गर्ने तथा तल्लो तटीयक्षेत्रमा जलमा आश्रित पारिस्थितिकीय प्रणालीको वचाउ गर्ने भएकोले वातावरणीय प्रणालीमा यिनीहरूको भूमिका महत्त्वपूर्ण छ । विगत केही वर्षदेखि विश्वमा 'जलवायु परिवर्तन' नामक समस्याले गम्भीर प्रभाव पारेको छ । यो किन भयो ? मानवले निर्माण गरेका स्रोत साधनद्वारा प्रकृतिमा गम्भीर प्रभाव पारेकाले नै यो चुनौती देखिएको हो । जलवायु परिवर्तनले अत्यधिक प्रभावित हिमतालहरूको अस्तित्वका वारेमा गम्भीर वहसहरू भएका छन् साथै अनेकौं अध्ययन र निष्कर्ष निकालिएका छन् । ओहो ! नेपालमा मात्रै करिब २०० भन्दा वढी हिमतालहरू ध्वस्त हुने स्थिति रहेको छ भने केहीको अस्तित्व धेरै अघिदेखि समाप्त भइसकेको छ । यी तालहरू नष्ट भए भने त्यसले भयानक वातावरणीय समस्या निम्त्याउँछ । यसवाट जैविक विविधता तथा मानवीय संरचनामा पर्ने असरको सीमा वढ्दै गइरहेको छ ।

१२. २०७३ प्र. नं. १० तलको अनुच्छेदलाई एक तृतीयांश शब्दमा सङ्क्षेपीकरण गर्नुहोस् : (५)

जीवहरू तापक्रमसित निकै सम्वन्धित हुन्छन् । तापक्रम घट्ने तथा वढ्ने क्रमको प्रभाव जीवहरूका भौतिक प्रक्रियामा पनि पर्छ । तीव्रगतिमा वदलिएको हावापानीमा जीवहरूका भौतिक प्रक्रियाहरू मिल्न सक्दैनन् । त्यसैले जीवहरू लोप हुने क्रम तीव्रगतिमा वढेको छ । जस्तै: कोस्टारिकाको स्थानीय क्षेत्रमा पाइने लगभग ४० प्रतिशत उभयचरहरू सधैंको लागि लोप भएका छन् । मेक्सिकोको जङ्गलभित्र एदिथको चेकपोस्ट नामको पुतलीको झुन्ड नै हराएको छ र त्यो क्यानडाको जङ्गलभित्र फेला परेको छ । दक्षिण अमेरिकाको कोलम्वियामा मलेरिया रोगका वाहक लामखुट्टेहरू २,२०० मिटरसम्म उचाइ भएका स्थानहरूमा समेत देखापर्न थालेको छन् । ती लामखुट्टेहरू प्राय: १,००० मिटरभन्दा माथिको उचाइमा वाँच्न सक्दैनन् । यमेगरी नेपालका पहाडी भेकहरूमा हिजोआज लामखुट्टे देखापरेको चर्चा सुन्न पाइन्छ । विभिन्न फलहरू समयभन्दा पहिल्यै फल्न थालेको अनुभव वनस्पतिविज्ञ वताउँछन् । ती सवै परिणामहरू सजीवहरूले वाँच्नका लागि उपयुक्त ठाउँ खोज्ने क्रमका प्रतिफलहरू हुन् । त्यसैले पृथ्वी तालाले सजीवहरू आफ्नो वंश जोगाउन सङ्कटको सामना गर्दै उपयुक्त वासस्थानको खोजीमा छन् ।

१३. २०७२ पूरक प्र. नं. १० तलको अनुच्छेदवाट मुख्यमुख्य पाँच बुँदाटिपोट गर्नुहोस् : (५)

हाम्रो समाजमा विद्यमान् अनेक विकृतिहरूमध्ये एउटा गम्भीर विकृति लागुपदार्थको दुर्व्यसन हो । लागुपदार्थ दुर्व्यसनले आज नेपाली समाजका युवापिँढीलाई नराम्रोसँग गाँज्दै लगिरहेछ । दिन प्रतिदिन समाजमा मौलाउँदै गएको यस विकृतिवाट अनेक युवायुवतीहरूले आफ्नो अमूल्य जीवन वर्वाद पारिरहेछन् । मुलुकले सक्षम जनशक्ति गुमाइरहेको छ भने अनेक परिवारलाई नष्ट गरिरहेछ । आज हाम्रै वरिपरि विभिन्न परिवारका सदस्यहरू लागुपदार्थको कुलतमा फसेर जीवन र मृत्युको दोसाँधमा पुगेको देख्न सक्छौं । कोही मृत्युसँग लडि रहेको हुन्छ त कसैले जीवन नै गुमाइसकेको हुन्छ । आजकल हामी मन्दिर, पार्क, वगैंचा, रेष्टुरा आदि सार्वजनिक स्थलमा युवायुवतीहरू नशामा झुमिरहेको देख्न सक्छौं । यस्तो किन भई रहेछ ? किन कुनै पनि परिवारले आफ्ना सन्तानको क्रियाकलाप र वानीवेहोरामाथि निगरानी गरिरहेको छैन ? सामाजिक, पारिवारिक पृष्ठभूमिले वा परिवारको ध्यान नपुग्नाले उनीहरू त्यतातिर आकृष्ट भएका त होइनन् ? जेहोस् परिवारमा सन्तानप्रति उचित नियन्त्रण र निगरानीको अभाव, साथीहरूको सङ्गत, खुला परिवेश, सञ्चार माध्यमको वढ्दो प्रभाव, नक्कल गर्ने प्रवृत्ति आदि कारणले कुलतमा लागेका युवायुवतीलाई जोगाउने पहिलो दायित्व परिवारको नै हो । परिवारले केटाकेटीहरूको क्रियाकलाप, उनीहरूको व्यवहारमा आएको परिवर्तनका कारणहरू, उनीहरूका साथीसंगी र तिनको पृष्ठभूमि आदिवारे समयमै जानकारी राख्ने गरेमा धेरै हदसम्म उनीहरूलाई कुलतवाट वचाउन सकिन्छ ।

१४. २०७२ प्र. नं. १० तलको अनुच्छेद पढी मुख्यमुख्य पाँच बुँदाटिपोट गर्नुहोस् : (५)

कुनै पनि आन्दोलनलाई मार्गदर्शन गर्ने निश्चित विचार, सिद्धान्त र प्रतिवद्धताको आवश्यकता पर्छ । अहिले महिलाअधिकार र समानताका लागि हिंसा र अशान्ति होइन, सम्झौताको आन्दोलनवाट समाधान खोज्नुपर्छ । महिलामाथि नकारात्मक रूपमा पारिएको सामाजिक प्रभावलाई परिवर्तन गराउनुपर्दछ । प्रत्येक महिलाले आफूमाथि परेको अन्याय, अत्याचार र शोषणवाट आफ्नो हक, अधिकार र कर्तव्यप्रति सचेत हुने अभियानमा निरन्तर, वैचारिक र व्यावहारिक रूपमा लागि रहनु नै 'नारीवाद' हो । यो अभियानमा महिला मात्र होइन, पुरुषहरू पनि सामेल भएर सहयोग गर्नु आवश्यक छ । महिलाहरू आफैं उत्पीडनको सिकार भएका हुन्छन् । उनीहरूले अत्याचार र शोषणको भुक्तमान सहेका हुन्छन् भने पुरुषहरूले महिलामाथि परेको त्यो शोषण अनुभूत गरेका हुन्छन् तर त्यो शोषण र भुक्तमानका कारक पुरुषहरू होइनन् । त्यसको कारक भनेको हाम्रो सामाजिक संरचना हो जसका आधारमा मूल्य र मान्यताहरू निर्धारित भएका छन् । समाजले महिला र पुरुषलाई लैङ्गिक विभेदका नाममा उनीहरूका जिम्मेवारी र दायित्व पनि

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फरकफरक बनाइदिएको छ, जसले महिलाहरूमाथि सधैं गलत प्रभाव पारिरहेको छ तर नारीवादी आन्दोलन भनेर आज पूर्वीय र पाश्चात्य जगतमा प्रशस्त भनाइहरू सुन्ने गरिन्छ र नारीवादलाई भिन्नभिन्न रूपमा बुझ्दै र बुझाउँदै आएको पनि पाइन्छ ।

१५. २०७२ सेट E प्र नं १० तलको अनुच्छेदबाट मुख्यमुख्य पाँच बुँदाटिपोट गर्नुहोस् (५)

कवि स्रष्टा हो, ऊ सृष्टि गर्छ । सय पङ्क्तिमा लेख्दा पनि जुन कुरा भन्न सकिँदैन, कविले त्यसलाई एकै पङ्क्तिमा अझ राम्री भन्न सक्तछ । प्रभातका एकै किरणमा सारा रङ्ग र रूपको कस्तो रमाइलो धोका उघ्रन्छ । एक धर्के प्रिया मुस्कानमा सम्पूर्ण प्रीति प्रकट हुन्छ । आमाको एउटै काखमा आशीर्वादका अनन्त फूलहरू फक्रिन्छन् । स्रष्टाको कलाको तेस्रो आँखाले अर्कै रूप र अर्कै अभिप्राय देख्दछ । एक जना अन्तरिक्ष यात्रीले भनेका थिए- यहाँबाट मैले सृष्टि सौन्दर्यको जो विचित्र रङ्ग र आभा देखेको छु, त्यसको वर्णन म गर्न सक्तिनँ, यसका निम्ति त कवि नै चाहिन्छ । सृष्टिमा जे जति छ, त्यति नै यति विचित्र छ कि त्यसको भाषा पाइँदैन, परन्तु कविका विचित्र वाणीमा त्यसको महिमा मुखरित हुन्छ । वैशाखी रातमा कुहुकुहु गर्दै कोइली मानौं विस्मय र आश्चर्यमा परी पखेटा खोलेर उड्छे र वसन्तलाई बोलाउँछे । विहानीपख सूर्यका किरणहरू जसरी छिरविराएर आउन थाल्दछन्, त्यसरी नै धोविनी चरीका कलकण्ठबाट उसका चिरविर वाणीहरू चिरविराउन थाल्छन्,- जहाँ अरु एक शब्द पनि बोल्न सक्तैनन, त्यही कवि सहस्र र सरल, सुन्दर शब्द बोल्न सक्तछ ।

१६. २०७१ पूरक प्र. नं. १० तलको अनुच्छेद पढी मुख्यमुख्य पाँच बुँदाटिपोट गर्नुहोस् (५)

लोकतन्त्र आफैं एउटा यस्तो सञ्चार व्यवस्था हो जसमा जनताले आफ्ना विचार र दृष्टिकोण खुलस्त रूपमा र व्यवधानरहित ढङ्गले राख्न पाउने मात्र होइन, अरूका विचार र दृष्टिकोणलाई पनि जान्न पाउने हक राख्तछ । सूचनामाथि हामी जति बढी अधिकार राख्न सक्छौं त्यति नै मात्रामा हामी छिटो र सजिलै सत्यको नजिक पुग्न सक्छौं । अन्यथा सूचनाको अभावले हामीलाई समस्या ग्रस्त मात्र होइन, उदासीन र कर्म शून्य समेत बनाउँछ । निश्चय नै लोकतन्त्र पनि समस्यारहित व्यवस्था होइन । समस्यालाई स्वीकार गर्ने, समाधान गर्ने र नयाँ समस्यासंग जुध्न तयार रहने खुला र मुक्त परिपाटी नै लोकतान्त्रिक विधि हो । यी सबै कुरा सूचनाको निर्बाध प्रवाहले मात्रै गर्न सक्छ । त्यसैले लोकतन्त्रमा सूचनाको प्रवाहलाई ज्यादै गम्भीर र उच्च महत्त्व दिइन्छ ।

१७. २०७१ प्र. नं. १० तलको अनुच्छेदलाई एक तृतीयांशमा सङ्क्षेपीकरण गर्नुहोस् (५)

लोकतन्त्रात्मक व्यवस्था संवैधानिक रूपमा अत्यन्त सरल तर अभ्यासका दृष्टिले जटिल र घुमाउरो हुन्छ । लोकतन्त्र आफैं एउटा यस्तो सञ्चार व्यवस्था हो जसमा जनताले आफ्ना विचार र दृष्टिकोण खुलस्त रूपमा र व्यवधानरहित ढङ्गले राख्न पाउने मात्र होइन, अरुका विचार र दृष्टिकोणलाई पनि जान्न पाउने हक राख्तछ । सूचनामाथि हामी जति बढी अधिकार राख्न सक्छौं त्यति नै मात्रामा हामी छिटो र सजिलै सत्यको नजिक पुग्न सक्छौं । अन्यथा सूचनाको अभावले हामीलाई समस्याग्रस्त मात्र होइन, उदासीन र कर्मशून्यसमेत बनाउँछ । निश्चय नै लोकतन्त्र पनि समस्या रहित व्यवस्था होइन । समस्यालाई स्वीकार गर्ने, समाधान गर्ने र नयाँ समस्यासंग जुध्न तयार रहने खुला र मुक्त परिपाटी नै लोकतान्त्रिक विधि हो । यी सबै कुरा सूचनाको निर्बाध प्रवाहले मात्रै गर्न सक्छ । त्यसैले लोकतन्त्रमा सूचनाको प्रवाहलाई ज्यादै गम्भीर र उच्च महत्त्व दिइन्छ ।

१८. २०७० प्र. नं. १० तलको अनुच्छेदलाई एक तृतीयांश सङ्क्षेपीकरण गर्नुहोस् :

राष्ट्रनिर्माणका काममा महत्त्वपूर्ण भूमिका खेल्ने हुँदा सञ्चार राष्ट्रको चौथो अङ्ग मानिन्छ । सञ्चार माध्यमकै कारण व्यक्ति परिवार, समाज, राष्ट्र र विश्वको चौतर्फी विकास सम्भव हुँदा यिनको ठूलो जिम्मेवारी रहेको देखिन्छ । अहिले विश्व जेजस्तो उन्नति भइरहेको छ त्यसमा सञ्चार माध्यमको विशेष भूमिका रहेको छ । यसले विशाल विश्वलाई ज्यादै साँ तुल्याइदिएको छ । यसकै सहयोग लिई मानिस घरमै व ठूलाठूला कामहरू गर्न सफल भएको छ । त्यसैले अहिले सञ्च माध्यमहरू मानिसका लागि वरदान साबित भएका छ सञ्चार माध्यमहरूबाट प्रसारित एवम् प्रकाशित समाचार तथ्यमा आधारित हुनुपर्दछ र ती कुनै पनि देशको राष्ट्रियतामा सङ्कट निम्त्याउने र विश्वलाई नै युद्धमैदानमा परि गराइदिने खालका कदापि हुनुहुँदैन । सञ्चार माध्यमकै का वेलावेलामा ठाउँठाउँमा सामाजिक सद्भाव खलबलिने राष्ट्रराष्ट्रका बीचमा द्वन्द्व चर्किने गरेको पनि देखिएको छ तथ्यहीन सामग्रीका कारण संसारमा डरलाग्दो उथलपुथल हु सक्ने भएकाले त्यसतर्फ यी बढी जिम्मेवार हुनुपर्ने देखिन्छ ।

१९. २०६९ प्र. नं. १० तलको अनुच्छेद पढी मुख्यमुख्य पाँच बुँदाटिपो गर्नुहोस् : (५)

नेपालको शिक्षाक्षेत्र सधैं अस्तव्यस्त रहन विवश बन्दै आएक छ । जुनसुकै आन्दोलनको पहिलो तारो बन्ने शिक्षा क्षेत्र नै धरमर रहेको छ भने आफूभित्रै भएका विकराल समस्या यसलाई झन् थला वसाउँदै आएको पाइन्छ । तसर्थ गुणात्मक शिक्षाको नारा जतिसुकै फलाक्ने परिपाटी रहे पनि स्थिति चाहि अत्यन्तै नकारात्मक बन्दै गइरहेको छ । यो राष्ट्रका लागि राम्र सङ्केत होइन । आजको समयमा राष्ट्रिय मात्र होइ अन्तर्राष्ट्रिय शिक्षानीति हुनु आवश्यक छ । यसका लागि सरका विद्यालय सञ्चालक, शिक्षक, विद्यार्थी र अभिभावक सबैको एउ उद्देश्य हुनुपर्दछ । यहाँका शैक्षिक संस्थाबाट उत्पादि जनशक्तिले विश्वको कुनै पनि कुनामा गएर अन्य देशबा आएकाहरूसित प्रतिस्पर्धा गर्न सकोस् । यसका लागि सम्बन्धि पक्षले गहन ज्ञान र सीप दिनुपर्ने हुन्छ । तर नेपालको वर्तमा शैक्षिक स्थितिलाई हेर्दा सबै पक्ष गैरजिम्मेवार भएको देखिन्छ विद्यालय सञ्चालक र मुनाफा, सरकार र निष्क्रियता, शिक्षक र राजनीति, अभिभावक र मौनता यी सबै एकअर्काका पर्याय त होइनन् ? यसतर्फ सबै पक्षले गम्भीर चिन्तन गर्नुपर्ने अवस्था आइसकेको देखिन्छ ।

एकाइ २: अनुच्छेदलेखन, पत्र रचना र व्यावहारिक लेखन (कुनै एक प्रश्न) (५ अङ्क)

१. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. ११

क. तपाईंको गाउँघरमा आजसम्म पनि बिजुली पुग्न नसक्न त्यसबाट पैदा भएका समस्याप्रति सम्बन्धित पक्षको ध्यानाकर्षण गराउँदै स्थानीय पत्रिकाका सम्पादकलाई चिठी लेख्नुहोस् । (५

ख. हावाहुरीका कारण पोलहरू ढल्न गई विद्युत आपूर्ति बन्द भएक विषयबारे सर्वसाधारणलाई जानकारी गराउन स्थानीय विद्युत प्राधिकरण कार्यालयले तयार पार्ने एउटा सूचना लेख्नुहोस् । (५

२. २०७६ ग्रेडवृद्धि प
क. आफ्नो घर बिजु
विद्युत् प्राधिकरण
भर्खरै बजारमा
ख. गर्दै एउटा आक

३. २०७६ प्र.नं. १
क. आफ्नो टोल,
त्यसबाट उत्प
गोरखापत्र रा
लेख्नुहोस् ।
ख. नेपालमा सञ्च
लागि सम्बन्धि
पार्नुहोस् ।

४. २०७५ ग्रेडवृद्धि
क. तपाईंको टोल
परेको समस्य
ध्यानाकर्षण
लेख्नुहोस् ।
ख. कक्षा १२
प्रकाशकका

५. २०७५ सेट A
क. सृजनशील
काठमाडौंला
पत्रको नमुन
ख. आफ्नो विद्य
निकालिने
नाम श्रेयम

६. २०७५ सेट
क. 'विद्युत चुह
गरी गोरख
ख. भर्खरै वज
व्यापार प्र
पार्नुहोस् ।

७. २०७४ पूरक
क. विद्युत् वल
कम प्रयोग
सर्वसाधार
गर्नुहोस् ।
ख. आफ्नो ट
सम्बद्ध नि
पत्रिकाका

८. २०७४ प्र.
क. 'सवारी
गरी गोर

ख. नेपालका
गरी उत्
उत्पादक
तयार प

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२. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. ११

क आफ्नो घर बिजुलीको लाइन जडान गरिदिनु अनुरोध गर्दै नेपाल विद्युत् प्राधिकरणलाई सम्बोधन गरी एउटा निवेदन लेख्नुहोस्। (५)

ख भर्खरै बजारमा आएको नयाँ मोटर साइकलको विशेषता उल्लेख गर्दै एउटा आकर्षक विज्ञापनको नमुना तयार पार्नुहोस्। (५)

३. २०७६ प्र.नं. ११

क आफ्नो टोल, बस्तीमा खानेपानीको उचित प्रबन्ध हुन नसक्दा त्यसबाट उत्पन्न समस्याप्रति सम्बद्ध पक्षको ध्यानाकर्षण गराउँदै गोरखापत्र राष्ट्रिय दैनिक पत्रिकाका सम्पादकलाई चिठी लेख्नुहोस्। (५)

ख नेपालमा सञ्चालन हुन लागेको पानी जहाजको प्रचार-प्रसारका लागि सम्बन्धित कार्यालयले गर्ने, विज्ञापनको नमुना तयार पार्नुहोस्। (५)

४. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. ११

क तपाईंको टोल छिमेकमा भत्केका सडक मर्मत नहुँदा भोग्नु परेको समस्या जनाई समाधानका लागि सम्बन्धित निकायलाई ध्यानाकर्षण गराउन आग्रह गरी सम्पादकलाई एउटा चिठी लेख्नुहोस्।

ख कक्षा १२ को कुनै एउटा पाठ्यपुस्तकको बिक्रीका लागि प्रकाशकका तर्फबाट गरिने विज्ञापनको नमुना बनाउनुहोस्।

५. २०७५ सेट A प्र. नं. ११

क सृजनशील पुस्तक पसल गुल्मीका तर्फबाट साझा प्रकाशन काठमाडौंलाई किताब पठाइदिन अनुरोध गर्दै लेख्ने व्यावसायिक पत्रको नमुना लेख्नुहोस्। (५)

ख. आफ्नो विद्यालयमा आयोजना हुने 'कविता महोत्सवका' लागि निकालिने सूचनाको नमुना तयार गर्नुहोस्। (मानौं तपाईंको नाम श्रेयम हो र विद्यालयको नाम भानुभक्त मा.वि. हो।) (५)

६. २०७५ सेट B प्र. नं. ११

क. 'विद्युत चुहावट' का विषयमा सम्बन्धित पक्षको ध्यानाकर्षण हुने गरी गोरखापत्र राष्ट्रिय दैनिकका सम्पादकलाई चिठी लेख्नुहोस्।

ख. भर्खरै बजारमा आएको 'हर्बल टी' वा 'जडिबुटी चिया' को व्यापार प्रवर्धनका लागि आकर्षक विज्ञापनको नमुना तयार पार्नुहोस्।

७. २०७४ पूरक प्र. नं. ११

क. विद्युत् बढी खपत हुने समयमा विद्युतीय उपकरण यथाशक्य कम प्रयोग गर्न आग्रह गर्दै नेपाल विद्युत् प्राधिकरणका तर्फबाट सर्वसाधारणका लागि जारी गरिने सूचनाको नमुना तयार गर्नुहोस्। (५)

ख. आफ्नो टोलछिमेकमा भत्किएका सडकको पुनर्निर्माणका निम्ति सम्बद्ध निकायको ध्यानाकर्षण हुने गरी कुनै एक राष्ट्रिय दैनिक पत्रिकाका सम्पादकलाई चिठी लेख्नुहोस्। (५)

८. २०७४ प्र. नं. ११

क. 'सवारी दुर्घटना' का विषयमा सम्बद्ध पक्षको ध्यानाकर्षण हुने गरी गोरखापत्र राष्ट्रिय दैनिकका सम्पादकलाई चिठी लेख्नुहोस्। (५)

ख. नेपालका युवा वैज्ञानिकहरूद्वारा आफ्नै सीप र प्रविधिको प्रयोग गरी उत्पादन गरिएको 'सोलार कार' को प्रचार प्रसारका लागि उत्पादक कम्पनीका तर्फबाट गरिने आकर्षक विज्ञापनको नमुना तयार पार्नुहोस्। (५)

९. २०७३ पूरक प्र. नं. ११

क सडक विस्तारको कार्य राष्ट्रव्यापी रूपमा सञ्चालन गरिने हुँदा सडक छेउमा अनाधिकृत रूपमा बने, बनाइएका घरटहरा ३५ दिनभित्र हटाउन निर्देशन दिँदै सडक विभागका तर्फबाट निकालिने सार्वजनिक सूचनाको नमुना तयार गर्नुहोस्। (५)

ख. उच्चमाध्यमिक तहका अनिवार्य विषयका पाठ्यपुस्तक यथाशीघ्र पठाइदिन अनुरोध गर्दै रेसुङ्गा किताब बिक्री केन्द्रका तर्फबाट साझा प्रकाशनलाई लेखिने चिठीको नमुना तयार गर्नुहोस्। (५)

१०. २०७३ प्र. नं. ११

क. निजी विद्यालयहरूले यसै शैक्षिक सत्रदेखि शिक्षण शुल्क वृद्धि गरेको भन्ने पत्रपत्रिकामा आएका समाचारलाई विषय बनाई कुनै राष्ट्रिय दैनिक पत्रिकाका सम्पादकलाई चिठी लेख्नुहोस्। (५)

ख. नियमित मर्मत सम्भार गर्नुपर्ने कारण देखाउँदै तीन दिन केबुलकार सेवा बन्द हुनेबारे सर्व साधारणलाई जानकारी गराउनका लागि मनकामना केबुलकार प्रा.लि. का तर्फबाट तयार पारिने सूचना लेख्नुहोस्। (५)

११. २०७२ पूरक प्र. नं. ११

क. साझा प्रकाशनबाट प्रकाशित 'सबैको नेपाली' किताबको आकर्षक विज्ञापन तयार गर्नुहोस्। (५)

ख. नेपालमा बढ्दै गएको 'नेपालबन्द संस्कृति' को अन्त्य हुनुपर्ने धारणा राख्दै गोरखापत्र दैनिकका सम्पादकलाई एउटा चिठी लेख्नुहोस्। (५)

१२. २०७२ प्र. नं. ११

क. आफ्नो घरमा बिजुलीको लाइन जडान गरिदिन अनुरोध गर्दै स्थानीय विद्युत् प्राधिकरण कार्यालयलाई सम्बोधन गरी एउटा निवेदन लेख्नुहोस्। (५)

ख. मारुती यातायात प्रा. लि.ले हालै सञ्चालनमा ल्याएका नयाँ रात्री डिलक्स बसहरूको प्रचारका लागि प्रकाशित गर्ने विज्ञापन लेख्नुहोस्। (५)

१३. २०७२ सेट E प्र. नं. ११

क. बढ्दो सडक दुर्घटना न्यूनीकरणका लागि जनचेतनामूलक समाचार प्रकाशित गर्न अनुरोध गर्दै स्थानीय राष्ट्रिय दैनिकका सम्पादकलाई चिठी लेख्नुहोस्। (५)

ख. 'स्वच्छ खानेपानी पिउने बानी बसालौं' भन्ने आशयको स्वास्थ्य मन्त्रालयबाट प्रकाशित विज्ञापनको नमुना तयार पार्नुहोस्। (५)

१४. २०७१ पूरक प्र. नं. ११

क. आफ्नो घरमा बिजुली जडान गरिदिन अनुरोध गर्दै स्थानीय विद्युत प्राधिकरण कार्यालयलाई सम्बोधन गरी एउटा निवेदन लेख्नुहोस्। (५)

ख. वैदेशिक रोजगारका लागि कुवेत पुगेका नेपाली चेलीहरूले भोग्नुपरेको समस्यावारे सम्बन्धित पक्षको ध्यानाकर्षण गराईदिन अनुरोध गर्दै कुनै राष्ट्रिय दैनिक पत्रिकाकार सम्पादकलाई चिठी लेख्नुहोस्। (५)

१५. २०७१ प्र. नं. ११

क. निलगिरि माध्यमिक विद्यालयले माग गरेबमोजिम नि.मा.वि. शिक्षकमा सेवा गर्ने अवसर पाऊँ भनी प्रधानाध्यापकलाई सम्बोधन गरी निवेदन लेख्नुहोस्। (५)

ख. सबैको नेपाली पुस्तकका विशेषता उल्लेख गर्दै प्रकाशित गरिने विज्ञापनको नमुना तयार गर्नुहोस्। (५)

१६. २०७० प्र. नं. १९

क उच्चमाध्यमिक विद्यालयहरूले निकट भविष्यमा शिक्षण शुल्क वृद्धि गर्नेबारे पत्र पत्रिकामा आएका समाचारलाई विषय बनाई सम्पादकलाई चिठी लेख्नुहोस् । (५)

ख नेपाल खाद्यसंस्थानले शाखा अधिकृत पदको पूर्तिका लागि निकाल्ने विज्ञापनको नमुना तयार गर्नुहोस् । (५)

१७. २०६९ प्र. नं. १९

क हावाहरीका कारण विग्रेको लाइन बनाउनुपर्ने हुँदा विद्युत् एक हप्तासम्म बन्द हुने भन्ने नेपाल विद्युत् प्राधिकरणको सूचनाको नमुना तयार पार्नुहोस् । (५)

ख देवकोटा जयन्तीका उलक्ष्यमा देवकोटा प्रतिष्ठानद्वारा आयोजित कविगोष्ठीमा शिक्षामन्त्रीलाई प्रमुख अतिथिको रूपमा आमन्त्रण गरी एउटा निमन्त्रणा पत्र तयार गर्नुहोस् । (५)

एकाइ ३: प्रतिवेदनलेखन, टिप्पणीलेखन र निबन्धलेखन

(५+१०=१५ अङ्क)

क. प्रतिवेदनलेखन (५ अङ्क)

१. २०७७ सेट H प्र. नं. ८ आफ्नो विद्यालयमा सम्पन्न स्वागत तथा विदाइ कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको एउटा प्रतिवेदन लेख्नुहोस् । (मानौं: तपाईंको नाम सगुन हो र तपाईंको विद्यालयको नाम सहिद स्मारक मा.वि. हो ।) (५)

२. २०७७ सेट I प्र. नं. ८ आफ्नो विद्यालयले आयोजना गरेको कुनै शिक्षण अस्पतालको विज्ञान प्रयोगशालाको अवलोकन भ्रमण कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको एउटा प्रतिवेदन लेख्नुहोस् । (मानौं: तपाईंको नाम किरण हो र तपाईंको विद्यालयको नाम सरस्वती मा.वि. हो ।) (५)

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १२ आफ्नो विद्यालयले आयोजना गरेको शैक्षिक भ्रमण कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको एउटा प्रतिवेदन लेख्नुहोस् । (५)

४. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १२ तपाईंको विद्यालयले आयोजना गरेको कविता प्रतियोगिता कार्यक्रमलाई समेटेर १५० शब्दसम्मको एउटा प्रतिवेदन तयार पार्नुहोस् । (५)

५. २०७६ प्र.नं. १२ आफ्नो विद्यालयले आयोजना गरेको रक्तदान कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको प्रतिवेदन लेख्नुहोस् । (मानौं: तपाईंको नाम तारा हो र तपाईंको विद्यालयको नाम जनसेवा मा.वि., प्रगतिनगर हो ।) (५)

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. १२ तपाईं आफू संलग्न भई सम्पन्न गरेको राहत वितरणको कार्यक्रमलाई समेटी १५० शब्दसम्मको प्रतिवेदन लेख्नुहोस् । (५)

७. २०७५ सेट A प्र. नं. १२ आफू सहभागी विद्यालयको शैक्षिक भ्रमणलाई समेटी १५० शब्दसम्मको प्रतिवेदन लेख्नुहोस् । (५)

८. २०७५ सेट B प्र. नं. १२ आफू संलग्न भएको वृक्षारोपण कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको प्रतिवेदन लेख्नुहोस् । (५)

९. २०७४ पूरक प्र. नं. १२ तपाईंको विद्यालयको वार्षिकोत्सव समारोहको जानकारी गराउँदै प्रधानाध्यापकलाई लेखिने प्रतिवेदनको नमुना तयार गर्नुहोस् । (मानौं : तपाईंको नाम नेपालमान हो र विद्यालय नेपालतारा माविं हो ।) (५)

१०. २०७४ प्र. नं. १२ 'पञ्चदेवल युवा क्लब' ले आयोजना गरेको रक्तदान कार्यक्रममा आफू सहभागी भएको विषयलाई समेटी १५० शब्दसम्मको प्रतिवेदन लेख्नुहोस् ।

११. २०७३ पूरक प्र. नं. १२ सप्ताहव्यापी रूपमा विद्यालयमा सञ्चालित खेलकुद समापन समारोहलाई समेटदै १५० शब्दसम्मको एउटा प्रतिवेदन तयार गर्नुहोस् । (मानौं विद्यालयको नाम 'राष्ट्रनिर्माण' र तपाईंको नाम 'जनता' हो ।

१२. २०७३ प्र. नं. १२ आफ्नो टोलको युवा क्लबले आयोजना गरेको रक्तदान कार्यक्रमका मुख्य कुराहरू समेटी १५० शब्दसम्मको प्रतिवेदन लेख्नुहोस् ।

१३. २०७२ पूरक प्र. नं. १२ आफ्नो विद्यालयमा सम्पन्न खेलकुद महोत्सवका सबै कुरा समेटी १५० शब्दसम्मको एउटा प्रतिवेदन तयार गर्नुहोस् ।

१४. २०७२ प्र. नं. १२ आफू सहभागी भएको कुनै एउटा कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको प्रतिवेदन लेख्नुहोस् ।

१५. २०७२ सैट E प्र. नं. १२ विद्यालयमा आयोजित वार्षिकोत्सव कार्यक्रमलाई समेटी १५० शब्दसम्मको एउटा प्रतिवेदन तयार पार्नुहोस् ।

१६. २०७१ पूरक प्र. नं. १२ विद्यालयमा सम्पन्न खेलकुद कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको एउटा प्रतिवेदन तयार पार्नुहोस् ।

१७. २०७१ प्र. नं. १२ आफूले गरेको कुनै एक भ्रमणलाई समेटी १५० शब्दसम्मको एउटा प्रतिवेदन तयार गर्नुहोस् ।

१८. २०७० प्र. नं. १२ आफ्नो टोल सुधार समितिले सम्पन्न गरेको टोल सरसफाइ अभियान कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको एउटा प्रतिवेदन तयार गर्नुहोस् ।

१९. २०६९ प्र. नं. १२ आफ्नो विद्यालयको तर्फबाट गरिएको शैक्षिक भ्रमणलाई समेटी १५० शब्दसम्मको एउटा प्रतिवेदन तयार गर्नुहोस् । (मानौं: तपाईंको नाम गंगा हो र तपाईंको विद्यालयको नाम भागीरथी उ.मा.वि. नेपालनगर हो)

ख. टिप्पणीलेखन (५ अङ्क)

१. २०७७ सेट H प्र. नं. ८ अथवा 'इन्टरनेटको उपयोगिता' विषयमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् ।

२. २०७७ सेट I प्र. नं. ८ अथवा 'छाउपडी प्रथा' विषयमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् ।

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १२ अथवा 'सामाजिक सञ्जालको दुरुपयोग' विषयमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् ।

४. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १२ अथवा 'बढ्दो वातावरण प्रदूषण' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् ।

५. २०७६ प्र.नं. १२ अथवा 'युवापुस्तामा बढ्दो फेसबुकको प्रयोग र यसको असर' विषयमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् ।

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. १२ अथवा 'नेपालका सडकको अवस्था समस्या समाधान' शीर्षकमा १५० शब्दसम्मको एउटा टिप्पणी लेख्नुहोस् ।

७. २०७५ सेट A प्र. नं. १२ अथवा 'स्वास्थ्य वीमा आजको आवश्यकता' शीर्षकमा १५० शब्दसम्मको एउटा टिप्पणी लेख्नुहोस् ।

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८. २०७५ सेट B प्र. नं. १२ अथवा 'वन फँडानी र यसको असर' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (१०)
९. २०७४ पूरक प्र. नं. १२ अथवा 'युवाको विदेश पलायन' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
१०. २०७४ प्र. नं. १२ अथवा 'महिला हिंसा' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
११. २०७३ पूरक प्र. नं. १२अथवा 'बढ्दो खाद्य सङ्कट' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
१२. २०७३ प्र. नं. ११ अथवा 'नेपालमा इन्धनको समस्या' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
१३. २०७२ पूरक प्र. नं. १२ अथवा 'नेपालको बहुजातीय सामाजिक बनोट' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
१४. २०७२ प्र. नं. १२ अथवा 'बोक्सीको आरोपमा महिलामाथि हुने दुर्व्यवहार' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
१५. २०७२ सेट E प्र. नं. १२ अथवा 'संविधान निर्माणमा भएको विलम्ब' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
१६. २०७१ पूरक प्र. नं. १२ अथवा 'रक्तदान जीवनदान' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
१७. २०७१ प्र. नं. १२ अथवा 'दुर्गम क्षेत्रमा समयमै पाठ्यपुस्तक नपुग्ने समस्या' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
१८. २०७० प्र. नं. १२ अथवा 'बढ्दो सवारी दुर्घटना' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)
१९. २०६९ प्र. नं. १२ अथवा 'उच्च माध्यमिक शिक्षाका चुनौती' शीर्षकमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् । (५)

ग. निबन्धलेखन (१० अङ्क)

तल दिइएका मध्ये कुनै एक शीर्षकमा २५० शब्दसम्मको निबन्ध लेख्नुहोस् : (१०)

१. २०७७ सेट H प्र. नं. ९
क. कोरोना महामारीको प्रभाव
ख. नेपालको आर्थिक विकासमा जलसम्पदाको भूमिका

२. २०७७ सेट I प्र. नं. ९
क. मलाई मनपर्ने वैज्ञानिक
ख. डाक्टरी पेसाको गरिमा र महत्त्व

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १३
क. मलाई मनपर्ने कवि
ख. स्वस्थ जीवन: सुखी जीवन
ग. नेपालमा कृषिको आधुनिकीकरण

४. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १३
क. हाम्रो संस्कृति: हाम्रो पहिचान
ख. जलवायु परिवर्तन: समस्या र चुनौती
ग. देश विकासमा पर्यटन उद्योगको भूमिका

५. २०७६ प्र.नं. १३
क. म र मेरो देश
ख. नेपालमा पर्यटन
ग. शान्ति र विकास

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. १३
क. सङ्घीय संरचना र नेपाल
ख. नेपालको आर्थिक समृद्धिमा उद्योग व्यवसायको भूमिका
ग. आजको युगमा विज्ञान शिक्षाको महत्त्व

७. २०७५ सेट A प्र. नं. १३
क. कृषिमा आधुनिकीकरण
ख. नेपालको अर्थतन्त्रमा वित्तीय संस्थाको भूमिका
ग. मेरो जीवन: मेरो गन्तव्य

८. २०७५ सेट B प्र. नं. १३
क. सङ्घीयता र चुनौती
ख. मेरो भविष्यको योजना
ग. स्वास्थ जीवन

९. २०७४ पूरक प्र. नं. १३
क. मेरो राष्ट्र : मेरो गौरव
ख. युवा पुस्तामा सञ्चार माध्यमको प्रभाव
ग. शान्ति र विकास

१०. २०७४ प्र. नं. १३
क. मेरो देश: मेरो स्वर्ग
ख. नेपालमा विज्ञान र प्रविधि शिक्षाको महत्त्व
ग. लोकतन्त्र र अनुशासन

११. २०७३ पूरक प्र. नं. १३
क. जनचाहना र संविधान
ख. नेपाल सबै जातको साझा फूलवारी
ग. मेरो जन्म स्थान

१२. २०७३ प्र. नं. १३
क. युवा वर्गमा बढ्दो मोबाइल फोनप्रतिको मोह
ख. मानवअधिकारको संरक्षणमा सरकारको भूमिका
ग. मेरो देश, मेरो स्वर्ग

१३. २०७२ पूरक प्र. नं. १३
क. प्राकृतिक सौन्दर्य र नेपाल
ख. मेरो जीवनको लक्ष्य
ग. राष्ट्रनिर्माणमा युवा दायित्व

१४. २०७२ प्र. नं. १२
क. राष्ट्र निर्माणमा सञ्चार माध्यमको भूमिका
ख. नेपालका प्राकृतिक सम्पदाहरू
ग. मलाई मन पर्ने पुस्तक

१५. २०७२ सेट E प्र. नं. १३
क. विज्ञान र प्रविधिको महत्त्व
ख. खाद्यान्नमा विषादीको प्रयोगले पार्ने असर
ग. मेरो जीवनको लक्ष्य

१६. २०७१ पूरक प्र. नं. १३
क. मलाई मन पर्ने कवि
ख. राष्ट्रप्रतिको मेरो कर्तव्य
ग. नेपालका हिम शृङ्खलाहरू

१७. २०७१ प्र. नं. १३
क. लोकतन्त्रको महत्त्व
ख. विज्ञान शिक्षाको महत्त्व
ग. मेरो जन्मभूमि

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१८. २०७० प्र. नं. १३
क मेरो बाल्यकाल
ख देश विकासमा पर्यटन उद्योगको भूमिका
ग पुस्तकालयको महत्त्व

१९. २०६९ प्र. नं. १३
क हाम्रो संस्कृति हाम्रो पहिचान
ख नेपालको आर्थिक विकासमा पर्यटन उद्योगको भूमिका
ग मैले देखेको नेपालको भविष्य

एकाइ ४: कृतिसमीक्षा/साहित्यिक रचनाको पठनबोध
(१०+१०+५=२५ अङ्क)

■ साहित्यिक रचनाको पठनबोध (नाटक/ एकाङ्की र उपन्यास) (१० अङ्क)

क. नाटक तथा एकाङ्की (१० अङ्क)

१. २०७७ सेट । प्र. नं. १० 'बौलाहा काजीको सपना' नाटकको तल दिइएको अंश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस्। (५)

अं, पहिले पैसा नभए माग्नुपर्थ्यो। मागेर पनि कसैले सोझो मुखले नदिएको भए, यतिका सहरका घरहरू छ्दै थिए नि, घनले ठोकेर, ताल्चा फोरेर, खोसेर, चोरेर भए पनि ल्याउनुपर्थ्यो। एउटा ज्यान मारेर ज्यानमारा बनिरहनु सट्टामा त चोर हुनु हजार गुना बेस। हामी ज्यान मारा हौं, ज्यानमारा। किन चोरेनौं ? किन लुटेनौं ? चुप लाग्, अब रोएर छाती फोडे पनि के ? जो बित्यो। त्यो गयो, त्यो गयो ! ...

प्रश्न:

क. माथिको नाट्यांशले कसको मृत्यु भएका कुराको सङ्केत गरेको छ ? उसको मृत्यु कसरी भएको हो ? स्पष्ट पार्नुहोस्।

२. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १४ 'नालापानीमा' नाटकको तल दिइएको अंश पढी अन्त्यमा सोधिएका प्रश्नहरूको उत्तर दिनुहोस्: (२×५=१०)

घाइते भो मानिस यो मानिस कहाँ आयो,
मानिसले मानिसबाट स्याहार पनि पायो,
धन्य कहलाऊ खोली हृदयको द्वार,
गुन लाएर मानिसलाई वैगुनी नपार,
कस्तुरीलाई हिमालको शिरमा चर्न देऊ,
नेपालीलाई नेपालको निम्ति मर्न देऊ, अब जान देऊ,
कि यो प्रान लेऊ . . .
कि उसको प्रान हो उसलाई यो दान गर्न देऊ
अब जान देऊ । जान देऊ . . .

प्रश्नहरू

क. माथिको नाट्यांशमा के-कस्तो मानवतावादी विचार व्यक्त भएको छ ? लेख्नुहोस्।

ख. 'नेपालीलाई नेपालको निम्ति मर्न देऊ' भन्नुको तात्पर्य के हो ? नाटकका आधारमा तर्क दिएर लेख्नुहोस्।

३. २०७४ प्र. नं. १४ 'बौलाहा काजीको सपना' नाटकबाट दिइएको अंश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस्: (२×५
भक्ते ! तेरो एउटा छोरो थियो, विरे । तेरो स्वार्थ त्यही थि
त्यही एक बिन्दु थियो, तेरो एउटै हीरा थियो, एउटै माया थि
अब त्यो मर्‍यो, त्यो छैन । हेर, त्यसको सट्टामा धेरै विरेजस्
छोराहरू यहाँ छन् । एक्लै विरेले पाउने माया ती सबै
बाँडिदिएस् । एकदिन तेरोमेरो इच्छा पूरा हुनेछ । फिक्री नले
अर्को सपना सिर्जना गर्छु। गरिबीलाई संसारबाट
मिल्काउँछु, वुझिस् भक्ते ! गरिबीलाई म मिल्काइ छाड्
पन्छाइ छाड्छु। पन्छाउने काममा बाधा मान्छे हुन्छ भने
त्यसको दुस्मन हुन्छु, त्यसैसित लड्छु रोकिन्नँ। बाधा वुद्धि
भने वरु म सिल्ली हुन्छु। मूर्ख हुन्छु। पछि हट्तिनँ। गरिबी
समर्थक भएर परमेश्वर खडा हुन्छन् भनेपनि वरु म नास्ति
हुन्छु, दब्दिनँ, नरो भक्ते ! संसारले एक दिन सुखी हुनु
कसैले रोक्न सक्तैन ।

प्रश्नहरू:

क. माथिको नाट्यांशका आधारमा नेपाली समाजबाट हटाउ
सम्बन्धमा काजीको विचार कस्तो रहेको छ ? स्प
पार्नुहोस्।

ख. "संसारले एकदिन सुखी हुनु छ। कसैले रोक्न सक्दैन।
यस भनाइप्रति तपाईंको सहमति या असहमति के छ ? त
दिएर प्रतिक्रिया लेख्नुहोस्।

४. २०७३ पूरक प्र. नं. १४ 'बौलाहा काजीको सपना' नाटकको त
दिइएको अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस्: (२×५=१०
भक्ते ! तेरो एउटा छोरो थियो, विरे । तेरो स्वार्थ त्यही थि
त्यही एक बिन्दु थियो, तेरो एउटै हीरा थियो, एउटै माया थि
अब त्यो मर्‍यो, त्यो छैन । हेर, त्यसको सट्टामा धेरै विरेजस्
छोराहरू यहाँ छन् । एक्लै विरेले पाउने माया ती सबै
बाँडिदिएस् । एकदिन तेरोमेरो इच्छा पूरा हुनेछ । फिक्री नले
अर्को सपना सिर्जना गर्छु। गरिबीलाई संसारबाट
मिल्काउँछु, वुझिस् भक्ते ! गरिबीलाई म मिल्काइ छाड्
पन्छाइ छाड्छु। पन्छाउने काममा बाधा मान्छे हुन्छ भने
त्यसको दुस्मन हुन्छु, त्यसैसित लड्छु रोकिन्नँ। बाधा वुद्धि
भने वरु म सिल्ली हुन्छु। मूर्ख हुन्छु। पछि हट्तिनँ। गरिबी
समर्थक भएर परमेश्वर खडा हुन्छन् भनेपनि वरु म नास्ति
हुन्छु, दब्दिनँ, नरो भक्ते ! संसारले एक दिन सुखी हुनु
कसैले रोक्न सक्तैन ।

प्रश्नहरू:

क. माथिको नाट्यांशका आधारमा काजी कस्तो विचार रा
पात्र हो ? स्पष्ट पार्नुहोस्।

ख. 'संसारले एक दिन सुखी छ, कसैले रोक्न सक्दैन' भन्नु
आशय के हो ?

५. २०७३ प्र. नं. १४ "नालापानीमा" नाटकको तलको अंश पढी
सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (२×५=१०

घाइते भो मानिस यो मानिस कहाँ आयो
मानिसले मानिसबाट सहयार पनि पायो
धन्य कहलाऊ खोली हृदयको द्वार
गुन लाएर मानिसलाई वैगुनी नपार
कस्तुरीलाई हिमालको शिरमा चर्न देऊ
नेपालीलाई नेपालका निम्ति मर्न देऊ, अब जान देऊ
कि यो प्रान लेऊ .....
कि जसकी प्रान हो उसलाई यो दान गर्न देऊ
अब जान देऊ । जान देऊ..... ।

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प्रश्नहरू:

क. माथिको नाट्यांशमा केकस्तो मानवतावादी चिन्तन व्यक्त भएको छ ? प्रष्ट पार्नुहोस् ।

ख. माथिको नाट्यांशको पनि आधार लिई "नालापानीमा" नाटकमा नरे कार्कीद्वारा अभिव्यक्त देशभक्तिको वर्णन गर्नुहोस् ।

६. २०७२ सेट E प्र. नं. १४ 'नालापानी'मा एकाङ्कीको तल दिइएको अंश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (२×५=१०)

छोरा, नरो अझ धैर्य गर, अरुलाई कांतर स्वर नसुना,
जन्मभूमिको लाज बचा, जातिलाई छि नभना ।
मनै पर्दछ एक दिन निश्चय दुई दिनकै हो देह भने
त्यसको ममता छोडिदे अमर यशले देश बना ।
दुःखलाई नमान्, अपमान गरी आँसुलाई फिर्ता गरिदे,
तेरो सहनशीलता देखी वल अझ बढ्ला भाइमा लाख गुना ।
मेरो काखमा जति जति तैले तप तप रगत चुहाइस् यो,
उति उति मातृऋण तिरें भनी पुत्र वरु सन्तोष मना ।

प्रश्नहरू:

क. 'नालापानीमा' एकाङ्कीको माथिको अंशमा धरतीले नेपाली सिपाही नरे कार्कीलाई के कस्तो आह्वान् गरेको छ ?

ख. माथिको नाट्यांशका आधारमा 'नालापानीमा' एकाङ्कीमा अभिव्यक्त देशभक्तिको वर्णन गर्नुहोस् ।

७. २०७१ पूरक प्र. नं. १४ 'वौलाहा काजीको सपना' नाटकको तल दिइएको अंश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (५+५)

भक्ते ! तेरो एउटा छोरो थियो, विरे । तेरो स्वार्थ त्यही थियो, त्यही एक विन्दु थियो, तेरो एउटै हीरा थियो, एउटै माया थियो, अब त्यो मऱ्यो, त्यो छैन । हेर्, त्यसको सट्टामा धेरै विरेजस्ता छोराहरू यहाँ छन् । एक्लै विरेले पाउने माया ती सबैमा बाँडिदिएस् । एकदिन तेरो मेरो इच्छा पूरा हुनेछ । फिक्री नले, म अर्को सपना सिर्जना गर्छु । गरिवीलाई संसारवाट टाढा मिल्काउँछु, बुझिस् भक्ते ! गरिवीलाई म मिल्काइछाड्छु, पन्छाइछाड्छु । पन्छाउने काममा बाधा मान्छे हुन्छ भने म त्यसको दुस्मन हुन्छु, त्यसैसित लड्छु रोकिन्नँ । बाधा वुद्धि हुन्छ भने वरु म सिल्ली हुन्छु । मूर्ख हुन्छु । पछि हट्तिनँ । गरिवीका समर्थक भएर परमेश्वर खडा हुन्छन् भनेपनि वरु म नास्तिक हुन्छु, दब्दिनँ, नरो भक्ते ! संसारले एक दिन सुखी हुनु छ। कसैले रोक्न सक्तैन ।

प्रश्नहरू:

क. माथिको नाट्यांशका आधारमा वौलाहा काजी कस्तो विचार राख्ने पात्र हो ? स्पष्ट पार्नुहोस् ।

ख. "संसारले एक दिन सुखी हुनु छ, कसैले रोक्न सक्तैन" भन्ने भनाइप्रति तपाईंको सहमति वा असहमति के छ ? आफ्ना तर्क दिई लेख्नुहोस् ।

८. २०७१ प्र. नं. १४ 'वौलाहा काजीको सपना' नाटकको तल दिइएको अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् : (२×५=१०)

समाजको दुःखको अन्त न कागजमा कोर्दैमा हुँदोरहेछ न वोल्दैमा मात्र । यसको लागि त समाजको जरादेखि नै परिवर्तन गर्नुपर्छ । खोइ फ्रान्सको त्यो उच्च आदर्श, खोइ अमेरिकनहरूको स्वाधीनताको सङ्ग्राम । एक हुरी आयो, सतहसतहमा गोलमाल मच्चियो, फेरि उस्ताको उस्तै, फेरि वाटैमा तिनीहरू अलमलिए । हब्सीहरू कालाका कालै रहे, गरिवहरू भोकाको भोकै हिन्दुस्तानमा अछुत अछुतै, स्वार्थ जस्ताको तस्तै । समानता, भ्रातृत्व, स्वाधीनता शब्दको शब्द ।

प्रश्नहरू:

क. समाजको जरैदेखि नै परिवर्तन गर्नु पर्छ भन्नुको तात्पर्य के हो ?

ख. समानता, भ्रातृत्व र स्वाधीनता किन शब्दमै सीमित रहे ? स्पष्ट पार्नुहोस् ।

ख. उपन्यास (१० अङ्क)

१. २०७७ सेट H प्र. नं. १० 'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् : (५)

राम खेलावन राउत शिवनारानको खेतमा दुई चार चोटि आउँदैमा शिवनारानले नानीथकुँ र राम खेलावान राउतविचमा मिठो भाव रहेको सङ्केत पाइसकेका थिए । अर्को कुरा नानीथकुँको विहे झटपट सिद्ध्याउनुपर्ने थियो । सवभन्दा लायकको कुरा त दुवै जना जोडा मिलेर आफूले र आफ्ना सिद्धान्तले चाहे जस्तै संयोग मिलिरहेको थियो । त्यसैले शिवनारान मौका चुकाउने सुस्त्याइँ गर्ने मूर्खता किन गरिरहन्थे ?

प्रसङ्ग पेस हुनासाथ राम खेलावान राउतले मन्जुर गरे, नानीथकुँले पनि स्वीकृति दिइन् । मधेसतिर भएको हुनाले नानीथकुँलाई एक चोटि त अलि कस्तो कस्तो लागेको थियो तर प्रेमको अगाडि दूरता कुन कुरा हो र ! नानीथकुँ प्रसन्न नै थिइन् ।

प्रश्न:

क. "प्रेमको अगाडि दूरता कुन कुरा हो र !" यस भनाइप्रति तपाईंको प्रतिक्रिया लेख्नुहोस् ।

२. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १४ 'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नहरूको उत्तरु दिनुहोस् । (२×५=१०)

शिवनारानले एक हप्ताभित्रै नानीथकुँलाई एउटा सुयोग्य वर फेला पनि पारे । दुलाहा हुने केटो म्याट्रिक पास पनि भएको एउटा मौजाको जिमिदार पनि, उमेर मिल्दो नै थियो । सवभन्दा हर्षको कुरो आफ्ना वावु अष्टनारान र आफूहरूको पनि विचार र सिद्धान्तअनुसार केटो मधेसी थियो । प्रायः चाहिँदा गुणहरूले परिपूर्ण भएको मधेसी केटो पाएको र आफ्नो र तराईका मधेसी जातिसित वैवाहिक सम्वन्ध जोडिन पुग्ने कुराले शिवनारान चौपट्टै सन्तुष्ट र सांस्कृतिक मेल झन आफ्नै घरमा हुन लागेकोमा शिवनारान अत्यधिक खुसी भए किनभने यी तीन जाति र संस्कृतिको समन्वय र स्थापना नभईकन नेपालको उन्नति हुँदै हुँदैन भन्ने उनलाई विश्वास थियो ।

प्रश्नहरू:

क. माथिको गद्यांशमा शिवनारानका के कस्ता प्रगतिशील र अग्रगमनकारी विचार प्रकट भएका छन् ? लेख्नुहोस् ।

ख. नानीथकुँलाई सुयोग्य वर फेला पारेपछि शिवनारान किन ज्यादै खुसी भए ? उपन्यासका आधारमा लेख्नुहोस् ।

३. २०७६ प्र.नं. १४ 'एक चिहान' उपन्यासको तल दिइएको अंश पढी अन्त्यमा सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (१०)

शिवनारानले एक हप्ताभित्रै नानीथकुँलाई एउटा सुयोग्य वर फेला पनि पारे । दुलाहा हुने केटो म्याट्रिक पास पनि भएको, एउटा मौजाको जिमिदार पनि, उमेर मिल्दो नै थियो । सवभन्दा हर्षको कुरा आफ्ना वावु अष्टनारान र आफूहरूको पनि विचार

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र सिद्धान्तअनुसार केटो मधेसी थियो । प्राय: चाहिंदा गुनहरूले परिपूर्ण भएको मधेसी केटो पाएको र आफ्नो र तराईका मधेसी जातिसित वैवाहिक सम्बन्ध जोडिन पुग्ने कुराले शिवनारान चौपट्टै सन्तुष्ट र प्रफुल्लित भए । नेवार, पर्वते, मधेसी यी तीनै जाति र संस्कृतिको मेल झन् आफ्नै घरमा हुन लागेकोमा शिवनारान अत्यधिक खुसी भए किनभने यो तीन जाति र संस्कृतिको समन्वय वा स्थापना नभइकन नेपालको उन्नति हुँदै हुँदैन भन्ने उनलाई विश्वास थियो ।

प्रश्नहरू:

क. नानीथकुको विवाहको सन्दर्भमा शिवनारान खुसी हुनुका कारणहरू के के हुन् ? चर्चा गर्नुहोस् ।

ख. 'नेवार, पर्वते र मधेसी यी तीन जाति र संस्कृतिको समन्वय नभईकन नेपालको उन्नति हुँदैहुँदैन' भन्ने भनाइसंग तपाईंको सहमति या असहमति के छ ? प्रतिक्रिया लेख्नुहोस् ।

४. **२०७५ ग्रेडवृद्धि परीक्षा प्र.नं. १४** 'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् : (१०)

"हुन त उनी गिद्धे दृष्टि राखेर हामीकहाँ पसेका हुन् । उनको धूर्त नीतिलाई सहानुभूति र सहयोग सम्झेर हामीले उनलाई देवता देखिरह्यौं तैपनि अस्ति अस्तिसम्म उनको प्रत्यक्ष बदमासी देखिएको थिएन ।"

शिवनारान अझै पनि चुप लागेका होइनन् बोलि नै रहेका थिए । अनि पुननारानले भने "भइगो नि डाक्टरले अहिलेसम्म केही नराम्रो गरिसकेका त छैनन् अवदेखि नबोलाई नआउनु होला भनि दिउँला कुरै मेटियो ।"

प्रश्नहरू:

क. माथिको गद्यांशअनुसार डाक्टर गोदत्तप्रसाद कस्तो चरित्रको पात्र हो ? स्पष्ट पार्नुहोस् ।

ख. कुदृष्टि लिएर आएको चाल पाउँदा पाउँदै पनि डाक्टर गोदत्तप्रसादको मृदतलाई अष्टनारानको परिवारले किन स्वीकार गर्नुपऱ्यो ? तर्क दिनुहोस् ।

५. **२०७५ सेट A प्र. नं. १४** 'एक चिहान' उपन्यासको तलको अंश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् । (१०)

मलाई पनि थाहा छ युगको गति, स्वतन्त्रताको महत्त्व र मानव इच्छाको कुरा । तर म स्वतन्त्रताको नाउँमा जसले जोसँग जस्तो पनि प्रेम गरेर हिँडेको हेर्न चाहन्नँ । प्रेमको पनि महत्त्व हुन्छ, उसका निम्ति पनि फुक्का र बन्धनको लेखाजोखा, मापदण्ड हुन्छ, सीमारेखा हुन्छ, विधान हुन्छ, सुपात्र र कुपात्र हुन्छ । यी सब कुरालाई, बाटोलाई तवरलाई नाघेर मानिस हिँड्न सक्दैन, पाउँदैन । त्यसैले जीवनमा अभिभावकहरू हुनु वेसै छ, यो सौभाग्यको कुरा हो र अभिभावकहरूले यस कुराको ख्याल विचार राम्ररी पुऱ्याउनुपर्छ ।

प्रश्नहरू:

क. माथिको गद्यांशमा प्रेमलाई कसरी परिभाषित गरिएको छ ?

ख. अभिभावककों भूमिकालाई उपन्यासले कसरी प्रस्तुत गरेको छ ? आफ्नो तर्क दिनुहोस् ।

६. **२०७५ सेट B प्र. नं. १४** 'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् । (१०)

शिवनारान गइ सकेपछि अष्टनारानले माहिला छोरा पुननारानलाई भने "तिमी पनि आफ्नो काममा जाऊ पुननारान । घर बनाउने काम अब धेरै दिन छैन, वर्षात सुरु भएपछि घर बनाउनेहरू कमै हुन्छन् । जाऊ, मलाई कुरिरहनु पर्दैन । आफ्नै काममा डटिरहनु यही तिम्रो परम कर्तव्य हो" ।

"हात खुट्टा बलियो भएपछि काम भनेको सधैं पाइन्छ वा । तो छोराछोरीका निम्ति बाबु सधैं पाईरहिन्न । बाको सेवा गर्न पाएपछि त्यस्ता काम लाख आउँछन् ।" पुननारानले भने ।

प्रश्नहरू:

क. माथिको पहिलो अनुच्छेदमा कामको महत्त्वलाई कसरी प्रस्तुत गरिएको छ ?

ख. दोस्रो अनुच्छेदमा बाबुआमाप्रति सन्तानको के कस्तो कर्तव्य औंल्याएको छ ?

७. **२०७४ पूरक प्र. नं. १४** 'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् : (२×५=१०)

शिवनारान गइ सकेपछि अष्टनारानले माहिला छोरा पुननारानलाई भने - "तिमी पनि आफ्नो काममा जाऊ पुननारान । घर बनाउने काम अब धेरै दिन छैन, वर्षात सुरु भएपछि घर बनाउनेहरू कमै हुन्छन् । जाऊ मलाई कुरिरहनु पर्दैन । आफ्नै काममा डटिरहू, यही तिम्रो परम कर्तव्य हो ।"

"हातखुट्टा बलियो भएपछि काम भनेको सधैं पाइन्छ वा ! तो छोराछोरीका निम्ति बाबु सधैं पाइरहिन्न । बाको सेवा गर्न पाएपछि त्यस्ता काम लाख आउँछन् ।" पुननारानले भने ।

प्रश्नहरू:

क. पहिलो अनुच्छेदमा अष्टनारानले श्रमिक छोरालाई कस्तो पाठ पढाएका छन् ? स्पष्ट पार्नुहोस् ।

ख. दोस्रो अनुच्छेदमा असल पुत्रका रुपमा पुननारानको कस्तो चरित्र प्रस्तुत भएको छ ? लेख्नुहोस् ।

८. **२०७२ पूरक प्र. नं. १४** 'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् : (२×५=१०)

ज्यान थापेर अर्काकी छोरीवेटी पाइन्छ, तरुनी स्वास्नी पाइन्छ भने म पनि ज्यान थापूला । सुरमान सुब्बा तपाईंलाई हुन्छ भने नानीथकु आफैंले पनि मन पराएर रोजेको डाक्टर गोदत्तप्रसाद कति कुराले चित्त बुझेन त ? मैले हेर्दा त डाक्टर गोदत्तप्रसाद सुरमानभन्दा सय गुणा वेस छन् । त्यही धन दौलत, मानमर्यादाको आँच, चहक महक, रवाफ रौनक देखेर भन्नुभएको होला, त्यस्ता बुढासुढा, कसैका पोइ, बाबु र वासनाका निम्ति बिहे गर्न खोज्ने बेवकुफलाई दिने कुरा मसंग गर्दै नगर्नोस् आमा । म त्यस्तो अवैधानिक विवाहको समर्थन कहिल्यै गर्दिनं ।

प्रश्नहरू:

क. माथिको अनुच्छेदमा सुरमान सुब्बा र गोदत्तप्रसादको चित्रण कसरी गरिएको छ ? लेख्नुहोस् ।

ख. आमा लतमाया र छोरा शिवनारानका विचारमा केकस्ता पुस्तागत भिन्नता पाइन्छ ? उपन्यासका आधारमा विश्लेषण गर्नुहोस् ।

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२०७२ प्र. नं. १४ 'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (२×५=१०)

"मलाई पनि थाहा छ युगको गति, स्वतन्त्रताको महत्त्व र मानव इच्छाको कुरा । तर म स्वतन्त्रताको नाउँमा जसले जोसँग जस्तो पनि प्रेम गरेर हिँडेको हेर्न चाहन्न । प्रेमको पनि महत्त्व हुन्छ, उसका निम्ति पनि फुक्का र बन्धनको लेखाजोखा हुन्छ, मापदण्ड हुन्छ, सीमारेखा हुन्छ, विधान हुन्छ, सुपात्र र कुपात्र हुन्छ । यी सब कुरालाई, बाटोलाई, तवरलाई नाघेर मानिस हिँड्न सक्तैन, पाउँदैन । त्यसैले जीवनमा अभिभावकहरू हुनु वेसै छ, यो सौभाग्यको कुरा हो र अभिभावकहरूले यस कुराको ख्याल विचार राम्ररी पुऱ्याउनुपर्छ" । शिवनारानले वडो गम्भीर भएर भने ।

"दाइले ठिक भन्नुभयो, म पनि दाइको यो विचारको स्वागत र समर्थन गर्दछु ।" पुननारानले हर्ष प्रकट गर्दै भने । शिवनारानले फेरि हर्षनारानलाई ताकेर भने- "अहिले तिमीले कसैकी स्वास्नी नवनेकी, प्रेमिका नवनेकी र वुढी तथा वच्ची भएर वेजोडा नभएकी जो कोही स्वास्नीमान्छेसित प्रेम गर्न सक्तछौ, ल्याउन सक्तछौ, यसमा म कत्ति विघ्नवाधा नगरीकन तिमीलाई पूरा स्वतन्त्रता दिन सक्तछु तर त्यसो नभइकन तिमीले कसैकी स्वास्नी, आमा, प्रेमिकालाई फकाएर वा उडाएर ल्यायौ भने त्यसलाई म प्रेम वा स्वतन्त्रता कहिल्यै भन्दिनं । त्यो सरासर वदमासी हो, चोरी हो, डकैती हो ।

प्रश्नहरू:

क. माथिका अनुच्छेदका आधारमा शिवनारानमा प्रेमसम्वन्धी केकस्तो दृष्टिकोण रहेको पाइन्छ ? लेख्नुहोस् ।

ख. माथिका अनुच्छेदमा मान्छेको केकस्तो स्वतन्त्रताको समर्थन र के कस्तो स्वतन्त्रताको विरोध गरिएको छ ? प्रष्ट पार्नुहोस् ।

१०. २०७० प्र. नं. १४ 'एक चिहान' उपन्यासका तल दिइएका अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् : (५+५=१०)

रञ्जनादेवीले सोधिन् - "तिमी विरामी भएर जँचाउन आएकी मानिस अगि किन डाक्टर साहेवसँग ख्यालठट्टा गरिरहेकी ? परपुरुषसित स्वास्नीमान्छेले त्यसरी ख्यालठट्टा गर्नु ठिक छ ? स्वास्नीमान्छेको इज्जत स्वास्नी मान्छेले नै राख्न जान्नुपर्दछ । यसरी सस्तो र खैराँती हुनुहुन्न नानीथकुँ !" रञ्जनादेवीले फेरि भनिन्- "त्यस्ता तीनओटा छोराछोरीका वावु, कपालमा जौ तिल पाकिसकेका वुढासित पनि तिमी जस्ती भरभराउँदी तरुनीले प्रेम गर्ने ? 'जात फ्याँक्नु गहतको झोलमा' भनेको यही हो ।"

प्रश्नहरू

क. रञ्जनादेवीले भने जस्तै किन स्वास्नीमान्छेको इज्जत स्वास्नीमान्छेले नै राख्न जान्नुपर्दछ ? तर्क दिई लेख्नुहोस् ।

ख. नानीथकुँले वुढो डाक्टरसित प्रेम गरेर के गहतकै झोलमा जात फ्याँकेकी हो ? उपन्यासका आधारमा स्पष्ट गर्नुहोस् ।

११. २०६९ प्र. नं. १४ 'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् : (५+५=१०)

"नारीको महत्त्व यो होइन कि नानीथकुँ ! कोही पुरुषप्रति पनि सम्वन्धै राख्न हुन्न, म त भन्दछु नारीको नारित्व नै कोही पुरुषलाई ग्रहण गर्नु हो, भिक्षुणी आदि हुनु त नपुँसक हुनु हो । प्रेम गरिसकेर यहाँसम्मको वन्दोबस्त गराइसकेर अहिले यस्तो कुरा गर्नु मेरा लागि त सरसर धोकै भयो" प्रभावपूर्ण भावमा डाक्टर गोदत्तप्रसादले भने । नानीथकुँलाई डाक्टर गोदत्तप्रसादमाथि माया वसिसकेको छ तर रञ्जनादेवीको भनाइ र आफ्ना दाजु शिवनारानको कुरामा नानीथकुँले सत्य देखिन् । त्यसैले नानीथकुँ दुवै प्रवल प्रभावको दोधारमा परी अल्मलिइ रहेकी छिन् वाल्ल परिरहेकी छिन् ।

प्रश्नहरू:

क. माथिको अनुच्छेदमा डाक्टर गोदत्तप्रसादको नारीप्रतिको केकस्तो दृष्टिकोण प्रस्तुत भएको छ ?

ख. नानीथकुँमा केकस्तो मानसिक विचलन आएको छ ? उपन्यासका आधारमा विश्लेषण गर्नुहोस् ।

■ साहित्यिक रचनाको पठनबोध (कविता, कथा र जीवनी)

(२×५=१० अङ्क)

क. कविता (५ अङ्क)

१. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १५क तलको कवितांश पढी अन्त्यमा सोधिएका प्रश्नहरूको एक दुई वाक्यमा उत्तर दिनुहोस् (५)

जहाँ
शीतल हावामा वुई चढेर
कस्तूरीको सुगन्ध डुल्दछ
जहाँ
एकवाजि आएर
घर फर्कन वसन्त भुल्दछ
जहाँ
वटुवालाई भन्ज्याङमा रोकेर
हिमाल पड्खा हम्कन्छ

प्रश्नहरू:

अ. नेपाली धरतीमा कस्तो हावा वहन्छ ?

आ. 'एकवाजि आएर घर फर्कन वसन्त भुल्दछ' भन्नुको तात्पर्य के हो ?

इ. हिमालको मुख्य विशेषता के हो ?

ई. यो कवितांश कुन कवितावाट लिइएको हो र यसका रचनाकार को हुन् ?

उ. 'सुगन्ध' र 'भन्ज्याङ' शव्दको अर्थ लेख्नुहोस् ।

२. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नको एक दुई वाक्यमा उत्तर दिनुहोस् : (५)

तिमी मेरो उत्पीडन वुझ्दैनौ
म तिम्रो उत्पीडन वुझ्छु
आऊ आज हामी उत्पीडनहरू साटासाट गरौं
हामी मानसिकताले एकाकार होऔं
हामी एकअर्काविना वाँच्न सक्ने प्राणी होइनौं
म तिम्रो हात दह्रो गरी समाउँछु
तिमी मलाई तिमी पुगेको ठाउँसम्म पुऱ्याऊ
त्यहाँ, जहाँ तिमीलाई मैले
सभ्यताको आदिमकालमा पुऱ्याइसकेकी थिएं ।

प्रश्नहरू:

अ. यस कवितांशमा 'तिमी' र 'म' ले क-कसलाई सङ्केत गरेका छन् ?

आ. 'तिमी मेरो उत्पीडन वुझ्दैनौ' भनी कसलाई भनिएको हो ?

इ. उत्पीडनहरू किन साटासाट गरिनुपर्दछ ?
ई. नारी र पुरुषबीचको सहयात्रा किन आवश्यक छ ?
उ. तिमीलाई मैले सभ्यताको आदिमकालमा पुऱ्याइसकेकी थिएँ भन्नुको तात्पर्य के हो ?

३. २०७६ प्र.नं. १५क तलको कवितांश पढी अन्त्यमा सोधिएका प्रश्नको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

आकाश छुने टाकुरा हाम्रो भेटेर भेटिन्न
पौरखी हाम्रा पुर्खाको पाइला मेटेर मेटिन्न
विम्फौंला कहां पूर्वको पैलो उज्यालो नरहे
नेपाली हामी रहौंला कहां नेपालै नरहे ।

प्रश्नहरू:

अ. आकाश छुने टाकुराले केलाई सङ्केत गर्दछ ?
आ. पुर्खाको पाइला किन मेटिन्न ?
इ. पूर्वको पहिलो उज्यालोले कुन कुराको बोध गराउँछ ?
ई. नेपाल नरहे हामी नेपाली किन रहँदैनौं ?
उ. यस कवितांशको मूलभाव के हो ?

४. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. १५क तलको कवितांश पढी सोधिएका प्रश्नको छोटो उत्तर दिनुहोस् : (५)

चियाको किल्ली जस्तै भकभकी उम्लिरहेको दुःखी मन अनि
रक्सीका बोतलहरूसित रित्तिरहेको बैंसालु यौवनलाई
विवशताका भोका थाली र कचौराहरूमा पस्केर
सन्तप्त मुस्कानहरूले उदासी बाँडि रहिछ
कान्छी भट्टी थापि रहिछ ।

प्रश्नहरू:

अ. 'सन्तप्त मुस्कानहरूको उदासी बाँडि रहिछ' भन्नको तात्पर्य के हो ?
आ. कान्छीको मन किन चियाको किल्ली जस्तै भकभकी उम्लिरहेको हो ?
इ. कान्छीको माध्यमबाट कविले कुन वर्गको चित्रण गरेका छन् ?
ई. कान्छीले भोग्नु परेको विवशता के हो ?
उ. यस कवितांशको मूलभाव के हो ?

५. २०७५ सेट A प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् । (५)

भोक यदि देश हो भने
हर्क बहादुरभन्दा सुकिलो अर्को देश हुन सक्तैन ।
शोक यदि देश हो भने
हर्क बहादुरभन्दा ठूलो अर्को देश हुन सक्तैन ।

प्रश्नहरू:

अ. 'भोक यदि देश हो भने' भन्नुको तात्पर्य के हो ?
आ. हर्क बहादुर किन सुकिलो छ ?
इ. शोकलाई किन देश भनेको हो ?
ई. यस कवितांशको मूलभाव के हो ?
उ. हर्क बहादुर र देशमा के समानता छ ?

६. २०७५ सेट B प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नको एक, दुई वाक्यमा उत्तर लेख्नुहोस् :

तराई हाम्रो सुनको टुक्रा हिमाल हिमाको
माटो र पानी पहिलो धन धर्तीका छोराको
ए कहाँबाट हरौंला संसार सन्भ्यालै नरहे
नेपाली हामी रहौला कहाँ नेपालै नरहे ।

प्रश्नहरू:

अ. तराईलाई 'सुनको टुक्रा' किन भनिएको हो ?
आ. धर्तीका छोरा को हुन् ?
इ. माटो र पानीलाई धन मान्नुको कारण के हो ?
ई. हामी नेपाली भइ रहन के चाहिन्छ ?
उ. उपयुक्त कवितांशको मुल आशय के हो ?

७. २०७४ पूरक प्र. नं. १५क तलको कवितांश पढी अन्त्यमा सोधिएका प्रश्नको छोटो उत्तर दिनुहोस् । (५)

शताब्दी शताब्दीअघि
झगडालु, ईर्ष्यालु वन मानुष तिमिलाई
माया र सहअस्तित्वको अँगालोमा बाँधी
आफ्नो ओडारको छानुमुनि भित्र्याएकी थिएँ
जसरी आज तिमी
दाइजोको लावालस्करसंग घुम्टोभित्र लुकाई
पशुलाई जस्तै रुवाउँदै भित्र्याउने गर्छौं
त्यसैले तिमी यति विमुख नहोऊ ।

प्रश्नहरू:

अ. शताब्दी अघि पुरुष कस्ता थिए ?
आ. 'माया र सहअस्तित्वको अँगालोमा बाँधी' भन्नुको तात्पर्य के
इ. आजका पुरुष कस्ता छन् ?
ई. यहाँ पुरुषलाई विमुख नहुन किन आग्रह गरिएको हो ?
उ. यस कवितांशको मूल आशय के हो ?

८. २०७४ प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (५)

हर्कबहादुरको देश छैन
हर्कबहादुर हरिऔनको बासिन्दा मात्र पनि होइन
ऊ तपाईंको गाउँमा/सहरमा देशमा पनि भेटिन सक्छ
जित बहादुर पनि हर्कबहादुर हो
भीम प्रसाद पनि हर्कबहादुर हो
हर्कबहादुर एकलव्यको नयाँ संस्करण हो ।
सलाम !

प्रश्नहरू:

अ. "हर्कबहादुरको देश छैन" भन्नाको कारण के हो ?
आ. हर्कबहादुर गाउँ, सहर सबैतिर किन भेटिन सक्छ ?
इ. हर्कबहादुर एकलव्यको नयाँ संस्करण किन भनिएको होला ?
ई. हर्कबहादुरलाई कविले सलाम गर्नाको कारण के हो ?
उ. यस कवितांशको मूल अभिप्राय के हो ?

९. २०७३ पूरक प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

चियाको किल्लीजस्तै भकभकी उम्लिरहेको दुःखी मन अनि
रक्सीका बोतलहरूसित रित्तिरहेको बैंसालु यौवनलाई
विवशताका भोका थाली र कचौराहरूमा पस्केर
सन्तप्त मुस्कानहरूले उदासी बाँडिरहिछ
कान्छी भट्टी थापिरहिछ ।

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प्रश्नहरू:

अ 'मन्तप्त मुस्कानहरूले उदासी वाडिरहिछ' भन्नुको तात्पर्य के हो ?

आ कान्छीको मन किन चियाको कित्लीजस्तै भकभकी उम्लिरहेको छ ?

इ कान्छीका माध्यमबाट कविले कुन वर्गको चित्रण गरेका छन् ?

ई कान्छीले भोग्नुपरेको विवषता के हो ?

उ यस कविताशको मूलभाव के हो ?

१०. २०७३ प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको एक दुई वाक्यमा उत्तर दिनुहोस् : (५)

जहां
शीतल हावामा वुई चढेर
कस्तूरीको सुगन्ध डुल्दछ
जहां
एकवाजि आएर
घरफर्कन वसन्त भुल्दछ
जहां
वटुवालाई भन्ज्याङमा रोकेर
हिमाल पड्खा हम्कन्छ
जहां
एकअर्काको मुख हेरेर
नीलगिरि र धवलागिरि चम्कन्छ ।

प्रश्नहरू :

अ. 'शीतल हावामा वुई चढेर कस्तूरीको सुगन्ध डुल्दछ' भन्ने पङ्क्तिवाट के कुराको सङ्केत पाइन्छ ?

आ. वसन्त किन भर फर्कन भुल्दछ ?

इ. हिमालले कसलाई कसरी पड्खा हम्कन्छ ?

ई. 'एकअर्काको मुख हेरेर नीलगिरि र धवलागिरि चम्कन्छ' भन्नुको तात्पर्य के हो ?

उ. माथिको कवितांशको मूल आशय के हो ?

११. २०७२ पूरक प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको छोटो उत्तर दिनुहोस् : (५)

आकाश छुने टाकुरा हाम्रो भेटेर भेटिन्न
पौरखी हाम्रा पुर्खाको पाइला मेटेर मेटिन्न
विम्फौंला कहां पूर्वको पैलो उज्यालै नरहे
नेपाली हामी रहौंला कहां नेपालै नरहे ।

प्रश्नहरू :

अ. "आकाश छुने टाकुरा" भन्नुको तात्पर्य के हो ?

आ. पुर्खाका पाइलाहरूलाई किन मेट्न सकिन्न ?

इ. सवै विउँझनका लागि के हुनुपर्दछ ?

ई. 'पूर्वको उज्यालो' भनाइको तात्पर्य के हो ?

उ. कवितांशमा नेपाल र नेपालीको कस्तो सम्वन्ध देखाइएको छ ?

१२. २०७२ प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

शताव्दी शताव्दीअघि
झगडालु, ईर्ष्यालु वन मानुष तिमीलाई
माया र सहअस्तित्वको अँगालोमा वाँधी
आफ्नो ओडारको छानुमुनि भित्र्याएकी थिएँ
जसरी आज तिमी
दाइजोको लावालस्करसंग घुम्टोभित्र लुकाई
पशुलाई जस्तै रुवाउँदै भित्र्याउने गर्छौ
त्यसैले तिमी यति विमुख नहोऊ ।

प्रश्नहरू:

अ. शताव्दीअगि पुरुष कस्ता थिए ?

आ. 'माया र सहअस्तित्वको अँगालोमा वाँधी' भन्नुको तात्पर्य के हो ?

इ. आजका पुरुष कस्ता छन् ?

ई. यहाँ तिमी अर्थात् पुरुषलाई किन विमुख नहुन अनुरोध गरिएको हो ?

उ. यस कवितांशको मूल आशय के हो ?

१३. २०७२ सेट E प्र. नं. १५ तलको कवितांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

भट्टीमा भात पाकिरहेछ
भातसंगसंगै कान्छीको लाज पाकिरहेछ
भट्टीमा मासु पाकिरहेछ,
मासुसंगसंगै कान्छीको आँसु पाकिरहेछ
भट्टीमा रक्सी विकिरहेछ,
रक्सीसंगसंगै कान्छीको श्री विकिरहेछ ।

प्रश्नहरू:

अ. 'भातसंगसंगै कान्छीको लाज पाकिरहेछ' भन्नुको तात्पर्य के हो ?

आ. कान्छीको आँसु किन पाकिरहेछ ?

इ. कान्छीको श्री कसरी विकीरहेछ ?

ई. यहाँ कान्छीको कस्तो अवस्था चित्रण गरिएको हो ?

उ. 'श्री' को अर्थ के हो ?

१४. २०७१ पूरक प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

सायद हर्कवहादुर
मनहरूमा कोलम्वस पनि वाँच्छ-
कि, मान्छेको प्रयोगमा आउनुभन्दा पर
वस्तुको अर्को ठूलो उपयोगिता छैन भने
वटुलेर संसारभरिका झण्डाहरू
लुगा सिउँदा
- हरेकलाई कछाड पुग्छ
- हरेकलाई मजेत्रो पुग्छ
झन्डा-मान्छेको परिचय होइन
मान्छे स्वयम्मा परिचित इतिहास हुन्छ
मान्छे स्वयम्मा परिलक्षित आकाश हुन्छ ।

प्रश्नहरू :

अ. "मनहरूमा कोलम्वस पनि वाँच्छ" भन्नुको तात्पर्य के हो ?

आ. वस्तुको उपयोगिता केमा छ ?

इ. संसारभरिका झन्डाहरू वटुलेर केके सिउन सकिन्छ ?

ई. झन्डा किन मान्छेको परिचय हुन नसकेको हो ?

उ. यस कवितांशको मूलभाव के हो ?

१५. २०७१ प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

जहाँ हरिया हरिया पहाडका फरिया
अलिक तल सारेर
निर्मल, स्वच्छ र न्यायो घाममा
हिमालले सधैं ढाड सेकेको हुन्छ
म जति टाढा भए पनि त्यो मेरो देश
सधैं मेरो मनले
सपनामा पाइला टेकेको हुन्छ ।

प्रश्नहरू:

अ. यो कवितांश कुन कवितासंग सम्बन्धित छ र यहाँ केकुराको चित्रण गरिएको छ ?
आ. पहाडले हरियो फरिया लगाउनु भनेको के हो ?
इ. 'हिमालले सधैं ढाड सेकेको हुन्छ' भन्नुको तात्पर्य के हो ?
ई. मनले सपनामा पाइला टेक्नु भनेको के हो ?
उ. यस अंशको मूलभाव के हो ?

१६. २०७० प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

जहाँ शीतल हावामा वुई चढेर
कस्तूरीको सुगन्ध डुल्दछ
जहाँ
एकवाजि आएर
घरफर्कन वसन्त भुल्दछ
जहाँ
वटुवालाई भन्ज्याङमा रोकेर
हिमाल पङ्खा हम्कन्छ

प्रश्नहरू:

अ. कस्तूरीको सुगन्ध कसरी डुल्दछ ?
आ. 'घर फर्कन वसन्त भुल्दछ' भन्नुको तात्पर्य के हो ?
इ. 'हिमालले पङ्खा हम्कन्छ' भन्नाले के बुझिन्छ ?
ई. माथिको कवितांशमा नेपालको केकस्तो महत्त्व दर्साइएको छ ?
उ. यस कवितांशको मूल आशय के हो ?

१७. २०६९ प्र. नं. १५क तलको कवितांश पढी सोधिएका प्रश्नहरूको एक दुई वाक्यमा उत्तर दिनुहोस् : (५)

भट्टीमा भात पाकिरहेछ
भातसंगसंगै कान्छीको लाज पाकिरहेछ
भट्टीमा मासु पाकिरहेछ
मासु संगसंगै कान्छीको आँसु पाकिरहेछ
भट्टीमा रक्सी विकिरहेछ
रक्सीसंगसंगै कान्छीको श्री विकिरहेछ ।

प्रश्नहरू:

अ. यस कवितांशको मूलभाव के हो ?
आ. नारीको पीडालाई आधुनिक भट्टीहरूले कसरी पकाइरहेका छन् ?
इ. कान्छीको श्री किन विकेको हो ?
ई. यस अनुच्छेदले कान्छीको कस्तो अवस्थाको चित्रण गरेको छ ?
उ. 'श्री' को अर्थ के हो ?

ख. कथा (५ अङ्क)

१. २०७७ सेट H प्र. नं. ११ तल दिइएको कथांश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (५)

एक रात कृष्ण राय खाईपिई सुत्ने यत्न गरिहेका थिए । तिनको मनमा धेरै प्रकारका विचार आउन थाले । तिनको जीवन कसैमा असफल भन्न सक्तैन । सानोतिनो पूंजी पनि कमाइहालेका थिए । रूपियां जम्मा गर्दा अरूहरूले गरे जस्तो रैतीहरूलाई पिरो पनि पारेनन् । तिनको कोही वैरी थिएन, यही तिनको सन्तोषको ठूलो कारण थियो । ४५ वर्षको यत्रो लामो जीवनमा तिनले कसैलाई आफ्नो शत्रु बनाएनन् ।

प्रश्नहरू:

अ. कृष्ण रायलाई आफ्नो जीवन किन सफल लागेको होला ?
आ. कृष्ण रायले कसरी पूंजी जोडेका थिए ?
इ. कृष्ण रायको सन्तोषको कारण के थियो ?
ई. कृष्ण रायलाई आफ्ना शत्रु कोही पनि छैनन् भन्ने किन लागेको हो ?
उ. यस कथांशको मुख्य सन्देश के हो ?

२. २०७७ सेट I प्र. नं. ११ तलको प्रश्नको उत्तर दिनुहोस् : (५)

यस्तै हो, मैले पनि सहर वसि दिएको भए किन झगडा हुन्थ्यो ? एउटै सिरान गरेर सुतेपछि कहिलेकाहीं गोडा लाग्छ नाई, झगडा भो भन्दैमा धर्म छाड्नुहुन्छ ? आफूले सांचो मनले उपकार गरेपछि उसको आत्माले पनि गर्न कर लाउंछ । अमृत रोपेको ठाउँमा विष फलेको कतै सुनेका छौ ? माटोको भर ढुङ्गो, ढुङ्गाको भर माटो, संसार भरैभरमा अडेको छ ।

प्रश्नहरू:

अ. यो भनाइ कसको हो ?
आ. 'एउटै सिरान गरेर सुतेपछि कहिलेकाहीं गोडा लाग्छ नाई' भन्नुको तात्पर्य के हो ?
इ. झगडा भो भन्दैमा किन धर्म छाड्नुहुन्न ?
ई. 'संसार भरैभरमा अडेको छ' यस भनाइको आशय के हो ?
उ. माथिको भनाइ कुन सन्दर्भमा आएको हो ?

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १५ख तलको कथांश पढी अन्त्यमा सोधिएका प्रश्नहरूको एक दुई वाक्यमा उत्तर दिनुहोस् : 'व्यर्थैमा हामीले वारी गर्ने भएर यो आपद् वेसाएको' उसको मनमा लाग्दै आयो-नत्र सुखसंग वजारमै वसेका थियौं । महिना मर्नासाथ तलव पाउँथ्यो, सुरुवुरु पुगेकै थियो । केटाकेटीलाई स्कुल जान नजिक, पानी भर्न जानलाई सिकसिको थिएन, सडक सजिलो राम्रो, न हावाको डर न पहिरोको डर । वित्थैमा नदुखेको कपाल वारी लिने भएर दुखाएको

प्रश्नहरू:

अ. यो भनाइ कसको हो ?
आ. वारी गर्नुलाई किन आपद् वेसाएको भनिएको हो ?
इ. वजारको वसाइ कसरी सुखद हुन्छ ?
ई. 'महिना मर्नासाथ तलव पाउँथ्यो' भन्ने कथनले कुन कुराको सङ्केत गरेको छ ?
उ. यस कथांशको मूल भाव के हो ?

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२०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १५ग तलको कथांश पढी सोधिएका प्रश्नहरूको एक दुई वाक्यमा उत्तर दिनुहोस् : (५)

यस्तै हो, मैले पनि महँर बसिदिएको भए किन झगडा हुन्थ्यो ? एउटै सिरान गरेर सुतेपछि कहिलेकाहीं गोडा लाग्छ नाई, झगडा भो भन्दैमा धर्म छाड्नु हुन्छ ? आफूले साँचो मनले उपकार गरेपछि उसको आत्माले पनि गर्न कर लाउँछ । अमृत रोपेको ठाउँमा विष फलेको कतै सुनेका छौं । माटाको भर ढुङ्गा ? ढुङ्गाको भर माटो, संसार भरैभरमा अडेको छ ।

प्रश्नहरू:

अ. यो भनाइ कसको हो ?

आ. झगडाको कारण के देखिन्छ ?

इ. झगडा भो भन्दैमा किन धर्म छाड्नुहुन्न ?

ई. 'संसार भरैभरमा अडेको छ' भन्नुको तात्पर्य के हो ?

उ. यस कथांशको मुख्य सार के हो ?

५. २०७६ प्र.नं. १५ख तल दिइएको कथांश पढी अन्त्यमा सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर लेख्नुहोस् : (५)

आपद् विपद् जहाँ पनि छ । हो, हुरीले विगाऱ्यो तर अब सबै ठिक बनाइहाल्छौं । कुनै नसकिने काम होइन त्यति गर्न । आफ्नो घर छ, गोठ छ, गोठमा गाईहरू छन्, बारी छ, बारीमा तिस चालिस झ्याउ बाँसहरू छन्, गगुन र नेभाराका रुखहरू छन्, कांक्राको लहरा आकाशतिर जादैछ ... हुरीले कति पो विगार्न सक्छ र ? इः अब गएर बनाइहाल्नुपर्छ ।

प्रश्नहरू:

अ. यो अंश कुन कथाबाट लिइएको हो र यसका लेखक को हुन् ?

आ. यो भनाइ कसको हो ?

इ. 'आपद् विपद् जहाँ पनि छ' भन्नुको तात्पर्य के हो ?

ई. यस भनाइमा के-कस्तो दृष्टिकोण प्रस्तुत भएको छ ?

उ. यो भनाइ कुन सन्दर्भमा आएको हो ?

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. १५ख तल दिइएको कथांश पढी अन्त्यमा सोधिएका प्रश्नको उत्तर दिनुहोस् : (५)

कृष्ण राय जुर्मुरिदै उठे, तवसम्म आक्रमणकारी भागिसकेको थियो । 'मलाई कसले यसरी आक्रमण गऱ्यो होला ?' तिनी विचार गर्न थाले 'यस जीवनमा मैले कसैलाई आफ्नो शत्रु बनाइनँ, झगडा फसादमा रहिनँ । कृष्ण रायलाई पहिले त कसैले आक्रमण गरेको हो भन्ने कुरामा विश्वास भएन, सब तन्द्रा अवस्थामा भ्रमजस्तो लाग्यो तर भित्तामा लागेर भाँचिएको लठ्ठीको टुक्रा त भ्रम हुन सक्तैन । कृष्ण रायले विछ्यौनाबाट निहुरीकन त्यस टुक्रालाई टिपे, हेरेर गम्न थाले 'को मेरो शत्रु हुन सक्छ ?'

प्रश्नहरू:

अ. यस कथांशभन्दा पहिलाको कथा सन्दर्भ के रहेको छ ?

आ. कृष्ण राय आफूमाथि कसैले आक्रमण गर्न नसक्ने आधार केलाई मान्थे ?

इ. कृष्ण रायलाई आक्रमण भएको प्रमाण के देखिन्छ ?

ई. कृष्ण राय कस्तो चरित्र भएका व्यक्तिका रूपमा देखिएका छन् ?

उ. कृष्ण रायलाई के कुरा तन्द्रा अवस्थाको भ्रम जस्तो लाग्यो ?

७. २०७५ सेट A प्र. नं. १५ग तलको कथांश पढी सोधिएका प्रश्नहरूको छोटो छरितो उत्तर दिनुहोस् । (५)

घटनालाई विर्सने प्रयत्न गर्दै कृष्ण राय निदाउने निहुँले विछ्यौनामा वहुड लडे । शत्रुताको पनि कस्तो व्यापक सम्बन्ध रहेछ ? दुनियाँमा कोही पनि मित्र हुँदैनन् सबै शत्रु, सबै वैरी नै हुन्छन् । कसले भन्छ अकारण नै कोही शत्रु हुँदैन ? मानौं, अकारण कोही कसैको शत्रु हुँदैन, तर 'झगडाको निहुं कति सजिलै पाइन्छ ? कृष्ण रायले धेरैसंग सङ्गत गरेनन् तर जतिसंग गरे सबैलाई तिनीसंग 'बाप वैरी साध्ने' कुनै न कुनै निहुं दिए । कस्तो अचम्म, निर्दोष कुरामा पनि विषालु साँप जस्तो वैरी बनाउने साधन लुकी रहेको देखिन्छ ।

प्रश्नहरू:

अ. कृष्ण रायलाई सबै शत्रु हुन्छन् भन्ने किन लागेको हो ?

आ. शत्रु हुनका लागि के चाहिन्छ ?

इ. कृष्ण रायले शत्रुका सम्बन्धमा कस्तो दृष्टिकोण लिएका छन् ?

ई. 'निर्दोष कुरामा पनि विषालु साँप जस्तो वैरी बनाउने साधन लुकिरहेको देखिन्छ' भन्नुको तात्पर्य के हो ?

उ. उपर्युक्त अनुच्छेदमा कृष्ण रायको कस्तो मानसिकताको चित्रण गरिएको छ ?

८. २०७५ सेट B प्र. नं. १५ख तलको कथांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर लेख्नुहोस् :

"तिमी जाऊ, केटाकेटीलाई उठाऊ ।" वृष्टिको आवाजलाई उछिनेर उसले स्वास्नीलाई अन्हायो । स्वास्नी गएपछि टर्च मारेर ऊ दैलोमा उभि रह्यो, हेरि रह्यो .....

प्रश्नहरू:

अ. "तिमी जाऊ, केटाकेटीलाई उठाऊ ।" कसले कसलाई भनेको हो ?

आ. केटाकेटीलाई किन उठाउनु परेको हो ?

इ. उसले दैलोमा उभिएर हेरि रहनुको कारण के हो ?

ई. उपयुक्त कथांशको लगत्तै पहिले के भएको थियो ?

उ. माथिको कथांश प्रयोग भएको कथाको शीर्षक र कथाकारको नाम लेख्नुहोस् ।

९. २०७४ पूरक प्र. नं. १५ख तल दिइएको कथांश पढी अन्त्यमा सोधिएका प्रश्नको छोटो उत्तर दिनुहोस् : (५)

"शङ्कर ! यो क्या छोटाहरूको छिमेक रे । हाम्री दिदी आमाले भन्या । यहाँका छोटाहरूको सङ्गले म बिग्रिएँ रे क्या ! त्यसैले हामी घर सरेको । हो अब म आउन्नँ । तिमी पनि नआउने हाम्रो घरमा ? ऊ पर मधेसमा ।"

प्रश्नहरू:

अ. यस कथांशका वक्ता र श्रोता को को हुन् ?

आ. 'यो क्या छोटाहरूको छिमेक रे !' भन्नुको तात्पर्य के हो ?

इ. यस कथांशमा रहेको म पात्र बिग्रिनुको कारण के हो ?

ई. म पात्र घर सरेको ठाउँ कहाँ हो ?

उ. यस कथांशमा के कस्तो सामाजिक परिवेशको चित्रण गरिएको छ ?

१०. २०७४ प्र. नं. १५ख तलको कथांश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (५)

"....शङ्कर ! यो क्या, छोटाहरूको छिमेक रे ! हाम्री दिदीआमाले भन्या । यहाँका छोटाहरूले सङ्गतले म बिग्रिएँ रे क्या ! त्यसैले

हामी घर सरेको । ... हो, साँच्ची, अब म आउन्ँ । तिमी पनि नहाउने हाम्रो घरमा ! उ पर मधेसमा ।"

प्रश्नहरू:

अ. माथिको कथांश कुन पाठवाट लिइएको हो र यसका लेखक को हुन् ?

आ. यो भनाई कसको हो र कुन सन्दर्भमा आएको हो ?

इ. यहां छोटा भनेर कसलाई भन्न खोजिएको छ ?

ई. यस कथांशले नेपाली समाजको कस्तो अवस्थालाई सङ्केत गर्दछ ?

उ. यस कथांशको मूल आशय के हो ?

११. २०७३ प्र. नं. १५ख तलको कथांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यामा उत्तर दिनुहोस् : (५)

'व्यर्थैमा हामीले वारी गर्ने भएर यो आपद् वेसाएको' उसको मनमा लाग्दै आयो-नत्र सुखसंग वजारमै वसेका थियौं । महिना मनांसाथ तलव पाउंथ्यो, सुरुवुरु पुगंकै थियो । केटाकेटीलाई स्कुल जान नजिक, पानी भर्न जानलाई सिकसिको थिएन, सडक सजिलो राम्रो, न हावाको डर न पहिरोको डर । वित्थैमा नदुखेको कपाल वारी लिने भएर दुखाएको ..... ।

प्रश्नहरू:

अ. माथिको कथांश कसको भनाइका रूपमा आएको छ ?

आ. यहां वक्ताले कुल कारणवाट आपद् वेसाएको अनुभूति गरेको छ ?

इ. वजारको वसाई कसरी सुविधाजनक हुन सक्छ ?

ई. 'वित्थैमा नदुखेको कपाल वारी लिने भएर दुखाएको' भन्नुको तात्पर्य के हो ?

उ. यस कथांशको मूलभाव के हो ?

१२. २०७२ पूरक प्र. नं. १५ख तलको कथांश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (५)

महतो वोलेनन् । गृहस्थीको वातावरणको यस्तो मूक विरोध उनको धेरै दिनदेखिको परिचित थियो । तर यसरी चुप लागेको सहनै नसकी महतिनीले फेरि मुख उघार्नुपऱ्यो भनिदिए है, नकच्चरा नकच्चरीको कुरामा हामीलाई पर्नु छैन मेरा पनि छोराछोरी छन्, वुहारी नाति छन् । कसैको दुस्मनी हामीले किन्नु वेसाहा गर्नुपर्ने कुनै काम छैन ।

प्रश्नहरू:

अ. कथामा यो घटना कुन प्रसङ्गमा आएको हो ?

आ. 'दुस्मनी वेसाहा गर्नु' भनेको के हो ?

इ. कथांशको 'नकच्चरा नकच्चरीले ककसलाई सङ्केत गरेको छ ?

ई. महतिनीले महतोको कुनकुराको विरोध गरेकी हुन् ?

उ. कथांशमा महतो कस्ता चरित्रका मानिस देखिन्छन् ?

१३. २०७२ प्र. नं. १५ख तलको कथांशक पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

किसानहरू सवै कुरा सहन सक्छन् परन्तु वस्तुलाई अर्कोले दाया छाडेर कुटेको सहन सक्दैनन् । विउवाट धपाइन्जेल त गुमाने केही वोलेको थिएन, परन्तु जव कुट्न लाग्यो अनि गुमानेको रिसको सीमा रहेन । असार महिनाका दिनभर जोत्नुपर्ने गोरु, उसमाथि पसेको मात्र थिए, उति नोक्सान गरेका थिएनन् । जुरुक्क उठेर भन्यो- "विउ नोक्सानी गरेको छ भने अर्मल ले, असारका गोर किन कुट्छस् ए धनजिते !"

प्रश्नहरू:

अ. माथिको कथांश कुन कथाको कुन सन्दर्भमा आएको हो ?

आ. किसानहरूको स्वभाव कस्तो हुन्छ ?

इ. गुमानेलाई रिस उठ्नाको मुख्य कारण के हो ?

ई. असार महिनामा किन गोरुको विशेष महत्त्व हुन्छ ?

उ. यस प्रसङ्गभन्दा पछाडि लगतै कुन कथा सम्म आउंछ ?

१४. २०७२ सेट E प्र. नं. १५ख तलको कथांश पढी सोधिएका प्रश्नको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

आपद्विपद् जहां पनि छ । हो हुरीले विगाऱ्यो तर अव सवै ठीक वनाइहाल्छौं, कुनै नसकिने काम होइन त्यति गर्न । आफ्नो घर गोठ छ, गोठमा गाईहरू छन्, वारी छ, वारीमा तीस चालीस भ्याङ्ग वांसहरू छन्, गगुन र नेभाराका रुखहरू छन्, कांक्रा लहरा आकाशतिर जादै छ, हुरीले हुरीले कति पो विगार्न सक्यो र ! इः, अव गएर वनाइहाल्नु पर्छ ।

प्रश्नहरू:

अ. यो भनाइ कसको हो ?

आ. 'आपद्विपद् जहां पनि छ' भन्नुको तात्पर्य के हो ?

इ. यस उद्धरणमा के कस्तो आशावादी दृष्टिकोण प्रस्तुत भएको छ ?

ई. यस कथांशले कस्तो परिवेश प्रस्तुत गरेको छ ?

उ. यस कथांशको मुख्य आशय के हो ?

१५. २०७१ पूरक प्र. नं. १५ख तलको कथांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

यस्तै हो, मैले पनि सहर वसिदिएको भए किन झगडा हुन्थ्यो ? एउटै सिरान गरेर सुतेपछि कहिलेकाहीं गोडा लाग्नै नाई, झगडा भो भन्दैमा धर्म छोड्नुहुन्छ ? आफूले सांचो मनले उपकार गरेपछि उसको आत्माले पनि गर्न कर लाउंछ । अर्काको रोपेको ठाउंमा विष फलेको कतै सुनेका छौ ? माटाको भाँडो ढुङ्गो, ढुङ्गाको भर माटो, संसार भरै भरमा अडेको छ ।

प्रश्नहरू:

अ. यो भनाइ कसको हो ?

आ. यहां झगडाको कारण के देखिन्छ ?

इ. झगडा भो भन्दैमा किन धर्म छाड्नुहुन्न ?

ई. "संसार भरैभरमा अडेको छ" भन्नुको तात्पर्य के हो ?

उ. यस कथांशको मूल आशय के हो ?

१६. २०७१ प्र. नं. १५ख तलको कथांश पढी सोधिएका प्रश्नको एक दुई वाक्यमा उत्तर दिनुहोस् : (५)

शत्रुताको पनि कस्तो व्यापक सम्वन्ध रहेछ ? दुनियांमा कोही पनि मित्र हुदैनन्, सवै शत्रु, सवै वैरी नै हुन्छन् । कस्तो अचम्म निर्दोष कुरामा पनि विषालु साप जस्तो वैरी वनाउने साप लुकिरहेको देखिन्छ ।

प्रश्नहरू:

अ. यस अंशमा भनिएको घटना कसको जीवनमा घटेको हो ?

आ. शत्रुताको सम्वन्ध किन व्यापक हुन्छ ?

इ. दुनियांमा किन शत्रु मात्र हुन्छन् भनिएको हो ?

ई. 'निर्दोष कुरामा पनि विषालु सांप जस्तो वैरी वनाउने साप लुकिरहेको हुन्छ' भन्नुको तात्पर्य के हो ?

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उ आफूलाई अजात शत्रु ठान्ने यस कथांशका पात्रले पछि किन सबैलाई शत्रु ठान्न पुगे ?

७. २०७० प्र. नं. १५ख तलको कथांश पढी सोधिएका प्रश्नको एक, दुई वाक्यमा उत्तर दिनुहोस् (५)

किसानहरू सबै कुरा सहन सक्छन् परन्तु वस्तुलाई अर्काले दया छोडेर कुटेको सहन सक्दैनन् । बिउवाट धपाइन्जेल त गुमाने केही बोलेको थिएन, परन्तु जब कुट्न लाग्यो अनि गुमानेको रिसको सीमा रहेन । असार महिनाका दिनभर जोत्नुपर्ने गोरु, उसमाथि पसेका मात्र थिए, उति नोक्सान गरेका थिएनन् । जुरुक्क उठेर भन्यो- "बिउ नोक्सानी गरेको छ भने अर्मल ले, असारका गोरु किन कुट्छस् ए धनजिते !"

प्रश्नहरू

अ किसानहरू किन आफ्ना वस्तुलाई अर्काले कुटेको सहन सक्दैनन् ?

आ. गुमानेको रिसको सीमा किन रहेन ?

इ. गुमाने र धनजितेका बीच झगडा हुनाको कारण के हो ?

ई. असारका गोरु किन कुट्नुहुदैन ?

उ 'सीमा' र 'अर्मल' शब्दको अर्थ लेख्नुहोस् ।

८. २०६९ प्र. नं. १५ख तलको कथांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

नभन्दै त्यसको भोलिपल्ट बेलुकी आमाले मेरो हातमा घोडा ल्याएर दिनुभयो- सानोसानो निरपानी रङ्गको सुन्दर वायुपङ्खी घोडा तर प्लाष्टिकको । मेरो मन केही खिस्रिक्क भयो । ख्याल ख्यालको गौरीसँग बाइस्कल नै छ नि । तर तत्काल मेरो मनमा अभिमान आयो- कहाँको घोडा कहाँ त्यस्तो जाबो बाइस्कल । अब रह्यो साँच्चिको र ख्यालख्यालको, साँच्चिको घोडा त ऊ त्यो बादलमाथिको घरमा पो छ, जसलाई म भोलिपर्सि ठूलो भएपछि गएर ल्याउँछु । अहिले त म केटाकेटी न छु, यसले भइहाल्छ नि ।

प्रश्नहरू

अ. घोडा किन्ने परिस्थिति सृजना हुनाको कारण के हो ?

आ. आमाले घोडा कोमार्फत् कसलाई झिकाइदिनुभएको हो ?

इ. गौरी र शङ्करसँग कुनकुन खेलौना छन् ?

ई. बादलमाथिको घोडा ल्याउनु भनेको के हो ?

उ. यहाँ गौरी र शङ्करको बीच के कस्तो भिन्नता देखाइएको छ ?

ग. निबन्ध (५ अङ्क)

१. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १५ग तलको निवन्धांश पढी अन्त्यमा सोधिएका प्रश्नहरूको एक दुई वाक्यमा उत्तर दिनुहोस् (५)

नोटको भाउ बढेको भए तापनि आजकल भलादमीपन यस्तो मोलमा पाइन्छ । भलादमीपनलाई सूचीकार र मारवाडीले बिक्री गरिरहेछन् । तिमी भलादमी बन्न चाहन्छौ भने सिधासाधा मानिसको कोरापनलाई दर्जीकहाँ गएर काँटछाँट गरी माग । दुईचार रुपियाँ बढाइदेऊ तब तिमी कुँदिएको पानीदार हिरा बन्दछौ । छाँट मिलेको कोट पहिरेर, एक छरितो छडी घुमाएर सडकमा टल्कने जुत्ताको चुरुमचुरुम आवाजमा फुर्तिलो कदम बढाऊ तब गल्लीको कुकुरले पनि तिमीलाई चिन्दछ । तिम्रो भलादमीपन स्वीकार गरेर तिमी उपर भुक्न आउँदैन । चोरीको शङ्काले सम्बोधन गर्नु भलादमीको अपमान हो । उसले पनि जानेको छ । सफलताजस्तो हौसला दिने कोही छैन । तिमी झन् फुर्तिलो कदम बढाउँछौ ।

प्रश्नहरू

अ. आजकल भलादमीपन किन सस्तो मोलमा पाइन्छ ?

आ. मानिसले भलादमी हुन के गर्नुपर्दछ ?

इ. कुकुरले भलादमीलाई कसरी चिन्दछ ?

ई. 'सफलताजस्तो हौसला दिने कोही छैन' भन्नुको तात्पर्य के हो ?

उ. यस निवन्धांशको मुख्य आशय के हो ?

२. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १५ख तलको निवन्धांश पढी सोधिएका प्रश्नहरूको एक दुई वाक्यमा उत्तर दिनुहोस् : (५)

भौतिक शरीरको सौन्दर्य जीवनको सम्पूर्णता होइन, मान्छेको मनचाहिँ कदापि कुरूप हुनुहुदैन । यो सहरको स्पर्शले यस शरीरलाई कुरूप बनाए पनि मन भने तिमीले जस्तो बनाइ दिएकी छौ । त्यस्तै छ त्यसैले त म तिमीभन्दा पर बसेर पनि तिम्रै मायाले द्रवीभूत भएकी छु र यी प्रत्येक अक्षर रूपमा परिलँदै परिलँदै झरिरहेकी छु ।

प्रश्नहरू:

अ. 'भौतिक शरीरको सौन्दर्य जीवनको सम्पूर्णता होइन' भन्नुको तात्पर्य के हो ?

आ. निवन्धकारका दृष्टिमा मान्छेलाई केले सुन्दर बनाउँछ र किन ?

इ. निवन्धकारको मन किन नफेरिएको हो ?

ई. निवन्धकारको जन्मभूमिप्रतिको माया कसरी पग्लिएको छ ?

उ. 'कुरूप' र 'द्रवीभूत' शब्दको अर्थ लेख्नुहोस् ।

३. २०७६ प्र.नं. १५ग तल दिइएको निवन्धांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर लेख्नुहोस् : (५)

विद्याको सर्टिफिकेट कोठाको वाकसमा हुन्छ । भलादमीको प्रमाणपत्र सधैँ उसका शरीरउपर विज्ञापन जाहेरी गर्दछ । पोसाक मात्र पहिला पास हो । त्यसमा पनि रेसमी रूमालको फूलदार फर्काइ र टोपीको कर्काइले पहिलो श्रेणीमा उत्तीर्ण भएको जनाउँछ । कपालको छाँट र जुँगाको कटाइले दोस्रो परीक्षाको परिचय दिन्छ । फेरि आँखीभौंको मसिनो डोराले, ओठ र गालाको फिक्का हलुका लालीको सुस्त चढाइले उत्तम श्रेणी जनाउँछ । सबको शिखर, एउटा सौन्दर्यको कोठी र अत्तरको हरहराउँदो खुसबुले सडकमा हिँड्नेहरूको नाक र नजरमा आक्रमण गरेको हुनुपर्दछ । यसमा पनि विशिष्टता हिँडाइको कला, लच्काइ, हाउभाउ, हास्य र बोलीमा निर्भर रहन्छ ।

प्रश्नहरू

अ. 'विद्याको सर्टिफिकेट कोठाको वाकसमा हुन्छ' भन्नुको अभिप्राय के हो ?

आ. यस निवन्धांशमा कस्तो प्रकारको भलादमीलाई चिनाइएको छ ?

इ. निवन्धकारले उत्तम श्रेणीको भलादमी कसलाई मानेका छन् ?

ई. भलादमीको विशिष्टता के कुरावाट थाहा पाइन्छ ?

उ. यस निवन्धांशको मूल आशय के हो ?

४. २०७५ पोडबुद्धि परीक्षा प्र.नं. १५ग तल दिइएको निवन्धांश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् (५)

जेसुकै होस्, म सधैं आलु खान्छु तर मलाई सधैं आलु खान डर लाग्छ किनभने म पनि विसौं शताब्दीकै आलु मान्छे, जसको कर्म हो आलु खानु, तर धर्म हो आलु खाएर पेडाको धाक लगाउनु ।

प्रश्नहरू:

अ. यस निवन्धांशका लेखक को हुन् ?
आ. लेखकलाई आलु खान किन डर लागेको हो ?
इ. मानवीय कर्म र धर्ममा के भिन्नता छ ?
ई. 'आलु खाएर पेडाको धाक लगाउनु' भन्नुको तात्पर्य के हो ?
उ. 'आलु मान्छे' ले के कस्ता मानवलाई सङ्केत गरेको छ ?

५. २०७५ सेट A प्र. नं. १५ख तलको निवन्धांश पढी सोधिएका प्रश्नहरूको छोटो छरितो उत्तर दिनुहोस् । (५)

भौतिक शरीरको सौन्दर्य जीवनको सम्पूर्णता होइन, मान्छेको मनचाहिं कदापि कुरूप हुनुहुदैन । यो सहरको स्पर्शले यस शरीरलाई कुरूप बनाए पनि मन भने तिमीले जस्तो बनाइदिएकी छौ त्यस्तै छ । त्यसैले त तिमीभन्दा यति पर बसेर पनि तिम्रै मायाले द्रवीभूत भएकी छु र यी प्रत्येक अक्षर रूपमा पग्लिदै झरिरहेकी छु ।

प्रश्नहरू:

अ. 'भौतिक शरीरको सौन्दर्य जीवनको सम्पूर्णता होइन' भन्नुको तात्पर्य के हो ?
आ. निवन्धकारका विचारमा मानिसलाई शरीर वा मन के ले सुन्दर बनाउँछ ?
इ. निवन्धकारको मन किन नफेरिएको हो ?
ई. निवन्धकारको सुनखानीप्रतिको माया कसरी पग्लिएको छ ?
उ. 'द्रवीभूत' र 'कुरूप' शब्दको अर्थ के हो ?

६. २०७५ सेट B प्र. नं. १५ग तलको निवन्धांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् :

आफ्नै पैसाले अरुको जुत्ता लगाएर स्व-स्थानीय वाली कुल्चदै हिँड्न छोडेका छैनौं हामी । खाद्यान्नमा नेपाललाई आत्मनिर्भर बनाउन भोट, हिमाल, पहाड, मधेस, तराई आदि विभिन्न परिवेशका विविधतालाई सम्बोधन गर्ने कृषि रणनीति चाहिएको छ ।

प्रश्नहरू:

अ. उपयुक्त निवन्धांश कुन निवन्धवाट लिइएको हो ?
आ. 'स्व-स्थानीय वाली कुल्चनु' को तात्पर्य खुलाउनुहोस् ।
इ. हामीलाई आत्मनिर्भर वन्न के चाहिएको छ ?
ई. विविधताका भौगोलिक आधारहरू के-के हुन् ?
उ. माथिको निवन्धांशको मूल आशय के हो ?

७. २०७४ पूरक प्र. नं. १५ग तल दिइएको निवन्धांश पढी अन्त्यमा सोधिएका प्रश्नको छोटो उत्तर दिनुहोस् : (५)

सुनखानी, म फूलसँगै राखेर मनुष्यलाई हेर्छु । मनुष्यका पीडारुपी जीवन हेर्छु । म मेरो गाउँ हेर्छु र देश हेर्छु । म मेरो देशका टुक्रा टुक्रामा तिम्रै जीवन पाउँछु र तिम्रै पीडा देख्छु । त्यसैले सुनखानी, तिमी मेरो देश हेर्ने ऐना ! तिमी मेरो जीवनको आस्था ! तिमी मेरो सानो देश र सानो संसार नै हौ ।

प्रश्नहरू:

अ. निवन्धकारले मानिसलाई फूलसँग दाँजेर हेर्नुको कारण हो ?
आ. निवन्धकारले सुनखानीको चित्रण कसरी गरेकी छन् ?
इ. निवन्धकारले सुनखानीलाई किन माया गरेका हुन् ?
ई. 'तिमी मेरो देश हेर्ने ऐना' भन्नुको तात्पर्य के हो?
उ. देश र सुनखानीका बीच कस्तो सम्बन्ध रहेको छ ?

८. २०७४ प्र. नं. १५ग तलको निवन्धांश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् :

आलु कस्तो मिलनसार छ भने गान्टोमा स्वयम् गान्टे मुलाहरू लिएर अरुलोमा लौकासम्म, चुच्चेमा स्वयम् चुच्चे करेलाहरू लिएर वुच्चेमा परवरसम्म, खाँदिएकोमा गुन्द्रकदेखि लिएर वाँधिएकोमा कुरिलोसम्म, जेसँग जसरी मिलाइदिनुहोस् आलु ठ्याम्मै मिलिहाल्छ । त्यसैले धनि, गरिव, मानी, मगन्ते, विद्वान, लम्फू, वुद्धिमान, लट्ठू साराका भान्सामा आलुको समान सम्मान छ, समान प्रवेश र प्रतिष्ठा छ । यस अर्थमा आलुलाई समाजवादी, समन्वयवादी, साम्यवादी तपाईं जे नाम दिनुहोस् वस्तुतः आलुको मूल सिद्धान्त आलुवाद नै हो । जतिसुकै समानताको आदर्श राखे पनि आफूआफूमा मेल नगर्ने आलुवादको विशेषता हो ।

प्रश्नहरू:

अ. आलुलाई किन मिलनसार भनिएको हो ?
आ. आलुको सम्मान किन छ ?
इ. आलुको मूल सिद्धान्तलाई किन आलुवाद भनिएको हो ?
ई. आलुवादको विशेषता के हो ?
उ. यस निवन्धांशमा प्रस्तुत भएको व्यङ्ग्य कसप्रति भनिएको हो ?

९. २०७३ पूरक प्र. नं. १५ग तलका निवन्धांश पढी सोधिएका प्रश्नको एक, दुई वाक्यमा उत्तर दिनुहोस् :

जेसुकै होस्, म सधैं आलु खान्छु तर मलाई सधैं आलु खान डर लाग्छ किनभने म पनि विसौं शताब्दीकै आलु मान्छे, जसको कर्म हो आलु खानु, तर धर्म हो आलु खाएर पेडाको धाक लगाउनु ।

प्रश्नहरू:

अ. यस निवन्धांशका लेखक को हुन् र यो कुन निवन्धवाट झिकिएको हो ?
आ. लेखकलाई आलु खान किन डर लाग्छ ?
इ. निवन्धकारको कर्म र धर्ममा के भिन्नता छ ?
ई. 'आलु मान्छे' भनी कस्ता मान्छेलाई भनिन्छ ?
उ. 'आलु खाएर पेडाको धाक लगाउनु' भन्नुको तात्पर्य के हो ?

१०. २०७३ प्र. नं. १५ग तलको निवन्धांश पढी सोधिएका प्रश्नको एक, दुई वाक्यमा उत्तर दिनुहोस् :

स्वास्नीमान्छेलाई लोग्नेमान्छे र लोग्नेमान्छेलाई स्वास्नीमान्छे साथी बनाउन अप्ठ्यारो पार्ने एउटा ठूलो कारण सिद्धान्तलाई पूजा गर्ने हाम्रो वानी पनि हो अर्थात् हामी सिद्धान्तलाई व्यावहारिक रूप दिने प्रयत्न गर्नुको सट्टा त्यसको खालि गुण गाएर हिँड्छौं । हामी न्यायको महात्म्य गाउँछौं तर स्वयं अन्याय गर्नवाट पछि सर्दैनौं । हामी विश्ववन्धुत्व र देशभक्तिको वयान गर्छौं तर खुद मानवताको विपरीत र देश भाँड्ने काम

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गरेर हिंड्छौं । हामी साम्प्रदायिकताका निन्दा गर्छौं, आर्थिक समानता र स्त्री पुरुषको समानताको ओड लिन्छौं तर आफैं साम्प्रदायिक भावनाअनुसार चल्छौं, आफैं स्त्री पुरुषको समानता र आर्थिक समानताको उल्टो हिंड्छौं । हाम्रा सबैजसो सिद्धान्त र व्यवहारमा यस्तै ठूलाठूला विरोधाभासहरू देखिन्छन् ।

प्रश्नहरू :

अ सिद्धान्तलाई पूजा गर्ने हाम्रो बानीले केकुरामा अप्ठ्यारो पर्छ ?

आ. न्यायसम्बन्धी हाम्रो दृष्टिकोण र व्यवहार कस्तो छ ?

इ हामीले दिने देशभक्तिको नारा र देशप्रतिको हाम्रो काममा केकस्तो भिन्नता छ ?

ई स्त्री र पुरुषबीचको समानताका सम्बन्धमा हाम्रा भनाइ र गराइमा केकस्तो बेमेल देखिन्छ ?

उ यस निबन्धांशले स्त्री र पुरुषबीच कस्तो सम्बन्धको अपेक्षा गरेको छ ?

११. २०७२ पूरक प्र. नं. १५ग तलको निबन्धांश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् : (५)

वास्तवमा भन्नुपर्दा, हाम्रो खाद्य सङ्कट भनेको भात सङ्कट हो । हाम्रो भोकमरी भातमरी हो । धान नफल्ने ठाउँमा आलु फल्छ, आलु नफल्ने ठाउँमा कोदो, कोदो नफल्ने ठाउँमा कागुनो, भोटप्रदेशतिर उवा करु फल्लान् । हिमखण्डलाई छाडेर केही नफल्ने मरुभूमि नै त नेपालमा छैन । तसर्थ कृषि खाद्यान्त र खाद्य सुरक्षाका बारेमा विकल्प खोज्न अब ढिलाइ गर्नुहुँदैन । यसका लागि ज्ञान र विज्ञान मात्र होइन मनोविज्ञानमा पनि परिवर्तनको आवश्यकता छ । कविले भनेझैं आफ्नै पाखुराको आधार र आफ्नै पैतालाको संसार खोज्ने बेला आएको छ । समाज र सरकार सबैले परनिर्भरताको संस्कारलाई त्याग्न सकेनन् भने भोगको सामना गर्नु पर्ने स्थिति टड्कारो छ ।

प्रश्नहरू :

अ. निबन्धकारले किन भोकमरीलाई भातमरी भनेका हुन् ?

आ. लेखकले निबन्धांशमा कुन-कुन खाद्य सामग्रीको नाम लिएका छन् ?

इ. भोकमरीवाट बच्न नेपालमा के गर्नुपर्छ ?

ई. 'परनिर्भरताको संस्कार' भनेको के हो ?

उ. 'पाखुराको आधार र पैतालाको संसार खोज्नु' भन्नाले के बुझिन्छ ?

१२. २०७२ प्र. नं. १५ग तलको निबन्धांश पढी सोधिएका प्रश्नहरूको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

एक केजी मासु उत्पादन गर्न १० केजी शाकाहारी भोजन खपत हुन्छ अर्थात् एक धनी मांसाहारीले १० गरिब शाकाहारीको खाना हसुर्छ । धनी र सम्पन्न वर्गकै इन्धन, उर्जा र आहारामा गरिवहरूले पिल्सिनुपर्ने र भोकमरी बेहोर्नुपर्ने स्थिति खडा भएको छ । यसको दोष भूमण्डलीय उष्णता (ग्लोवल वार्मिङ) मा थोपर्ने प्रवृत्ति पनि छ । जो होस्, भोलिको सङ्घर्ष भोकमा आधारित हुने कुरालाई यत्तिकै नकार्न मिल्दैन । क्यामरुन, सेनेगल, मौरिटानिया, हाइटी र इन्डोनेसियामा भोकबाट क्रान्तिले जन्म लिन थालेको तथ्य समाचारमा सुनिसकेका छौं ।

प्रश्नहरू:

अ. मांसाहरका कारणवाट पर्ने खाद्य असर के हो ?

आ. गरिवहरू केकारणले भोकमरी बेहोर्नुपर्ने अवस्थामा पुग्दछन् ?

इ. भोलिको सङ्घर्ष भोकमा आधारित हुन्छ भन्नुको कारण के हो ?

ई. यस अनुच्छेदको मुख्य आशय के हो ?

उ. भूमण्डलीय उष्णता (ग्लोवल वार्मिङ) भन्नाले के बुझिन्छ ?

१३. २०७२ सेट E प्र. नं. १५ग तलको निबन्धांश पढी सोधिएका प्रश्नहरूको छोटो छरितो उत्तर दिनुहोस् : (५)

नारीलाई नरकको मूल ढोका नठान्ने र जीवनका सबैजसो क्षेत्रमा स्त्रीपुरुषको बराबर हक हुनुपर्छ भन्ने एवम् पछौटे देशका आइमाईलाई घर नाउँको भ्यालखानाभित्र दुबिरहन नदिई सामाजिक क्षेत्रमा समेत होस्याउनेहरू साहित्य तथा राजनीति आदितर्फ लागेका आधुनिक युवाहरू नै हुन् ।

प्रश्नहरू:

अ. 'नारीलाई नरकको मूल ढोका नठान्ने' भन्नुको तात्पर्य के हो ?

आ. आधुनिक युवाहरूमा स्त्रीपुरुषका विषयमा कस्तो दृष्टिकोण रहेको छ ?

इ. माथिको निबन्धांशले नेपाली समाजको कस्तो तस्विर प्रस्तुत गरेको छ ?

ई. लेखकको नारीसम्बन्धी मान्यता कस्तो रहेको छ ?

उ. यो निबन्धांश कुन सन्दर्भमा आएको छ ?

१४. २०७१ पूरक प्र. नं. १५ग तलको निबन्धांश पढी सोधिएका प्रश्नको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

आलु कस्तो मिलनसार छ भने गान्टोमा स्वयम् गान्टे मुलादेखि लिएर अग्लोमा लौकासम्म, चुच्चेमा स्वयम् चुच्चे करेलादेखि लिएर वुच्चेमा परवरसम्म, खाँदिएकोमा गुन्द्रकदेखि लिएर बाँधिएकोमा कुरिलोसम्म, जेसंग जसरी मिलाई दिनुहोस् आलु ठ्याम्मै मिलिहाल्छ । त्यसैले धनी, गरिव, मानी, मगन्ते, विद्वान्, लम्फू, वृद्धिमान, लटठू साराका भान्सामा आलुको समान सम्मान छ, समान प्रवेश र प्रतिष्ठा छ । यस अर्थमा आलुलाई समाजवादी, समन्वयवादी, साम्यवादी तपाईं जे नाम दिनुहोस्, वस्तुतः आलुको मूल सिद्धान्त आलुवाद नै हो । जतिसुकै समानताको आदर्श राखे पनि आफूआफूमा मेल नगर्नु आलुवादको विशेषता हो ।

प्रश्नहरू :

अ. आलुलाई किन मिलनसार भनिएको हो ?

आ. आलुको सम्मान किन छ ?

इ. आलुको मूल सिद्धान्तलाई किन आलुवाद भनिएको हो ?

ई. आलुवादको विशेषता के हो ?

उ. यस निबन्धांशमा प्रस्तुत भएको व्यङ्ग्य कसप्रति लक्षित छ ?

१५. २०७१ प्र. नं. १५ग तलको निबन्धांश पढी सोधिएका प्रश्नको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

एक केजी मासु उत्पादन गर्न १० केजी शाकाहारी भोजन खपत हुन्छ अर्थात् एक धनी मांसाहारीले १० गरिब शाकाहारीको खाना हसुर्छ । धनी र सम्पन्न वर्गकै इन्धन, ऊर्जा र आहारमा गरिवहरूले पिल्सिनु पर्ने र भोकमरी बेहोर्नुपर्ने स्थिति खडा भएको छ । यसको दोष भूमण्डलीय उष्णता (ग्लोवल वार्मिङ)

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मा थोपर्ने प्रवृत्ति पनि छ। जे होस्, भोलिको सङ्घर्ष भोकमा आधारित हुने कुरालाई यत्तिकै नकार्न मिल्दैन।

प्रश्नहरू:

अ. एक केजी मासु उत्पादन गर्न १० केजी शाकाहारी भोजन कसरी खपत हुन्छ ?

आ. गरिबहरू केकारणले भोकमरी वेहोर्नु पर्ने अवस्थामा छन् ?

इ. भोलिको सङ्घर्ष भोकमा आधारित हुन्छ भन्नुको तात्पर्य के हो ?

ई. भूमण्डलीय उष्णता भन्नाले के बुझिन्छ ?

उ. यस अनुच्छेदको मुख्य आशय के हो ?

१६. २०७० प्र. नं. १५ग तलको निवन्धांश पढी सोधिएका प्रश्नको एक, दुई वाक्यमा उत्तर दिनुहोस् : (५)

समुद्रपारिका नारीहरूलाई साथी वनाउन वरु सजिलो होला तर आफ्नो देश, आफ्नो सहर र गाउँका, आफ्नो टोल र छिमेकका आइमाईलाई साथी वनाउन हामीलाई गाह्रो पर्छ तर गाह्रो भन्दैमा राम्रो कामवाट पन्छिनु उचित कुरा होइन। त्यसैले आइमाई साथी वनाउन सकिने किसिमको अवसर पर्दा म प्रायः पछि सर्ने गर्दिन।

प्रश्नहरू

अ. समुद्रपारिका नारीलाई साथी वनाउन किन सजिलो होला?

आ. आफ्नै देशका नारीलाई किन साथी वनाउन नसकिएको हो ?

इ. 'गाह्रो भन्दैमा राम्रो कामवाट पन्छिनु उचित कुरा होइन' भन्नुको तात्पर्य के हो ?

ई. निवन्धकारलाई किन आइमाई साथी वनाउन मन लागेको हो ?

उ. यस निवन्धांशको मूल आशय के हो ?

१७. २०६९ प्र. नं. १५ग तलको निवन्धांश पढि सोधिएका प्रश्नहरूको एक दुई वाक्यमा उत्तर दिनुहोस् : (५)

तिम्रै नासो यो जिन्दगानी काडमाडौंको ढुङ्ग्यान छानीमा घिसिँदा घिसिँदै खिईदै गइरहेको छ। कतै यो तिम्रो नासो फर्काउन पो नसकिने हो कि भन्ने सन्त्रासले म सधैं थर्कमान छु। जे जस्तो हालतमा होस् यो देह ढल्नु अगावै तिम्रो नासो तिमीलाई सम्पन पाए मेरो ठूलो तृष्णा मेटिने थियो। सद्दे त के फर्काउन देला र यो काठमाडौंले। यो सहरले यो मरुभूमिले। यसले पिल्स्याई पिल्स्याई तिमीले दिएको सौकुमार्यलाई त अवश्य नै कुरूप पार्ने छ।

प्रश्नहरू:

अ. यस निवन्धांशमा तिमी भनेर कसलाई सम्बोधन गरिएको हो ?

आ. निवन्धकार के कुराले थर्कमान छिन् ?

इ. काठमाडौं सहरलाई निवन्धकारले किन गाली गरेकी हुन् ?

ई. 'काठमाडौंको ढुङ्ग्यान छाती' भनेर के भन्न खोजिएको हो ?

उ. निवन्धांशमा मातृभूमिप्रतिको आस्था कसरी प्रकट भएको छ ?

■ साहित्यिक रचनाको पठनबोधः सङ्क्षिप्त उत्तरात्मक (भाव, विचार, परिवेश, चरित्र र सन्देश लेखन) (कथा, कविता, निबन्ध, नाटक/ एकाङ्की, उपन्यास): [पाठक प्रतिक्रिया] (५ अङ्क)

१. २०७७ सेट H प्र. नं. ११ अथवा "नेपाल रहेन भने हामी नेपाली पनि रहँदैनौं। यस भनाइप्रति तर्क दिएर आफ्नो प्रतिक्रिया लेख्नुहोस्। (५)

२. २०७७ सेट I प्र. नं. ११ अथवा 'समुद्रपारिका नारीहरूलाई साथी वनाउन वरू सजिलो होला तर आफ्नो सहर, गाउँ, टोल र छिमेकका आइमाईलाई साथी वनाउन हामीलाई गाह्रो पर्छ' यस भनाइप्रति तर्क दिएर आफ्नो प्रतिक्रिया लेख्नुहोस्। (५)

३. २०७६ ग्रेडवृद्धि परीक्षा सेट A प्र. नं. १६ 'किसानको परिश्रम र पसिना नै जगत्को जीवन हो र जिन्दगीको ज्योति हो।' यस भनाइप्रति तपाईंको प्रतिक्रिया के छ ? तर्क दिएर लेख्नुहोस्। (५)

४. २०७६ ग्रेडवृद्धि परीक्षा सेट B प्र. नं. १६ 'नालापानीमा' एकाङ्कीमा धरतीले नेपाली वीरहरूसँग के कस्तो आह्वान गरेकी छिन् ? आफ्नो प्रतिक्रिया लेख्नुहोस्। (५)

५. २०७६ प्र.नं. १६ 'संसारले एक दिन सुखी हुनु छ, कसैले रोक्न सक्दैन' भन्ने भनाइप्रति तपाईं सहमत वा असहमत के हुनुहुन्छ ? 'वौलाहा काजीको सपना' नाटकका आधारमा प्रतिक्रिया लेख्नुहोस्। (५)

६. २०७५ ग्रेडवृद्धि परीक्षा प्र.नं. १६ 'वौलाहा काजीको सपना' नाटकमा वौलाहा कार्जीले देखाएको व्यवहार कत्तिको स्वभाविक छ ? आफ्नो प्रतिक्रिया लेख्नुहोस्। (५)

७. २०७५ सेट A प्र. नं. १६ 'नालापानीमा' एकाङ्कीमा जातीय विविधताभित्रको राष्ट्रिय एकतालाई कसरी प्रस्तुत गरिएको छ ? आफ्नो प्रतिक्रिया प्रस्तुत गर्नुहोस्। (५)

८. २०७५ सेट B प्र. नं. १६ 'वौलाहा काजीको सपना' नाटकको वौहाला काजी साच्चिकै वौलाहा हो त ? तर्कसहित आफ्नो प्रतिक्रिया दिनुहोस्। (५)

९. २०७४ पूरक प्र. नं. १६ कुनै पनि व्यक्ति शत्रुविहीन हुन सक्दैन भन्ने कुरा 'शत्रु' कथाले कसरी पुष्टि गरेको छ ? समीक्षात्मक प्रतिक्रिया लेख्नुहोस्। (५)

१०. २०७४ प्र. नं. १६ 'एक चिहान' उपन्यासमा अष्टनारानलाई समाजसुधारक र क्रान्तिकारी चरित्रका रूपमा प्रस्तुत गरिएको छ। यसप्रति तपाईंको प्रतिक्रिया के छ ? तर्क दिएर लेख्नुहोस्। (५)

११. २०७३ पूरक प्र. नं. १६ 'एक चिहान' उपन्यासका पात्रहरू डा. गोदत्तप्रसाद र रञ्जनादेवी उपन्यासमा पति पत्नी हुन् तर प्रेमका सम्बन्धमा उनीहरूमा पाइने दृष्टिकोणगत भिन्नता केकस्ता छन् ? आफ्नो तर्कसहित प्रतिक्रिया लेख्नुहोस्। (५)

१२. २०७३ प्र. नं. १६ "वालवालिकाका वीचमा विभेद सिर्जना गर्ने मूल कारण समाज नै हो।" यस भनाइप्रति 'मधुमालतीको कथा' का आधारमा आफ्नो प्रतिक्रिया लेख्नुहोस्। (५)

१३. २०७२ पूरक प्र. नं. १६ 'शत्रु हुँदै नभएको मान्छे हुन्छ कि हुँदैन' शत्रु कथाका आधारमा आफ्नो प्रतिक्रिया लेख्नुहोस्। (५)

१४. २०७२ प्र. नं. १६ 'नेपाल अत्यन्त सुन्दर देश हो' भन्ने भनाईप्रति 'मेरो देश' कविताका आधारमा प्रतिक्रिया लेख्नुहोस्। (५)

१५. २०७२ सेट E प्र. नं. १६ 'नेपाली हामी रहौंला कहां नेपालै नरहे' भन्ने भनाइप्रति तपाईंको दृष्टिकोण कस्तो छ ? 'नेपालै नरहे' कविताका आधारमा प्रतिक्रिया लेख्नुहोस्। (५)

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१६. २०७० प्र. नं. १६ लोककथामा मधुकर र मालतीको मिलन भएको छ तर 'मधु मालतीको कथा' कथामा शङ्कर र गौरीको चाहि किन विछोड भएको होला ? प्रतिक्रिया लेख्नुहोस् । (५)

१७. २०७१ पुरक प्र. नं. १६ "जन्मभूमि स्वर्गभन्दा पनि महान हुन्छ" भन्ने भनाइप्रति 'म फूल लिएर आउने छु' निबन्धका आधारमा आफ्नो प्रतिक्रिया लेख्नुहोस् । (५)

१८. २०७१ प्र. नं. १६ समुद्रपारिका नारीहरूलाई साथी बनाउन सजिलो तर आफ्नो देश र टोल छिमेकका नारीहरूलाई साथी बनाउन गारो हुनुको कारण के हो ? 'आइमाई साथी' निबन्धका आधारमा आफ्नो प्रतिक्रिया लेख्नुहोस् । (५)

१९. २०६९ प्र. नं. १६ 'आलु' निबन्धमा लेखकले नेपाली बुद्धिजीवीलाई गरेको व्यङ्ग्यप्रति तपाईं सहमत हुनुहुन्छ ? प्रतिक्रिया लेख्नुहोस् । (५)

परीक्षा प्रश्नपत्र

२०७७ (सेट H)

समय: १ घण्टा ३० मिनेट पूर्णाङ्क (सङ्क्षिप्त): ४०

१. कुनै एक प्रश्नको उत्तर दिनुहोस् : (२)

क तलका वर्णहरूलाई प्रयत्न र उच्चारण स्थानका आधारमा चिनाउनुहोस् :

ज, ह ।

ख. तलका शब्दहरूको अक्षर संरचना लेखी अक्षर सङ्ख्या समेत देखाउनुहोस् :

प्रचार, कूटनीतिज्ञ

२. शुद्ध गरी पुनर्लेखन गर्नुहोस् : (२)

सौन्दर्यका मोहनीमा वर्ग्नेहरू प्राय असभ्य, वर्वर आततायी र जङ्गली भइदिन्छन् । उनीहरू सुन्दर फुल देख्नासाथ तेसका निकट् पुगी टासिन चाहन्छन् ।

३. तलको अनुच्छेदमा रेखाङ्कन गरिएका पदहरूको शब्दवर्ग पहिचान गरी लेख्नुहोस् । (२)

वासनाले हामी ससारसित जोडिएका हुन्छौं र अन्ततः अनिच्छावश नै मृत्युले हामीलाई यो स्थितिवाट तानेर लैजान्छ । हामी मर्न त मर्छौं तर मुक्त हुँदैनौं ।

४. कुनै एक प्रश्नको उत्तर दिनुहोस् : (३)

क. तलको अनुच्छेदवाट तीनओटा समस्त शब्द र तीनओटा द्वित्व व्युत्पन शब्द खोजी समस्त शब्दलाई विग्रह गर्नुहोस् र द्वित्व व्युत्पन्न शब्दको निर्माण प्रक्रिया देखाउनुहोस् :

गाउं समाजमा कसैसँग पनि नमिल्ने, कसैलाई साह्रोगाह्रो पर्दा आँचोखाँचो पनि नटार्ने अनि ऐरेगैरेसँग सम्बन्ध राख्ने मान्छेवाट कामसाम वन्ला भनी ठान्नु मूर्खता हुन जान्छ । त्यस्ता नरपशुवाट सहयोगको अपेक्षा गर्नुभन्दा आफूआफूवाटै भाग्योदयका लागि प्रयास गर्नु हाम्रा लागि उपयुक्त हुने देखिन्छ ।

ख. तलको अनुच्छेदवाट छ ओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् :

विभिन्न जातजातिका मानिसको साझा कर्मथलोका रूपमा रहेको नेपाल सांस्कृतिक विविधताले भरिपूर्ण छ । खर्चवर्च नहुँदा सरसापटका भरमा चाडपर्व मनाउने प्रचलन त यहाँ प्राचीन समयदेखि नै चल्दै आएको छ । सानन्दका साथ रमाइलो गरी जीवन जिउने कला सिकेका हामी शुभ कार्यमा कुनै किसिमको झैझमेलामा पर्ने गरेका छैनौं ।

५. कुनै एक प्रश्नको उत्तर दिनुहोस् : (३)

क. वाक्य ढाँचासहित तलको अनुच्छेदका वाक्यलाई एक वचनमा परिवर्तन गरी लेख्नुहोस् :

हाम्रा सबै योजनाहरू पूरा हुनेछन् । हामी भ्रमणवाट अथाह ज्ञान आर्जन गर्नेछौं । हामी प्राप्त ज्ञानको उपयोग गर्न चुक्ने छैनौं ।

ख. तलको अनुच्छेदका वाक्यलाई सम्भावनार्थमा परिवर्तन गरी लेख्नुहोस् :

यस वर्ष उनीहरू मनग्यै अन्नवाली भित्र्याउने छन् । हामी सबैलाई केही राहत मिल्ने छ । यद्यपि चामलको मूल्य भने घट्ने छैन ।

६. तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् : (४)

तपाईं सहरमा बसेर के गर्दै छ ? साना भाइ त्यहाँ बसेर पढ्दै छ । मेरो बहिनी त पढाइमा मात्र होइन, अतिरिक्त क्रियाकलापमा पनि अव्वल छ । ठुलो माइजूले बहिनीलाई प्रेरणा दिएको थिइन् । भाइ बहिनीको सफलतावाट हामी खुसी भएको छ । उनीहरू जीवनमा सफलताको शिखर चुमोस् ।

७. तलको अनुच्छेद पढी मुख्य मुख्य चार वुंदा टिपोट गर्नुहोस् : (४)

साहित्य के हो ? थाहै नपाई साहित्यसँग मानिसको साइनो बस्दो रहेछ । केही थाहा पाउन थालेदेखि नै साहित्य मानिसलाई मन पर्ने पनि थाल्दो रहेछ । यसरी साहित्य प्रिय लागिरहे पनि साहित्यको पहिचान र पारख गर्नुचाहिं त्यति सहज र सुगम नरही चुनौतीपूर्ण नै रहँदै आएको छ । साहित्य छ र हुन्छ अनि हामी त्यसलाई केही चिन्दछौं र त्यसको प्रयोग वा उपयोग समेत गरिरहेका हुन्छौं तापनि त्यो के हो वा कस्तो हुन्छ र त्यसका के कस्ता विविध प्रकार देखिन आएका छन् भनी सोधनी गर्न लाग्नासाथ अनेक कठिनाइसँग हाम्रो जम्काभेट हुन थाल्दछ । यस्ता जिज्ञासाले साहित्यका जुन तत्त्व मिमांसातर्फ हामीलाई डोऱ्याउँछन् त्यो नै साहित्यको शास्त्र हो । वनस्पतिहरू छन् र नै वनस्पति शास्त्रको अपेक्षा भई त्यसको उठान र विकास भए जस्तै साहित्य हामीसँग भएकाले नै हामीलाई साहित्यको शास्त्र पनि चाहिने हुन्छ । शास्त्र त्यही हो, जसले साहित्यको पर्याप्त पहिचान र सही पारखका क्रममा समालोचना कर्मी वा समालोचकलाई पनि सघाउँछ । त्यसैले साहित्य शास्त्र वा साहित्य सिद्धान्तको अर्को नाउँ समालोचना सिद्धान्त पनि हो । कुनै भाषाको कुनै स्रष्टाका खास कृति वा कृतित्व बारेको समालोचना प्रायोगिक वा व्यावहारिक समलोचना हो भने साहित्यको स्वरूप, हेतु प्रकार, प्रयोजन आदि सम्बन्धी तत्त्व मिमांसाचाहिं सैद्धान्तिक समालोचना हो, जसले सिद्धान्ततः साहित्यलाई चिनाउनुका साथै त्यसको समालोचनात्मक पारखका निम्ति सैद्धान्तिक मार्ग दर्शनमार्फत् एकल वा बहुल उपयुक्त पद्धति समेत प्रदान गरी सघाउने गर्दछ ।

८. आफ्नो विद्यालयमा सम्पन्न स्वागत तथा विदाइ कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको एउटा प्रतिवेदन लेख्नुहोस् । (५)

(मानौं तपाईंको नाम सगुन हो र तपाईंको विद्यालयको नाम सहिद स्मारक मा.वि. हो ।)

अथवा

'इन्टरनेटको उपयोगिता' विषयमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस् ।

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९. तल दिइएका मध्ये कुनै एक शीर्षकमा १५० शब्दसम्मको निबन्ध लेख्नुहोस् (५)

क. कोरोना महामारीको प्रभाव

ख. नेपालको आर्थिक विकासमा जलसम्पदाको भूमिका

१०. 'एक चिहान' उपन्यासको तल दिइएको अंश पढी सोधिएका प्रश्नको उत्तर दिनुहोस् (५)

राम खेलावन राउत शिवनारायणको खेतमा दुई चार चोटि आउँदैमा शिवनारायणले नानीथकु र राम खेलावान राउतथिचमा मिठो भाव रहेको सङ्केत पाइसकेका थिए। अर्को कुरा नानीथकुको बिहे झटपट सिद्धयाउनुपर्ने थियो। सबभन्दा लायकको कुरा त दुवैजना जोडा मिलेर आफूले र आफ्ना सिद्धान्तले चाहे जस्तै सयोग मिलिरहेको थियो। त्यसैले शिवनारायन मौका चुकाउने मुर्ख्याइँ गर्ने मूर्खता किन गरिरहन्थे ?

प्रस्ट्रा पेस हुनासाथ राम खेलावान राउतले मञ्जुर गरे, नानीथकुले पनि स्वीकृति दिइन्। मधेसतिर भएको हुनाले नानीथकुलाई एक चोटि त अलि कस्तो कस्तो लागेको थियो तर प्रेमको अगाडि दूरता कुन कुरा हो र ! नानीथकु प्रसन्न नै थिइन्।

प्रश्न

क. "प्रेमको अगाडि दूरता कुन कुरा हो र !" यस भनाइप्रति तपाईंको प्रतिक्रिया लेख्नुहोस्।

११. तल दिइएको कथांश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस् : (५)

एक रात कृष्ण राय खाईपिई सुत्ने यत्न गरिरहेका थिए। तिनका मनमा धेरै प्रकारका विचार आउन थाले। तिनको जीवन कसैले असफल भन्न सक्तैन। सानोतिनो पूँजी पनि कमाइहालेका थिए। रूपियाँ जम्मा गर्दा अरूहरूले गरे जस्तो रैतीहरूलाई पिर पनि पारेनन्। तिनको कोही वैरी थिएन, यही तिनको सन्तोषको ठूलो कारण थियो। ४५ वर्षको यत्रो लामो जीवनमा तिनले कसैलाई आफ्नो शत्रु बनाएनन्।

प्रश्नहरू:

अ. कृष्ण रायलाई आफ्नो जीवन किन सफल लागेको होला ?

आ. कृष्ण रायले कसरी पूंजी जोडेका थिए ?

इ. कृष्ण रायको सन्तोषको कारण के थियो ?

ई. कृष्ण रायलाई आफ्ना शत्रु कोही पनि छैनन् भन्ने किन लागेको हो ?

उ. यस कथांशको मुख्य सन्देश के हो ?

अथवा

"नेपाल रहेन भने हामी नेपाली पनि रहदैनौं।" यस भनाइप्रति तर्क दिएर आफ्नो प्रतिक्रिया लेख्नुहोस्।

२०७७ (सेट I)

समय: १ घण्टा ३० मिनेट **पूर्णाङ्क (सङ्क्षिप्त): ४०**

१. कुनै एक प्रश्नको उत्तर दिनुहोस् : (२)

क. तलका वर्णहरूलाई **प्रयत्न र उच्चारण स्थान**का आधारमा चिनाउनुहोस् : (२)

ज, म्।

ख. तलका शब्दहरूको **अक्षरसंरचना** लेखी **अक्षरसङ्ख्या** समेत देखाउनुहोस् : (२)

त्रिभुज, वटुवा।

२. शुद्ध गरी पुनर्लेखन गर्नुहोस् : (२)

मान्छेले किन फूलको इर्ष्या गर्छ आफू फुलजस्तो सुन्दर जिन्दगी बाँच्न किन खोज्दैन।

३. तलको अनुच्छेदमा रेखाङ्कन गरिएका पदहरूको शब्द पहिचान गरी लेख्नुहोस्।

प्रकृतिको आफ्नै नियम छ। जनचाहनाअनुरूप नयाँ नेपाल निर्माण निश्चय हुनेछ। कानुनको पालन र अनुशासनले हामीलाई सुखी एवम् समृद्धिको यात्रामा अगि बढाउँछ।

४. कुनै एक प्रश्नको उत्तर दिनुहोस् :

क. तल दिइएका उपसर्ग र प्रत्यय लगाई एक एक शब्द निर्माण गर्नुहोस् :

उपसर्ग : अन, निर, वे।

प्रत्यय : ईन, याइँ, एलु।

ख. तलको अनुच्छेदबाट छ ओटा सन्धियुक्त शब्द पहिचान गरी तिनको सन्धि विच्छेद गर्नुहोस् :

सरकारले भव्यताका साथ उद्घाटन गरेको पर्यटन वर्षमा विदेशी पर्यटकहरूलाई भित्र्याई राष्ट्र निर्माण गर्ने एउटा महत्त्वपूर्ण महोत्सव नै हो। यसलाई सफल तुल्याई आर्थिक समृद्धिका मार्गमा लम्कने अभियानलाई सबैले आआफ्नो क्षेत्रबाट सरसहयोग गर्नुपर्ने देखिन्छ। अझ बेरोजगार युवा युवतीले त कुनै राम्रो कामसाम गरेर आफ्नो भविष्य निर्माणको योजना बनाउने अवसरका रूपमा यसलाई लिनुपर्ने देखिन्छ।

५. कुनै एक प्रश्नको उत्तर दिनुहोस् :

क. तलका अनुच्छेदका वाक्यलाई द्वितीय पुरूषमा परिवर्तन गर्नुहोस् :

ऊ विज्ञान विषय पढ्दै छ। ऊ डाक्टर बन्न चाहन्छ। ऊ नियमित रूपमा विद्यालय जाने गरेको छ।

ख. तलको अनुच्छेदका वाक्यलाई आज्ञार्थमा परिवर्तन गर्नुहोस्

तँ पनि राम्रै काम गर्लास्। तँ बरालिएर हिँड्दैनस्। तैं आफ्नो क्षमता देखाउने छस्। तँ सत्मार्गमा लम्कने छस्।

६. कुनै एक प्रश्नको उत्तर दिनुहोस् :

क. ले, लाई, द्वारा, बाट विभक्ति लागेका भिन्न भिन्न कारकको प्रयोग भएका चार वाक्यमा कुनै डरलाग्दो घटनाको वर्णन गर्नुहोस्।

ख. तलको अनुच्छेदका वाक्यहरूलाई सङ्गति मिलाई पुनर्लेखन गर्नुहोस् :

वगैंचामा फूलहरू रोपिएको छ। यहाँ वस्नका लागि ठाउँहरू पनि बनाइएको छ। साँझ बिहान त्यहाँ मानिसहरू डुल्न जान्छ। सानो वहिनी पनि त्यहाँ जान मन गर्छ।

७. तलको अनुच्छेदलाई एकतृतीयांशमा सङ्क्षेपीकरण गर्नुहोस् :

प्राचीन समयदेखि नै पुच्छ्रेताराले पृथ्वी र पृथ्वीवासीहरूमा आउने अनिष्टताका पूर्व सूचक र विपत्तिका द्योतक आकाशीय पिण्डका रूपमा हेर्ने गरिएको पाइन्छ। यो अवधारणा अझै पनि विभिन्न समाजमा विद्यमान छ। विश्वमा धेरै अगिदेखि नै मानवले पुच्छ्रेताराहरूको अवलोकन गर्दै आइरहेको ज्ञात भए तापनि सन् १७०५ मा हेलीको वृहत् अनुसन्धानको परिणामस्वरुप नै पुच्छ्रेताराहरू अनिष्टताका पूर्व सूचक होइनन् र यिनीहरू पनि सौर मण्डलमा अवस्थित अन्य पिण्डहरूजस्तै सामान्य पिण्ड छन्, त्यसैले सूर्यलाई एउटा निश्चित अवधिमा परिभ्रमण गर्ने पिण्डहरूका रूपमा पुच्छ्रेतारालाई लिन थालियो। यसरी पुच्छ्रेताराका बारेमा जे-जस्ता अनुश्रुतिहरू रहेका भए पनि वैज्ञानिक विकासको क्रमसँगै यी भनाइहरू अन्धविश्वासमा परिणत भइसकेका छन्। वास्तवमा पुच्छ्रेतारा कुनै विशिष्ट आकार नभएको हिमकण एवम् विविध ग्यासहरू तथा

अवाष्पशील पदार्थहरूको ठोस कणहरूको समूहद्वारा संरचित एउटा फोहोर हिमपिण्ड नै हो भन्ने तथ्य प्रमाणित भइसकेको छ। आफ्नो कक्षमा परिभ्रमण गर्ने क्रममा सूर्यदेखि निकै दूरीमा रहँदा ब्रह्माण्डको शून्यताको चिसोमा जमेको पुच्छ्रेतारा शिर र पुच्छ्रविहीन प्रकाशयुक्त एउटा जगमगाउँदो बिन्दुका रूपमा देखिन्छ। तर सूर्यको समीपमा आइपुग्दा यसको सतह तात्ल पुर्गी यसमा निहित हिमराशि, ग्यासहरू एवम् विद्युतीय कणहरू वाष्पका रूपमा पग्लन्छन्। त्यसपछि यसको शिर मात्र दृष्टिगोचर हुन थाल्दछ र सूर्यको विकिरण र सौर आँधीका चापले गर्दा वाष्पित हिमकण तथा ग्यासहरू सूर्यको दिशातिर फैलिन थाल्दछन्।

८ आफ्नो विद्यालयले आयोजना गरेको कुनै शिक्षण अस्पतालको विज्ञान प्रयोगशालाको अवलोकन भ्रमण कार्यक्रमका सबै कुरा समेटी १५० शब्दसम्मको एउटा प्रतिवेदन लेख्नुहोस्। (५)
(मानौं तपाईंको नाम किरण हो र तपाईंको विद्यालयको नाम सरस्वती मा.वि. हो।)

अथवा

'छाउपडी प्रथा' विषयमा १५० शब्दसम्मको टिप्पणी लेख्नुहोस्।

९. तल दिइएका मध्ये कुनै एक विषयमा १५० शब्दसम्मको निबन्ध लेख्नुहोस् : (५)

क. मलाई मनपर्ने वैज्ञानिक

ख. डाक्टरी पेसाको गरिमा र महत्त्व

१० 'बौलाहा काजीको सपना' नाटकको तल दिइएको अंश पढी सोधिएका प्रश्नहरूको उत्तर दिनुहोस्। (५)

अँ, पहिले पैसा नभए माग्नु पर्थ्यो। मागेर पनि कसैले सोझो मुखले नदिएको भए, यतिका सहरका घरहरू छँदै थिए नि, घनले ठोकेर, ताल्चा फोरेर, खोसेर, चोरेर भए पनि ल्याउनुपर्थ्यो। एउटा ज्यान मारेर ज्यानमारा बनिरहनु सट्टामा त चोर हुनु हजार गुना वेस। हामी ज्यान मारा हौं, ज्यानमारा। किन चोरेनौं ? किन लुटेनौं ? चुप लाग, अब रोएर छाती फोडे पनि के ? जो वित्यो। त्यो गयो, त्यो गयो !...

प्रश्न:

क. माथिको नाट्यांशले कसको मृत्यु भएका कुराको सङ्केत गरेको छ ? उसको मृत्यु कसरी भएको हो ? स्पष्ट पार्नुहोस्।

११. तलको प्रश्नको उत्तर दिनुहोस् : (५)

यस्तै हो, मैले पनि सहेर बसि दिएको भए किन झगडा हुन्थ्यो ? एउटै सिरान गरेर सुतेपछि कहिलेकाहीं गोडा लाग्छ नाई, झगडा भो भन्दैमा धर्म छाड्नुहुन्छ ? आफूले साँचो मनले उपकार गरेपछि उसको आत्माले पनि गर्न कर लाउँछ। अमृत रोपेको ठाउँमा विष फलेको कतै सुनेका छौ ? माटोको भर ढुङ्गो, ढुङ्गाको भर माटो, संसार भरैभरमा अडेको छ।

प्रश्नहरू:

अ. यो भनाइ कसको हो ?

आ. 'एउटै सिरान गरेर सुतेपछि कहिलेकाहीं गोडा लाग्छ नाई' भन्नुको तात्पर्य के हो ?

इ. झगडा भो भन्दैमा किन धर्म छाड्नुहुन्न ?

ई. 'संसार भरैभरमा अडेको छ' यस भनाइको आशय के हो ?

उ. माथिको भनाइ कुन सन्दर्भमा आएको हो ?

अथवा

'समुद्रपारिका नारीहरूलाई साथी बनाउन वरू सजिलो होला तर आफ्नो सहर, गाउँ, टोल र छिमेकका आइमाईलाई साथी बनाउन हामीलाई गाह्रो पर्छ' यस भनाइप्रति तर्क दिएर आफ्नो प्रतिक्रिया लेख्नुहोस्। (५)

उत्तर

एकाइ १: वर्ण र अक्षरको संरचनाको पहिचान

१.	क. **वर्ण**	**प्रयत्न**	**स्थान**
	ज्	स्पर्शसङ्घर्षी	वर्त्स्य (दन्तमूलीय)
	ह्	सङ्घर्षी	स्वरयन्त्रमुखी
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	प्रचार	प्र्अ.च्आर्	२
	कूटनीतिज्ञ	क्.उट्.न्इ.त्इग्.ग्य्अ	४
२.	क. **वर्ण**	**प्रयत्न**	**स्थान**
	ज्	स्पर्शसङ्घर्षी	वर्त्स्य (दन्तमूलीय)
	म्	नासिक्य	ओष्ठ्य
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	त्रिभुज	त्र्इ.भ्उज्	२
	बट्वा	ब्अ.ट्उ.ब्आ	३
३.	क. **वर्ण**	**स्थान**	**प्रयत्न**
	ग्	कण्ठ्य	स्पर्शी
	झ्	वर्त्स्य (दन्तमूलीय)	स्पर्शसङ्घर्षी
	म्	ओष्ठ्य	नासिक्य
	य्	तालव्य	अर्धस्वर
	ह्	स्वययन्त्रमुखी	सङ्घर्षी
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	देश	द्एस्	१
	विज्ञान	बइग्.ग्य्आन्	२
	प्रतीक्षा	प्र्अ.त्इक्.क्स्आ	३
	उपयोगी	उ.प्अ.य्ओ.ग्इ	४
	पञ्चतन्त्र	प्अन्.च्अ.त्अन्.त्र्अ	५
४.	क. **वर्ण**	**घोषत्व**	**प्राणत्व**
	ख्	अघोष	महाप्राण
	छ्	अघोष	महाप्राण
	ब्	घोष	अल्पप्राण
	ल्	घोष	अल्पप्राण
	स्	अघोष	महाप्राण
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	कन्या	क्.अन्.न्य्आ	२
	सम्पदा	स्अम्.प्अ.द्आ	३
	अभिव्यक्ति	अ.भ्इ.ब्य्अक्.त्इ	४
	विशेषज्ञता	ब्इ.स्ए.स्अग्.ग्य्अ.त्आ	५
	दश	द्अस्	१
५.	क. **वर्ण**	**घोषत्व**	**प्राणत्व**
	क	अघोष	अल्पप्राण
	ज	घोष	अल्पप्राण
	भ	घोष	महाप्राण
	य	घोष	अल्पप्राण
	स	अघोष	महाप्राण
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	काँट	काँट् (क्आँट्)	१

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	समाज	स.माज् (स्अ.म्आज्)	२
	ज्ञानवान्	ग्यान्.वान् (ग्यआन्.व्आन्)	२
	शोषणमूलक	सो.सन्.मु.लक् (स्ओ.स्अन्.म्उ.ल्अक्)	४
	पञ्चरत्न	पन्.च.रत्.न (प्अन्.च्अ.र्अत्.न्अ)	४

६.	क.	**वर्ण**	**प्राणत्व**	**स्थान**
		ज	अल्पप्राण	वर्त्स्य (दन्तमूलीय)
		ठ	महाप्राण	वर्त्स्य (दन्तमूलीय)
		म	अल्पप्राण	ओष्ठ्य
		य	अल्पप्राण	तालव्य
		ह	महाप्राण	स्वरयन्त्रमुखी (अतिकण्ठ्य)
	ख.	**शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
		समान	स.मान् (स्अ.म्आन्)	२ अक्षर
		नगरपालिका	न.गर्.पा.लि.का (न्अ.ग्अर्.प्आ.ल्इ.क्आ)	५ अक्षर
		सभ्यता	सभ्.य.ता. (स्अभ्.य्अ.त्आ)	३ अक्षर
		विज्ञान	विग्.ग्यान् (बइग्.ग्यआन्)	२ अक्षर
		आधुनिकता	आ.धु.नि.क.ता (आ.ध्उ.न्इ.क्अ.त्आ)	५ अक्षर

७.	क.	**वर्ण**	**घोषत्व**	**प्राणत्व**
		ठ	अघोष	महाप्राण
		म	घोष/ सघोष	अल्पप्राण
		प	अघोष	अल्पप्राण
		स	अघोष	महाप्राण
		ह	घोष/ सघोष	महाप्राण
	ख.	**शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
		मुसुमुसु	मु.सु.मु.सु. (म्उ.स्उ.म्उ.स्उ)	४
		आँत	आँत् (आँत्)	१
		सन्निपात	सन्.नि.पात् (स्अन्.न्इ.प्आत्)	३
		सम्मान	सम्.मान् (स्अम्.म्आन्)	२
		प्रतिभाशाली	प्र.ति.भा.सा.लि (प्र्अ.त्इ.भ्आ.स्आ.ल्इ)	५

८.	क.	**वर्ण**	**प्रयत्न**	**प्राणत्व**
		ख	स्पर्शी	महाप्राण
		ज	स्पर्शसङ्घर्षी	अल्पप्राण
		द	स्पर्शी	अल्पप्राण
		य	अन्तस्थ/ अर्धस्वर	अल्पप्राण
		स	सङ्घर्षी	महाप्राण
	ख.	**शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
		गाँस	गाँस् (ग्आँस्)	१
		सार्वभौम	सार्.ब्.भौ.म (स्आर्.ब्अ.भ्अउ.म्अ)	४
		सङ्घर्षशील	सङ्.घर.स.सिल् (स्अङ्.घ्अर्.स्अ.स्इल्)	४
		प्यारो	प्या.रो (प्य्आ.र्ओ)	२
		संविधान	सम्.बि.धान् (स्अम्.ब्इ.ध्आन्)	३

९.	क.	**वर्ण**	**स्थान**	**प्रयत्न**
		घ	कण्ठ्य	स्पर्शी
		ज	वर्त्स्य (दन्तमूलीय)	स्पर्शसङ्घर्षी
		म	ओष्ठ्य	नासिक्य
		य	तालव्य	अर्धस्वर/ अन्तस्थ
		ह	स्वरयन्त्रमुखी	सङ्घर्षी
	ख.	**शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
		विज्ञ	बिग्.ग्य (ब्इग्.ग्य्अ)	२
		शेष	सेस् (स्एस्)	१

		अभिव्यञ्जना	अ.भि.ब्यन्.ज.ना (अ.भ्इ.ब्य्अन्.ज्अ.न्आ)	५
		झटपट	झट्.पट् (झ्अट्.प्अट्)	२
		महिमा	म.हि.मा (म्अ.ह्इ.म्आ)	३

१०.	क.	**वर्ण**	**स्थान**	**प्रयत्न**
		ग	कण्ठ्य	स्पर्शी
		छ	वर्त्स्य (दन्तमूलीय)	स्पर्श सङ्घर्षी
		म	ओष्ठ्य	नासिक्य
		य	तालव्य	अर्धस्वर (अन्तस्थ)
		ह	स्वरयन्त्रमुखी	सङ्घर्षी
	ख.	**शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
		काल	काल् (क्आल्)	१
		बटुवा	ब.टु.वा. (ब्अ.ट्उ.ब्आ)	३
		विशेषज्ञ	बि.से.सग्.ग्यँ (ब्इ.स्ए.स्अग्.ग्य्अँ)	४
		कानुन	का.नुन् (क्आ.न्उन्)	२
		रमणीयता	र.म.नि.य.ता (र्अ.म्अ.न्इ.य्अ.त्आ)	५

११.	क.	**वर्ण**	**घोषत्व**	**प्राणत्व**
		प	अघोष	अल्पप्राण
		झ	सघोष	महाप्राण
		ध	सघोष	महाप्राण
		ङ	सघोष	अल्पप्राण
		स	अघोष	महाप्राण
	ख.	**शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
		औचित्यपूर्ण	औ.चित्.त्य.पुर्.न (अउ.च्इत्.त्य्अ.प्उर्.न्अ)	५ अक्षर ३ अक्षर
		सिर्जनशील	सिर्.जन्.सिल् (स्इर्.ज्अन्.स्इल्)	
		इख	इख् (इख्)	१ अक्षर
		सत्य	सत्.त्य (स्अत्.त्य्अ)	२ अक्षर
		महाकाली	म.हा.का.लि (म्अ.ह्आ.क्आ.ल्इ)	४ अक्षर

१२.	क.	**वर्ण**	**स्थान**	**प्रयत्न**
		ज	वर्त्स्य (दन्तमूलीय)	स्पर्श सङ्घर्षी
		थ	दन्त्य	स्पर्शी
		म	ओष्ठ्य	नासिक्य
		य	तालव्य	अर्धस्वर
		ल	वर्त्स्य (दन्तमूलीय)	पार्श्विक
	ख.	**शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
		सूर्योदय	सुर्.यो.द.य. (स्उर्.य्ओ.द्अ.य्अ)	४ अक्षर
		सामाजिक	सा.मा.जिक्. (स्आ.म्आ.ज्इक्)	३ अक्षर
		तात्तातो	तात्.ता.तो. (त्आत्.त्आ.त्ओ)	३ अक्षर
		बैठक	बै.ठक् (ब्अइ.ठ्अक्)	२ अक्षर
		ऋषि	रि.सि. (र्इ.स्इ)	२ अक्षर

१३.	क.	**वर्ण**	**स्थान**	**प्रयत्न**
		क	कण्ठ्य	स्पर्शी
		छ	वर्त्स्य (दन्तमूलीय)	स्पर्श सङ्घर्षी
		ठ	वर्त्स्य (दन्तमूलीय)	स्पर्शी
		य	तालव्य	अन्तस्थ/ अर्धस्वर
		ल	वर्त्स्य (दन्तमूलीय)	पार्श्विक
	ख.	**शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
		संविधान	सम्.बि.धान् (स्अम्.ब्इ.ध्आन्)	३ अक्षर
		झल्याकझुलुक	झ्अ.ल्याक्.झ्.लुक् (झ्अ.ल्य्आक्.झ्उ.ल्उक्)	४ अक्षर
		पञ्चामृत	पन्.चाम्.रित् (प्अन्.च्आम्.र्इत्)	३ अक्षर

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	शेष	सेस् (स्एस्)	१ अक्षर
	नासो	ना.सो (न्आ.स्ओ)	२ अक्षर
१४.	क. **वर्ण**	**स्थान**	**प्रयत्न**
	घ	कण्ठ्य	स्पर्शी
	छ	वर्त्स्य (दन्तमूलीय)	स्पर्श सङ्घर्षी
	ब	ओष्ठ्य	स्पर्शी
	य	तालव्य	अन्तस्थ/अर्धस्वर
	ह	स्वरयन्त्रमुखी	सङ्घर्षी
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	काम	काम् (क्आम्)	१ अक्षर
	शोषण	सो.सन् (स्ओ. स्अन्)	२ अक्षर
	टेलिभिजन	टे.लि.भि.जन् (ट्ए.ल्इ.भ्इ.ज्अन्)	४ अक्षर
	पञ्चरत्न	पन्.च.रत्.न (प्अन्.च्अ.र्अत्.न्अ)	४ अक्षर
	उपनिवेशवाद	उ.प.नि.बेस्.बाद् (उ.प्अ.न्इ.ब्एस्.ब्आद्)	५ अक्षर
१५.	क. **वर्ण**	**स्थान**	**प्रयत्न**
	ख	कण्ठ्य	स्पर्शी
	ज	वर्त्स्य (दन्तमूलीय)	स्पर्श सङ्घर्षी
	ब	ओष्ठ्य	स्पर्शी
	ह	स्वरयन्त्रमुखी (अतिकण्ठ्य)	सङ्घर्षी
	स	वर्त्स्य (दन्तमूलीय)	सङ्घर्षी
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	झ्फल्को	झ्.फल्.को(झ्अ.झ्अल्.क्ओ)	३ अक्षर
	जोस	जोस् (ज्ओस्)	१ अक्षर
	इमान्दारी	इ.मान्.दा.रि. (इ.म्आन्.द्आ.र्इ)	४ अक्षर
	ख्यालख्याल	ख्याल्.ख्याल् (ख्य्आल्.ख्य्आल्)	२ अक्षर
	अभिव्यक्ति	अ.भि.ब्यक्.ति (अ.भ्इ.ब्य्अक्.त्इ)	४ अक्षर
१६.	क. **वर्ण**	**स्थान**	**प्रयत्न**
	ख	कण्ठ्य	स्पर्शी
	झ	वर्त्स्य (दन्तमूलीय)	स्पर्श सङ्घर्षी
	ढ	वर्त्स्य (दन्तमूलीय)	स्पर्शी
	ब	ओष्ठ्य	स्पर्शी
	ह	स्वरयन्त्रमुखी (अतिकण्ठ्य)	सङ्घर्षी
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	हिमाली	हि.मा.लि (हइ . म्आ . ल्इ)	३ अक्षर
	शारीरिक	सा.रि.रिक् (स्आ.र्इ.र्इक्)	३ अक्षर
	विद्यालय	बिद्.द्या.ल.य (ब्इद्.द्य्आ.ल्अ.य्अ)	४ अक्षर
	विशेष	बि.सेस् (ब्इ.स्एस्)	२ अक्षर
	घाम	घाम् (घ्आम्)	१ अक्षर
१७.	क. **वर्ण**	**घोषत्व**	**प्राणत्व**
	क	अघोष	अल्पप्राण
	घ	सघोष	महाप्राण
	न	सघोष	अल्पप्राण
	थ	अघोष	महाप्राण
	स	अघोष	महाप्राण
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	तिन	तिन् (त्इन्)	१ अक्षर
	नेपाली	ने.पा.लि (न्ए.प्आ.ल्इ)	३ अक्षर
	विशेषज्ञता	बि.से.सग्.ग्यँ.ता (ब्इ.स्ए.स्अग्.ग्य्अँ.त्आ)	५ अक्षर
	शब्द	सब्.द (स्अब्.द्अ)	२ अक्षर
	सल्यान	सल्.ल्यान् (स्अल्.ल्य्आन्)	२ अक्षर

१८.	क. **वर्ण**	**घोषत्व**	**प्राणत्व**
	ज	सघोष	अल्पप्राण
	थ	अघोष	महाप्राण
	म	सघोष	अल्पप्राण
	ल	सघोष	अल्पप्राण
	ह	सघोष	महाप्राण
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	एक	एक् (एक्)	१ अक्षर
	सहरीकरण	स.ह.रि.क.रन् (स्अ.ह्अ.र्इ.क्अ.र्अन्)	५ अक्षर
	पुनर्जन्म	पु.नर्.जन्.म(प्उ.न्अर्.ज्अन्.म्अ)	४ अक्षर
	कन्या	कन्.न्या. (क्अन्.न्य्आ.)	२ अक्षर
	छताछुल्ल	छ.ता.छुल्.ल (छ्अ.त्आ.छ्उल्.ल्अ)	४ अक्षर
१९.	क. **वर्ण**	**स्थान**	**प्रयत्न**
	घ	कण्ठ्य	स्पर्शी
	न	वर्त्स्य (दन्तमूलीय)	नासिक्य
	ध	दन्त्य	स्पर्शी
	ह	स्वरयन्त्रमुखी	सङ्घर्षी
	य	तालव्य	अन्तस्थ/अर्धस्वर
	ख. **शब्द**	**अक्षरीकरण**	**अक्षर सङ्ख्या**
	विशेष	बि.सेस् (ब्इ.स्एस्)	२ अक्षर
	सञ्चारिका	सन्.चा.रि.का (स्अन्. च्आ. र्इ. क्आ)	४ अक्षर
	आँप	(आँप्)	१ अक्षर
	नगरपालिका	न.गर.पा.लि.का (न्अ.ग्अर्.प्आ.ल्इ.क्आ)	५ अक्षर
	झलझली	झल्.झ.लि (झ्अल्. झ्अ. ल्इ)	३ अक्षर

एकाइ २: वर्णविन्यास र चिह्न परिचय

१.	सौन्दर्यका मोहनीमा बग्नेहरू प्राय असभ्य, वर्वर आततायी र जङ्गली भइदिन्छन् । उनीहरू सुन्दर फूल देख्नासाथ त्यसका निकट पुगी टाँसिन चाहन्छन् ।
२.	मान्छेले किन फूलको इर्ष्या गर्छ ? आफू फूलजस्तो सुन्दर जिन्दगी बाँच्न किन खोज्दैन ?
३.	दुःख र अनेकौं समस्याहरूसँग जुध्दै अनि अल्झिँदै बाँच्नु नै मान्छेको नियति हो । सहज एवम् सरल ढङ्गले बाँच्न उसले कसरी पाउँछ र ? यस यथार्थलाई बुझ्ने व्यक्तिले मात्र जीवन जिउन जान्दछ ।
४.	जेसुकै होस्, म सधैं आलु खान्छु तर मलाई सधैं आलु खान डर लाग्छ किनभने म पनि बिसौं शताब्दीकै आलु मान्छे जसको कर्म हो आलु खानु तर धर्म हो आलु खाएर पेडाको धाक लगाउनु ।
५.	अहिलेको खाद्य सङ्कट खडा गर्ने मूल कारण अर्थबजार हो । यसको प्रमुख जड कृषि उपजलाई ऊर्जामा खपत गर्ने कार्यमा रहेको छ । हामी भने आफ्नो खेतबारी बाँझै छोड्छौं ।
६.	विद्याको सर्टिफिकेट कोठाको बाकसमा हुन्छ । भलादमीको प्रमाणपत्र सधैं उसका शरीरउपर विज्ञापन जाहेरी गर्दछ । पोसाक मात्र पहिला पास हो । त्यसमा पनि रेसमी रूमालको फूलदार फर्काइ र टोपीको कर्काइले पहिलो श्रेणीमा उत्तीर्ण भएको जनाउँछ ।
७.	सुशासन र विकास अहिले नेपाली जनताका चाहना होइनन् भनेर कसले भन्न सक्छ र । त्यसको प्राप्तिका लागि नै युगौंदेखि हामीले सपना देख्दै आएका छौं । हरे शिव ! अब पनि के हुने हो भन्न सकिन्न ।
८.	गुरुले भने, "विश्वका वैज्ञानिकहरू पनि आध्यात्मिक कुरामा विश्वास गर्छन् ।"

९.	मेरी जननी तिमीसँग एउटा कुरा सोध्छु, नढाँटी भन है। म अचेल नराम्रा सपना देख्न थालेकी छु। तिमीमाथि भएको पीडाको सपना। तिमीसँग के ढाँट्नु अब। मेरा सपनामा तिम्रा सम्पूर्ण रूखहरू ढलेछन्।
१०.	भाइ विद्यालयबाट फर्कदै थियो। उसको भेट बाटामा बहिनीसँग भयो। उनीहरू समयमै घर फर्के। उनीहरूले करेसामा ढकमक्क फुलेको सेता, पहेंला र राता पुष्पहरू हेरे। उनीहरू खुसी भए।
११.	"त्यसले भनेर म मान्दिनँ के ! बुबामुमाले भने पनि मान्दिनँ।" आखिर गौरी आफैं निश्चय गर्थी अनि हामी दुबै हातेमालों गर्दै बगैंचाको डिलमा आएर उभिन्थ्यौं।
१२.	फेरि निराशावादी बनेर मात्र के गर्ने ? बाँच्नु छ, जीवन बिताउनु नै छ, नबदलिने यस समाजलाई एक धक्का दिएर बदल्नुपर्छ। नत्र यतिका पढेको, गुनेको के फाइदा भो ?
१३.	पूजा गरेको पर्सिपल्ट गुमानेकी स्वास्नी लडी। बिचरी झण्डै खुस्की थी, बाँची। त्यसपछि धनजितेलाई समात्यो।
१४.	दुनियाँमा कोही पनि मित्र हुँदैनन् सबै शत्रु, सबै बैरी नै हुन्छन्। कसले भन्छ अकारण नै कोही शत्रु हुँदैन ? मानें, अकारण कोही कसैको शत्रु हुँदैन तर झगडाको निहुँ कति सजिलै पाइन्छ ?
१५.	मान्छेलाई बेगुनी भन्नुपर्ने कारणै यही हो, ऊ गुणको पारख गर्नको साटो बेइज्जती गर्छ।
१६.	"समुद्रपारि पुग्न सक्यो भने उनीहरूको जोर चल्दैन।" आमा भन्नुहुन्थ्यो। म आफ्नो सम्पूर्ण इच्छाशक्तिले मधुकरको घोडालाई छिटोछिटो धकेल्न थाल्दथें।
१७.	"चाहिदैन हामीलाई कसैको छातासाता" भन्दै ती तरुनीले रिस, शङ्का, डर इत्यादि भावहरू मिसिएको जस्तो अनुहार लाइन् र तीखा आँखाले हेर्दै फट्टाफट आफ्नो बाटो लागिन्।
१८.	यसरी दिनरातको पहिरो र हावाको डरमा बाँचेर, दुई एकर जमिनको माटो वर्षमा दुईचोटि पल्टाएर जीविका गर्ने मेलो परिवारको हत्या हो।
१९.	प्रिय सुनखानी ! तिम्रा अरू छोराछोरीको खवर के छ ? तिनीहरू तिम्रो वक्षस्थलको तातोले नपुगेर सम्साँझैदेखि बोतलभित्रको सिरकमा लपेटिएर हिँड्छन् रे।

एकाइ ३: शब्दवर्ग (पदवर्ग)

१.	**पद**	**शब्दवर्ग**
	सित	नामयोगी
	यो	विशेषण
	लैजान्छ	क्रिया
	हामी	सर्वनाम
२.	**पद**	**शब्दवर्ग**
	नियम	नाम
	हुनेछ	क्रिया
	र	संयोजक
	हामी	सर्वनाम
३.	**पद**	**शब्दवर्ग**
	तिमी	सर्वनाम
	मान्छेको	विशेषण
	आदर	नाम
	है	निपात
	धत्	बिस्मयादिबोधक
	लखरलखर	क्रियाविशेषण
४.	**पद**	**शब्दवर्ग**
	यी	विशेषण
	ज्ञान	नाम
	तसर्थ	संयोजक
	म	सर्वनाम
	गर्छु	क्रिया
	मेरा	विशेषण
५.	**पद**	**शब्दवर्ग**
	र	संयोजक
	दौडेर	क्रियाविशेषण
	जस्तो	नामयोगी
	दुङ्गाको	विशेषण
	म	सर्वनाम
	पाऊँ	क्रिया
६.	**पद**	**शब्दवर्ग**
	यस्तो	क्रियाविशेषण
	म	सर्वनाम
	शङ्का	नाम
	सम्म	नामयोगी
	सक्ला	क्रियापद
	त	निपात
७.	**पद**	**शब्दवर्ग**
	खिस्स	क्रियायोगी
	छैन	क्रिया
	र	संयोजक
	लाज	नाम
	त्यो	विशेषण
	सित	नामयोगी
८.	**पद**	**शब्दवर्ग**
	ऊ	सर्वनाम
	एक्कासी	क्रियाविशेषण
	मनको	विशेषण
	स्थिति	नाम
	दिन्थी	क्रियापद
	सँग	नामयोगी
९.	**पद**	**शब्दवर्ग**
	हर्षनारान	नाम
	सबैको	विशेषण
	सँग	नामयोगी
	तर	संयोजक
	भने	क्रिया
	त	निपात
१०.	**पद**	**शब्दवर्ग**
	आलु	नाम
	भन्दा	नामयोगी
	निकै	क्रियाविशेषण
	र	संयोजक
	यस	सर्वनाम
	सक्दैन	क्रिया
११.	**पद**	**शब्दवर्ग**
	इतिहासले	नाम
	तिमी	सर्वनाम
	आज	क्रियाविशेषण (क्रियायोगी)
	त	निपात
	पछाऱ्यो	क्रियापद
	भन्दा	नामयोगी
१२.	**पद**	**शब्दवर्ग**
	निर्दोष	विशेषण
	तर	संयोजक
	हुन	क्रियाविशेषण
	शत्रु	नाम
	भै	नामयोगी
	यो	विशेषण

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१३.	पद	शब्दवर्ग
	हालबखर	नाम
	नि	निपात
	धेरै	विशेषण
	चुहाएर	क्रिया विशेषण
	सित	नामयोगी
	तिमी	सर्वनाम

१४.	पद	शब्दवर्ग
	भएपछि	नामयोगी
	सधैं	क्रियाविशेषण
	वा!	विस्मयादिबोधक
	बाबु	नाम
	बाको	विशेषण
	आउँछन्	क्रियापद

१५.	पद	शब्दवर्ग
	ओहो !	विस्मयादिबोधक
	कुरा	नाम
	बाबु !	विस्मयादिबोधक
	अब	क्रियायोगी
	नबोलाउनु	क्रिया
	ती	विशेषण

१६.	पद	शब्दवर्ग
	अँध्यारो	विशेषण
	सम्म	नामयोगी
	सत्कार्य	नाम
	त्यसरी	क्रियाविशेषण
	नै	निपात
	झल्कन्छ	क्रियापद

१७.	पद	शब्दवर्ग
	मिठो	विशेषण
	राम्रो	क्रियाविशेषण
	भने	संयोजक
	मिठाले	नामपद
	हानि	नामपद
	हो	क्रियापद

१८.	पद	शब्दवर्ग
	अँ	निपात
	सम्झैं	क्रियापद
	समाजको	विशेषण
	कागज	नामपद
	मात्र	निपात
	परिवर्तन	नामपद

१९.	पद	शब्दवर्ग
	त	निपात
	कुरा	नाम
	पोष्य	विशेषण
	माथि	नामयोगी
	उन	सर्वनाम
	थिएन	क्रिया

एकाइ ४: शब्दस्रोत

१.	तत्सम शब्दः ग्रामीण, स्पष्ट आगन्तुक शब्दः सहर, जमिन
२.	तत्सम शब्दः भाषा, प्राचीन आगन्तुक शब्दः लवज, खुसबु
३.	तत्सम शब्दः अत्यन्त, पुस्तक आगन्तुक शब्दः हात, पाँच
४.	तत्सम शब्दः भाग्य, नियम आगन्तुक शब्दः भलादमी, कानुन
५.	तत्सम शब्दः विद्यालय, विद्युत् आगन्तुक शब्दः इन्टरनेट, डस्टर
६.	तत्सम शब्दः विद्या, विज्ञापन आगन्तुक शब्दः सर्टिफिकेट, भलादमी
७.	तत्सम शब्दः स्वागत, व्यवस्था आगन्तुक शब्दः कलेज, ड्रेस
८.	तत्सम शब्दः मित्रता, स्मृति आगन्तुक शब्दः रेल, मोटर
९.	तत्सम शब्दः अनुसन्धान, दृष्टि आगन्तुक शब्दः टुरिष्ट, लज
१०.	तत्सम शब्दः ग्रामीण, आधुनिक आगन्तुक शब्दः गरिब, सरकार
११.	तत्सम शब्दः अन्न, उर्जा आगन्तुक शब्दः डिजेल, पेट्रोल
१२.	तत्सम शब्दः कृषक, अन्न तद्भव शब्दः असार, धान
१३.	तत्सम शब्दः आवास, मन्दिर आगन्तुक शब्दः टोप, टाई
१४.	तत्सम शब्दः ग्रामीण, सुखद आगन्तुक शब्दः आम्दानी, सहर
१५.	तत्सम शब्दः विद्या, प्रमाणपत्र आगन्तुक शब्दः सर्टिफिकेट, उपर
१६.	तत्सम शब्दः कार्य, भण्डारण आगन्तुक शब्दः कम्प्युटर, इलेक्ट्रोनिक
१७.	तत्सम शब्दः शौचालय, लज्जाबोध आगन्तुक शब्दः टुरिस्ट, केक

एकाइ ५: शब्दनिर्माण

१.	क.	**समस्त शब्द**	**विग्रह**
		नरपशु	नररुपि पशु
		भाग्योदय	भाग्य उदय
		गाउँसमाज	गाउँ र समाज
		द्वित्व शब्द	**निर्माण प्रक्रिया**
		साह्रोगाह्रो	गाह्रो+गाह्रो
		आँचोखाँचो	खाँचो+खाँचो
		कामसाम	काम+काम
	ख.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
		सांस्कृतिक	संस्कृति+इक
		विविधता	विविध+ता
		प्रचलन	प्र+चलन
		प्राचीन	प्राच+ईन
		सिकेका	सिक्+एका
		कार्य	कृ+य

२.	क.	**उपसर्ग व्युत्पन्न शब्दः**	
		अन+जान	अन्जान
		निर+अन्तर	निरन्तर
		बे +काम	बेकाम
		प्रत्यय व्युत्पन्न शब्दः	
		काल+ईन	कालीन
		पण्डित+याइँ	पण्डित्याइँ
		घर+एलु	घरेलु
	ख.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
		भव्यता	भव्य+ता
		उद्घाटन	उद्+घाटन
		पर्यटन	परि+अटन

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	निर्माण	निर+मान
	महोत्सव	महा+उत्सव
	अवसर	अव+सर
३.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	अति+आचार	अत्याचार
	परि+वेश	परिवेश
	कु+कर्म	कुकर्म
	प्रत्यय व्युत्पन्न शब्दः	
	लेख्+अन्त	लेखन्त
	जान्+आउ	जनाउ
	जल+मय	जलमय
	ख. **समस्त शब्द**	**विग्रह**
	वर्षभर	वर्ष भरी
	अन्नबाली	अन्न र बाली
	घर खर्च	घर खर्च
	द्वित्व शब्द	**निर्माण प्रक्रिया**
	आल्तुफाल्तु	फाल्तु+फाल्तु
	घरघर	घर+घर
	सरसामान	सामान+सामान
	ग. **सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	सामुदायिक	समुदाय+इक
	विद्यालय	विद्या+आलय
	गैरसरकारी	गैर+सरकारी
	परोपकारी	पर+उपकारी
	प्रदान	प्र+दान
	असहाय	अ+सहाय
४.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	सञ्चालक	सम्+चालक
	उद्योग	उद्+योग
	नसक्दा	नं+सक्दा
	प्रत्यय व्युत्पन्न शब्दः	
	राजनैतिक	राजनीति+इक
	अस्थिरता	अस्थिर+ता
	योग्यता	योग्य+ता
	ख. **समस्त शब्द**	**विग्रह**
	दाजुभाइ	दाजु भाइ
	वनभोज	वनमा भोज
	बुढाबुढी	बुढा बुढी
	द्वित्व शब्द	**निर्माण प्रक्रियः**
	सरसल्लाह	सल्लाह+सल्लाह
	तम्तयार	तयार+तयार
	खानासाना	खाना+खाना
	ग. **सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	हिमालय	हिम+आलय
	सौन्दर्य	सुन्दर+य
	पर्यटन	परि+अटन
	पर्यटक	परि+अटक
	प्रदूषण	प्र+दूषण
	प्रकृति	प्र+कृति
५.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	अन + आदर	अनादर
	सु + आगत	स्वागत
	दुस् + मन	दुस्मन
	प्रत्यय व्युत्पन्न शब्दः	
	नेपाल + ई	नेपाली
	गै + अक	गायक
	पूर्व + एली	पूर्वेली

	ख. **समस्त शब्द**	**विग्रह**
	जीवनपथ	जीवनरुपी पथ
	कर्तव्यनिष्ठ	कर्तव्यले निष्ठ
	पञ्चामृत	पाँच अमृतको समूह
	द्वित्व शब्द	**दोहोरिएको अंश**
	आ-आफ्ना	आफ्ना + आफ्ना
	पलपल	पल + पल
	मरमद्दत	मद्दत + मद्दत
	ग. **सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	सूर्योदय	सूर्य + उदय
	सूर्यास्त	सूर्य + अस्त
	अत्यन्त	अति + अन्त
	कर्तव्य	कृ+ तव्य
	सामाजिक	समाज + इक
	डुलेर	डुल् + एर
६.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	सु+गन्ध	सुगन्ध
	अधि+आय	अध्याय
	निर्+आकार	निराकार
	प्रत्यय व्युत्पन्न शब्दः	
	जुन+एली	जुनेली
	भूगोल+इक	भौगोलिक
	उच्च+तम्	उच्चतम्
	ख. **समस्त शब्द**	**विग्रह**
	चरित्रनिर्माण	चरित्रको निर्माण
	देशभक्त	देशको भक्त
	दाजुभाइ	दाजु भाइ
	द्वित्व शब्द	**दोहोरिएको अंश**
	कर्तव्यसर्तव्य	कर्तव्य + कर्तव्य
	एकआपस	आपस + आपस
	गाउँगाउँ	गाउँ + गाउँ
	ग. **सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	विद्यार्थी	विद्या+अर्थी
	विद्यालय	विद्या+आलय
	पर्यटक	परि+अटक
	हिमालय	हिम+आलय
	आधुनिक	अधुना+इक
	प्रत्येक	प्रति+एक
७.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	निर+भीक	निर्भीक
	नि+डर	निडर
	सम्+उचित	समुचित
	प्रत्यय व्युत्पन्न शब्दः	
	गाउँ+ले	गाउँले
	मानव+ईय	मानवीय
	गम्भीर+य	गाम्भीर्य
	ख. **समस्त शब्द**	**विग्रह**
	बालबालिका	बाल बालिका
	बांह्रसत्ताइस	बाह्र सत्ताइस
	द्रव्यपिशाच	द्रव्यरुपी पिशाच
	द्वित्व शब्द	**निर्माण प्रक्रिया**
	मरमद्दत	मद्दत+मद्दत
	सरसहयोग	सहयोग+सहयोग
	आल्तुफाल्तु	फाल्तु+फाल्तु
	ग. **सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	पुस्तकालय	पुस्तक+आलय
	विद्यार्थी	विद्या+अर्थी
	प्राकृतिक	प्रकृति+इक

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		परोपकार	परः+उपकार
		मनोभाव	मनः+भाव
		सौन्दर्य	सुन्दर+य
८.	क.	**उपसर्ग व्युत्पन्न शब्दः**	
		अ+ज्ञान	अज्ञान
		उद्+योग	उद्योग
		कु+कर्म	कुकर्म
		प्रत्यय व्युत्पन्न शब्दः	
		दृश्+अनीय	दर्शनीय
		कवि+त्व	कवित्व
		बाला+पन	बालापन
	ख.	**समस्त शब्द**	**विग्रह**
		बालबालिका	बाल बालिका
		ऋषिमुनि	ऋषि मुनि
		चित्तशुद्धि	चित्तको शुद्धि
		द्वित्व शब्द	**निर्माण प्रक्रिया**
		ससाना	साना+साना
		ठूल्ठूला	ठूला+ठूला
		कुटाकुट	कुट+कुट
	ग.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
		विदेश	वि+देश
		पर्यटक	परि+अटक
		स्वागत	सु+आगत
		आतिथ्य	अतिथि+य
		अत्यन्त	अति+अन्त
		हर्षित	हर्ष+इत
९.	क.	घर+एलु	घरेलु
		उद्+योग	उद्योग
		उप+आर्जन	उपार्जन
		जीव+इक	जैविक
		सम्+वर्धन	संवर्धन
		हु+एका	भएका
	ख.	**समस्त शब्द**	**विग्रह**
		देशविदेश	देश विदेश
		रातदिन	रात दिन
		गाउँसहर	गाउँ सहर
		द्वित्व शब्द	**निर्माण प्रक्रिया**
		ठूल्ठूला	ठूला+ठूला
		झैझगडा	झगडा+झगडा
		आआफ्ना	आफ्ना+आफ्ना
	ग.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
		पुस्तकालय	पुस्तक+आलय
		परोपकार	परः+उपकार
		महर्षि	महा+ऋषि
		सूर्योदय	सूर्य+उदय
		अत्यावश्यक	अति+आवश्यक
		अध्ययन	अधि+अयन
१०.	क.	**उपसर्ग व्युत्पन्न शब्दः**	
		सु+पुत्र	सुपुत्र
		अन+आदर	अनादर
		बद+नियत	बदनियत
		प्रत्यय व्युत्पन्न शब्दः	
		केन्द्र+ईय	केन्द्रीय
		कवि+ता	कविता
		रात+यौली	रत्यौली
	ख.	**समस्त शब्द**	**विग्रह**
		घामछाया	घाम र छाया
		मखिबुट्टे	माखाको जस्तो बुट्टा भएको
		हात्तीसुँढे	हात्तीको जस्तो सुँढ भएको
		द्वित्व शब्द	दोहोरिएको अंश
		आलोपालो	आलो
		आङसाङ	साङ
		खुरूखुरू	खुरू
	ग.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
		मनोरम	मनः + रम
		सरोवर	सरः + वर
		प्रत्येक	प्रति + एक
		वर्णित	वर्ण + इत
		राष्ट्रिय	राष्ट्र + इय
		सामाजिक	समाज+इक
११.	क.	**उपसर्ग व्युत्पन्न शब्दः**	
		बि+जोड	बिजोड
		सम्+मान	सम्मान
		अधि+आत्म	अध्यात्म
		प्रत्यय व्युत्पन्न शब्दः	
		गाउँ+ले	गाउँले
		मान+अनीय	माननीय
		कवि+ता	कविता
	ख.	**समस्त शब्द**	**विग्रह**
		साँझबिहान	साँझ बिहान
		साथीभाइ	साथी र भाइ
		कुलदीप	कुलको दीप
		द्वित्व शब्द	**दोहोरिएको अंश**
		झैझगडा	झगडा
		ससाना	साना
		गोदगाद	गोद
	ग.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
		खँदिलो	खाँद + इलो
		रमेश	रमा + इश
		मनोरथ	मनः + रथ
		परोपकार	परः + उपकार
		सदैव	सदा + एव
		हिमालय	हिम + आलय
१२.	क.	**उपसर्ग व्युत्पन्न शब्दः**	
		परिस्थिति	परि + स्थिति
		उत्प्रेरक	उत् + प्रेरक
		सुरक्षा	सु + रक्षा
		प्रत्यय व्युत्पन्न शब्दः	
		वैदेशिक	विदेश + इक
		रोजगारी	रोजगार + इ
		खेलेका	खेल् + एका
	ख.	**समस्त शब्द**	**विग्रह**
		सप्तर्षि	सात ऋषिको समूह
		छात्रछात्रा	छात्र र छात्रा
		वनभोज	वनमा भोज
		द्वित्व शब्द	**दोहोरिएको अंश**
		सरसल्लाह	सल्लाह
		तात्तातो	तातो
		आआफ्ना	आफ्ना
	ग.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
		प्रत्येक	प्रति + एक
		मधेसी	मधेस + ई
		पहाडी	पहाड + ई

	अत्यावश्यक	अति + आवश्यक
	व्यस्त	वि + अस्त
	रक्स्याहा	रक्सी + आहा
१३.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	कुलत	कु + लत
	अकाल	अ + काल
	विकास	वि + कास
	परिसंवाद	परि + संवाद
	कुबाटो	कु + बाटो
	उपकार	उप + कार
	प्रत्यय व्युत्पन्न शब्दः	
	सामाजिक	समाज + इक
	बुझक्कड	बुझ + अक्कड
	मायालु	माया + आलु
	मित्रता	मित्र + ता
	गन्तव्य	गम् + तव्य
	ममतामय	ममता + मय
	ख. **समस्त शब्द**	**विग्रह**
	दुईचार	दुई वा चार
	जीवनयात्रा	जीवनरूपी यात्रा
	सुखदुःख	सुख र दुःख
	द्वित्व शब्द	**दोहोरिएको अंश**
	झ्फल्को	झल्को
	ससाना	साना
	सरसहयोग	सहयोल
	ग. **सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	सूर्योदय	सूर्य + उदय
	मनोरथ	मनः + रथ
	सदैव	सदा + एव
	परोपकार	पर + उपकार
	देवर्षि	देव + ऋषि
	सूर्यास्त	सूर्य + अस्त
१४.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	संविधान	सम् + विधान
	निर्माण	निर् + माण
	उपेक्षा	उप + इक्षा
	प्रत्यय व्युत्पन्न शब्दः	
	लोकतान्त्रिक	लोकतन्त्र +इक
	आर्थिक	अर्थ + इक
	नेपाली	नेपाल+ई
	ख. **समस्त शब्द**	**विग्रह**
	कर्तव्यनिष्ठ	कर्तव्यले निष्ठ
	हकहित	हक र हित
	महापुरुष	महान पुरुष
	द्वित्व शब्द	**दोहोरिएको अंश**
	टाढाटाढा	टाढा
	झ्ल्याकझ्लुक	झ्लुक
	झ्फल्को	झ्फल्को
	ग. **सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	रमणीय	रम् + अनीय
	पर्यटक	परि+ अटक
	गन्तव्य	गम् + तव्य
	विदेशी	विदेश + ई
	टल्केको	टल्क + एको
	अत्युक्ति	अति + युक्ति

१५.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	अन + जान	अन्जान
	अति + अन्त	अत्यन्त
	सु + आगत	स्वागत
	प्रत्यय व्युत्पन्न शब्दः	
	घोक् + अन्त	घोकन्त
	स्वर्ण + इम	स्वर्णिम
	कृति + त्व	कृतित्व
	ख. **समस्त शब्द**	**विग्रह**
	साँझबिहान	साँझ र बिहान
	श्रमजीवी	श्रमले जीउने
	छात्रछात्रा	छात्र र छात्रा
	द्वित्व शब्द	**दोहोरिएको अंश**
	मर्मसला	मसला
	गर्गहना	गहना
	ससाना	साना
	ग. **सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	प्राकृतिक	प्रकृति + इक
	सौन्दर्य	सुन्दर + य
	जैविक	जीव + इक
	सूर्योदय	सूर्य + उदय
	गफाडी	गफ + आडी
	धरोहर	धरः + हर
१६.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	अकाल	अ + काल
	अनपत्यार	अन् + पत्यार
	कुभलो	कु + भलो
	प्रत्यय व्युत्पन्न शब्दः	
	दयालु	दया + आलु
	स्वाभाविक	स्वभाव + इक
	दुखी	दुःख + ई
	ख. **समस्त शब्द**	**विग्रह**
	पिताम्बर	पीत छ अम्बर जसको
	कक्षाकोठा	कक्षाका लागि कोठा
	बिनाकाम	बिना काम
	द्वित्व शब्द	**दोहोरिएको अंश**
	तात्तातो	तातो
	छिटोछिटो	छिटो
	पढाइसढाइ	पढाइ
	ग. **सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	अत्यावश्यक	अति + आवश्यक
	भौतिक	भूत + इक
	भलाइ	भलो + आइ
	सङ्गति	सम् + गति
	अव्यवस्थित	अ + व्यवस्थित
	सोचाइ	सोच + आइ
१७.	क. **उपसर्ग व्युत्पन्न शब्दः**	
	बद + मास	बदमास
	परा + जय	पराजय
	कु + कर्म	कुकर्म
	प्रत्यय व्युत्पन्न शब्दः	
	प्रकाशक + ईय	प्रकाशकीय
	मित्र + ता	मित्रता
	दया + आलु	दयालु

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ख.	**समस्त शब्द**	**विग्रह**
	पीताम्बर	पीत छ अम्बर जसको
	देशहित	देशका लागि हित
	देशविदेश	देश र विदेश
	द्वित्व शब्द	**दोहोरिएको अंश**
	आआफ्नो	आफ्नो
	सरसहयोग	सहयोग
	छरछिमेक	छिमेक
ग.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	सौन्दर्य	सुन्दर + य
	हिमाली	हिम + आली
	प्राकृतिक	प्रकृति + इक
	स्वागत	सु + आगत
	हँसिलो	हाँस् + इलो
	कान्छयामा	कान्छी + आमा
१८. क.	**उपसर्ग व्युत्पन्न शब्दः**	
	गैरजिम्मेवारी	गैर + जिम्मेवारी
	अनिर्णय	अ + निर्णय
	प्रमुख	प्र + मुख
	प्रत्यय व्युत्पन्न शब्दः	
	राजनैतिक	राजनीति + इक
	दलीय	दल + ईय
	कर्तव्य	कृ + तव्य
ख.	**समस्त शब्द**	**विग्रह**
	सप्तकोशी	सात कोसीको समूह
	वनभोज	वनमा भोज
	नीलकण्ठ	नीलो छ कण्ठ जसको
	द्वित्व शब्द	**दोहोरिएको अंश**
	सरसल्लाह	सल्लाह
	आआफ्ना	आफ्ना
	गल्याकगुलुक	गल्याक
ग.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	पण्डित्याइँ	पण्डित+ याइँ
	वयोबृद्ध	वयः+ बृद्ध
	व्यावहारिक	व्यवहार+ इक
	उपदेश	उप+ देश
	सदैव	सदा+एव
	भएको	हु+एको
१९. क.	**उपसर्ग व्युत्पन्न शब्दः**	
	बे + इमान	बेइमान
	सु + पुत्र	सुपुत्र
	अप + मान	अपमान
	प्रत्यय व्युत्पन्न शब्दः	
	पाल्पा + ली	पाल्पाली
	मोटो + आइ	मोटाइ
	आत्मा + ईय	आत्मीय
ख.	**समस्त शब्द**	**विग्रह**
	नौगेडी	नौ गेडीको समूह
	मृगनयनी	मृगका जस्ता नयन भएकी
	रातोपिरो	रातो पिरो
	द्वित्व शब्द	**दोहोरिएको अंश**
	मरमसला	मसला
	आआफ्ना	आफ्ना
	झझल्को	झल्को
ग.	**सन्धियुक्त शब्द**	**सन्धिविच्छेद**
	सौन्दर्य	सुन्दर + य
	भलाइ	भलो + आइ
	आर्थिक	अर्थ + इक
	उपार्जन	उप + आर्जन
	पर्यटन	परि + अटन
	स्वागत	सु + आगत

एकाइ ६: शब्द रूपायन

१.	क. मेरा योजना सबै पूरा होऊन्। म भ्रमणबाट अथाह ज्ञान आर्जन गर्नेछु। म प्राप्त ज्ञानको उपयोग गर्न चुक्ने छैन।
	ख. यस वर्ष उनीहरू मनग्यै अन्नबाली भित्र्याउलान्। हामी सबैलाई केही राहत मिल्ला। यद्यपि चामलको मूल्य भने नघट्ला।
२.	क. तँ विज्ञान विषय पढ्दै छस्। तँ डाक्टर बन्न चाहन्छस्। तँ नियमित रूपमा विद्यालय जाने गरेको छस्।
	ख. तँ पनि राम्रो काम गर। तँ बरालिएर नहिँड्। तैंले आफ्नो क्षमता देखा। तँ सत्मार्गमा लम्की।
३.	क. गायिका गीत गाउनका लागि मञ्चतिर उक्लिन्। उसका पछिपछि गायक पनि मञ्चतिर लम्क्यो। गायिकाले आफ्नो गीतद्वारा सबैलाई मन्त्रमुग्ध तुल्याइन्। गायक पनि के कम थियो र ! उसले पनि सबैलाई नचाउँदै मिठो गीत गुनगुनायो।
	ख. श्याम विहान सबेरै उठ्नुहुन्छ। उहाँ धेरै बेरसम्म व्यायाम गर्नुहुन्छ। उहाँ साथीहरूसँग घुम्न निस्कनुहुन्छ। उहाँ पत्रपत्रिकाहरूमा सरसरती आँखा दौडाउनुहुन्छ। उहाँ खाना खाइसकेपछि नियमित काममा व्यस्त हुनुहुन्छ।
४.	क. उनीहरू मेरा मामाका छोराहरू हुन्। उनीहरू खाइलाग्दा र रातापिरा देखिन्छन्। उनीहरूले भर्खरै कक्षा उत्तीर्ण गरेका छन्। उनीहरू स्नातक पढ्न विदेश जाने तरखरमा छन्। उनीहरूका साथी पनि त्यही चक्करमा छन्।
	ख. ऊ चित्रकला प्रदर्शनीमा जान्थ्यो। ऊ चित्रकलामा रुचि राख्थ्यो। साथीहरूले पनि उसलाई राम्रो मान्थे। बुबाआमाले पनि उसको चित्र हेरेर सुझाव दिनुहुन्थ्यो। ऊ महान् चित्रकार बन्न चाहन्थ्यो।
५.	क. मेरी आमा आज बजार जानुभएको छ। बहिनीले आफूलाई खानेकुरा मगाएकी छ। काकीले खेत खन्ने सामान लिएर आउन भन्नुभयो। दिदी आज नै हाम्रो घर आउँदै हुनुहुन्छ। बेलुका हजुरआमासँग पनि भेटेर रमाउन पाइन्छ।
	ख. तिमी नियमित कलेज जाऊ। तिमीले पढाइ नै जीवनको ज्योति हो भन्ने बुझ। तिमीले आफ्नो व्यवहार पनि सुधार। तिमी अरूको विचारलाई सम्मान गर । तिमी भविष्यमा असल मान्छे बन।
६.	क. क्रिकेट खेलाडीले उत्कृष्ट खेल प्रदर्शन गर्नेछ। उसले आफ्नो क्षमता देखाउने छ। खेल जितेपछि पुरस्कार प्राप्त गर्नेछ। उसले देशको नाम राख्नेछ। राज्यले उसलाई सम्मान गर्नेछ।
	ख. तिमी गीत रचना गर्छौं। तिमी आफैंले गीत गाउँछौ। तिमीमा गीत गाउने क्षमता छ। तिमीले गीत गाएर सबैलाई आकर्षित तुल्याउँछौ। तिमी देशको चर्चित गायक र गीतकार पनि हौ।
७.	क. तिमीहरू बजार जाओ। तिमीहरू किताब किन। बजारमा भेटिएको साथीसँग परिचय गर। उसको घर ठेगाना सोध। उनीहरू मलाई असल कुरा सिकाऊन्।
	ख. तिमी त साह्रै राम्रा छौं। केटीले केटासँग भनिछे। केटाले भन्यो, "राम्रो त ज्ञानको चेतना हो।" यो कुरा केटीले राम्ररी बुझिन। केटालाई जिस्क्याउने उसको योजना बिफल भयो।

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८.	क. गुरु बाले भाइलाई नियमित विद्यालय आउनुपर्छ भन्नुभयो। काकाले पनि नियमित रूपमा पढाइ नभएको बताउनुभयो। राम्रो केटो झोला बोकेर आउँदै थियो। दाज्यले उसको पढाइप्रति ध्यान दिएका थिए। मामा र बुबा सामाजिक काममा लागेकाले दाजुको भूमिका बढेको थियो। ख. म नेपाली हुँ। म रारा पुगेकी छैन। म कहिले त्यहाँ पुगूँ भन्ने विचारमा छु। मैले अहिलेसम्म त्यहाँ जाने अवसर पाएकी छैन। म रारामा पुगेर गौरवान्वित हुनेछु।
९.	क. मेरा साथीहरू वनभोज गए। उनीहरूले वनभोजमा गीत गाए। उनीहरूले चुटकिला सुनाए। उनीहरू आफ्ना साथीसँग नाचे। उनीहरूका केटी साथीहरू वनभोज आएनन्। ख. म राष्ट्रका लागि असल काम गरूँ। मलाई साथीहरू सहयोग गरून्। हामी उद्यमी बनौं। हामी देशलाई समृद्ध पारौं। देशविरोधी विचार हामीलाई नआओस्।
१०.	क. म प्रत्येक दिन बिहान सबेरै उठ्छु। म हातमुख धुन्छु। म चिया पिएर पढ्न थाल्छु। तिमीहरू भने सधैं ढिलो उठ्छौ। तिमीहरू पढाइमा पनि पछि पर्छौ। ख. उनी कक्षा १२ मा पढ्दै छन्। उनी अति नै परिश्रमी छन्। उनी अनुशासित छन्। उनकी एक बहिनी पनि छिन्। उनी बहिनीलाई पनि पढ्न लेख्न सिकाउँछन्।
११.	क. उनीहरू इमान्दार कृषक हुन्। उनीहरू साँझबिहान नभनी काम गर्दछन्। उनीहरूले प्रशस्त अन्न फलाएका छन्। ती अन्न हामीले पनि प्रयोग गरेका छौं। ती सबैलाई जीवन दिने कृषकलाई हाम्रो नमस्कार छ। ख. यसपटक प्रशस्त हिमपात भयो। हिमाली क्षेत्रमा खुसीलायी छायो। कृषकहरू रमाए। उनीहरूले इष्ट देवतालाई पूजे। यो कुरा पत्रिकामा छापियो।
१२.	क. मेरो साथी क्रिकेट खेलाडी हो। उसले स्कुल पढ्दादेखि नै क्रिकेट खेलको अभ्यास गरेको थियो। ऊ अहिले पनि निरन्तर अभ्यास गर्दै छ। उसले अन्तर्राष्ट्रिय प्रतियोगितामा सहभागिता जनाउने छ। उसले विश्वकप जित्ने योजना पनि बनाएको छ। ख. शिवनारानले बाबुको काजक्रिया सम्पन्न गरेका छन्। उनले आमालाई आदरसाथ पालेका छन्। उनले भाइहरूप्रति सधैं माया दर्साएका छन्। उनले नानीथैंकको विवाह गराइ दिएर दाजुको दायित्व पूरा गरेका छन्। उनी सधैं कर्तव्य पथमा हिँडेका छन्।
१३.	क. गौरी साह्रै फुर्तिली छे। शङ्कर गरिब केटो हो। गौरी र शङ्कर साथी हुन्। उनीहरू सँगै खेल्छन्। उनीहरू खेलेको अभिभावकलाई मन परेको छैन। ख. म दिनहुँ स्कुल जान्छु। म स्कुल जाँदा कापीकिताब लैजान्छु। म स्कुलमा नै खाना खान्छु। म साथीहरूसँग खेल्छु। म अतिरिक्त क्रियाकलापमा भाग लिन्छु।
१४.	क. उनी विदेशमा बस्दै आएकी छिन्। उनले त्यहाँ राम्रो आम्दानी हुने काम फेला पारेकी छन्। उसको भाइ पनि विदेशमै बस्छ। ऊ त्यहाँ विद्यावारिधि गर्दै छ। उसले पढाइ सकेर स्वदेश फर्कने सोचाइ बनाएको छ। ख. नेपालको चाँडै उन्नति होओस्। युवाहरूले स्वदेशमै काम पाऊन्। जलविद्युतको विकासमा देशले ठूलो फड्को मारोस्। नेपालीहरूलाई लोडसेडिङको समस्याले नपिरोलोस्। नेपालीहरू सुखी जीवन बिताऊन्।
१५.	क. म अमेरिका जाने छु। म त्यहाँ विभिन्न ठाउँहरूको अवलोक गर्ने छु। म विज्ञान र प्रविधिका क्षेत्रमा अमेरिकाले गरेको प्रगतिका विषयमा जानकारी लिने छु। म नेपाललाई पनि त्यस्तै विकसित गराउने लक्ष्य लिने छु। म नेपाल फर्कने छु। ख. म गाउँमा जन्मेको हुँ। मलाई मेरै गाउँ प्यारो छ। मैले स्कुले शिक्षा गाउँमै पाएको हुँ। म उच्च शिक्षाका लागि सहर पसेको हुँ। मेरो मनमा गाउँकै बास छ।
१६.	क. मेरा साथीहरू मूर्ति बनाउने काम गर्छन्। उनीहरू त्यसबाट निकै पैसा कमाउँछन्। उनीहरू आफूले बनाएका मूर्ति विदेशतिर पनि पठाउँछन्। उनीहरू राम्रो आम्दानी गरेर सुखी जीवन बिताइरहेका छन्। उनीहरूले आफ्नो अँगालेर बाँचे अठोट लिएका छन्। ख. मेरी बहिनी सबैरै उठिछे। ऊ उठ्न बित्तिकै हातमुख धुने पढ्न बसिछे। उसले शिक्षकहरूले दिएको गृहकार्य खुरुखुरु गरिछे। उसले आमालाई घरधन्दाका काममा पनि सघाइछे। ऊ आफैं तयार भएर विद्यालय गइछे।
१७.	क. उनी ताराकी छोरी हुन्। उनले प्रवेशिका प्रथम श्रेणीमा उत्तीर्ण गरेकी छिन्। उनी अहिले कक्षा एघारमा पढ्दैछिन् यहाँ पनि उनी कक्षामा ध्यान दिएर सिक्छिन्। उनी सबैकी प्यारी भएकी छिन्। ख. तपाईं गाउँमा जन्मनुभएको हो। तपाईं त्यहाँको अन्नपानी खाएर हुर्किनु र बढ्नुभएको हो। अहिले पढ्नका लागि तपाईं सहरमा आएर बस्नुभएको छ। गाउँलाई तपाईंले बिर्सनुभएको छैन। पढिसकेर तपाईं गाउँकै सेवामा फर्कनुहोस्।
१८.	क. गायिका गीत रेकर्ड गर्नका लागि स्टुडियोतिर जाँदै थिइन् उनको पछिपछि गायक पनि आउँदै थियो। पहिले गायिकाले गीत गाईन्। त्यसपछि गायकले पनि एउटा मिठो गीत गायो। उसको मधुर स्वर सुनेर गायिका दङ्ग परिन्। ख. ऊ क्रान्तिकारी कवि हो। ऊ आफ्ना कवितामा क्रान्तिको सन्देश दिन्छ। उसले जनताका पक्षमा मात्र कविता रचेको छ। उसले आफ्ना कविताकै माध्यमबाट समाज परिवर्तनको प्रयास गरेको छ। उसले यही कुरामा सन्तोष मानेको छ।
१९.	क. ऊ पोखरामा बस्छे। ऊ विद्यालयमा पढाउँछे। उसका एउटा पुरुष साथी छ। ऊ संस्थानमा काम गर्छ। ऊ आफ्नो पुरुष साथीलाई बैङ्कक घुम्न जाने प्रस्ताव गर्छे। ख. विद्यार्थी दार्जिलिङ घुम्न गएको थियो। त्यहाँ विदेशी पर्यटनहरू पनि आएका रहेछन्। उनीहरूले दार्जिलिङभन्दा त नेपानै राम्रो छ भने। विद्यार्थी झसङ्ग भयो। विद्यार्थी स्वदेशी पर्यटनलाई महत्त्व दिनुपर्ने कुरा बुझ्यो।

एकाइ ७: वाक्य तत्त्व

१.	तपाईं सहरमा बसेर के गर्दै हुनुहुन्छ ? सानो भाइ त्यहाँ बस्ने पढ्दै छ। मेरी बहिनी त पढाइमा मात्र होइन, अतिरिक्त क्रियाकलापमा पनि अब्बल छिन्। ठुली माइजूले बहिनीलाई प्रेरणा दिएको थियो। भाइ बहिनीको सफलताबाट हामी खुसी भएका छौं। उनीहरूले जीवनमा सफलताको शिखर चुमून्।
२.	क. मैले आज सडकर दुर्घटना देखें। बसले माइक्रोलाई ठक्कर दिएको थियो। ट्राफिकद्वारा दुर्घटनाको जानकारी लिइयो। एम्बुलेन्सबाट घाइतेहरूलाई अस्पताल लगियो। ख. बगैंचामा फूलहरू रोपिएका छन्। यहाँ बस्नका लागि ठाउँ पनि बनाइएको छ। साँझ बिहान त्यहाँ मानिसहरू हुन जान्छन्। सानी बहिनी पनि त्यहाँ जान मन गर्छे।
३.	क. **शब्द** — **कारक** आँगन — अधिकरण फरुवा — करण बजार — अपादान काँटी — करण आमा — कर्ता डोका — करण भाले — कर्ता काँध — अधिकरण बजार — कर्मकारक

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	उसलाई — कर्मकारक इसारा — करण चिया — सम्प्रदान ख. अर्जुन सहरमा पढ्दै थियो। उसकी आमा बिरामी हुनुभयो। कान्छी बहिनीले उसलाई फोन गरिन्। आफ्नी बहिनीको फोन आएपछि ऊ गाउँ फर्किंयो। उसले बिरामी आमालाई अस्पताल लग्यो। आमाको उपचार चल्दै छ।
५.	क. लक्ष्मीप्रसाद देवकोटाले नेपाली साहित्यलाई ठूलो योगदान दिएका छन्। देवकोटालाई हामी सबैले महाकविको रूपमा सम्मान गर्छौं। देवकोटाका पुस्तकबाट हामी सबैले स्वच्छन्दतावाद र प्रकृतिका छटा पाएका छौं। मुनामदन कृतिद्वारा भ्याउरे लयको संयोजन र गरिबीको जीवनको कहालीलाग्दो रूप भेट्न सकिन्छ। उनका रचनादेखि बच्चादेखि बुढासम्म सन्तुष्ट छन्। उनका रचनामा प्रकृतिको सुन्दर संयोजन पाइन्छ। ख. झुमा र जुना दिदीबहिनी हुन्। उनीहरू कलेजमा पढ्छन्। ती दुवैले नाँच सिक्छन्। तपाईं पनि उनीहरूलाई चिन्नुहुन्छ। उनीहरू चित्रकलामा पनि रुचि राख्छन्। तिनीहरू जुम्ल्याहा हुन्।
६.	क. **शब्द — कारक** कैंची — करण कारक रिबन — कर्म कारक दाइ — कर्ता कारक उस — सम्प्रदान कारक मुक्तिनाथ — अपादान कारक लुगा — कर्म कारक उस — कर्ता कारक दराज — अधिकरण कारक पत्रिका — कर्म कारक आरन — अपादान कारक कोदाली — करण कारक इज्जत — सम्प्रदान कारक ख. म हिजो घरबाट आएँ। आमाले मेरो लागि ताजा तरकारी पठाइदिनु भएको छ। आमा मलाई असाध्यै माया गर्नुहुन्छ। म पनि आमालाई धेरै सम्मान गर्छु। आमासँग मेरी बहिनी पनि बस्छे। बहिनी अहिले दश कक्षामा पढ्छे।
६.	क. वनभोज कार्यक्रमबाट फर्कंदा हामीले दुर्घटना देख्यौं। सिन्धुलीबाट विपरीत दिशाबाट आएको बसले मोटरसाइकललाई ठक्कर दिएको थियो। हामीले गाडीबाट नै उक्त दुर्घटना देखेका थियौं। पुलिसहरूको अनुसन्धानपश्चात् एम्बुलेन्सद्वारा घाइते यात्रुहरूलाई क्रमैसँग धुलिखेल अस्पताल पुऱ्याईंदै थियो। मैले मनमनै अबदेखि यस्तो दृश्य देख्न नपरोस् भन्ने कामना भगवानसँग गरें। अस्पतालमा घाइतेहरूलाई हेर्न ठूलो सङ्ख्यामा भिँड जम्मा भएको थियो। ख. एकपटक हामी वनभोज गयौं। वनभोजमा रमाइलो गऱ्यौं। साथीहरूले गीत गाए। मेरी बहिनी पनि गएकी थिई। उसले अचार बनाई। सबैले खानपिन गरेर रमाइलो गऱ्यौं।
७.	क. मैले पढाइमा क्याम्पसका सबैलाई जितेको छु। मलाई मेरा साथीहरूलगायत सबैबाट बधाईको ओइरो लाग्यो। मेरो पढाइदेखि प्रशन्न भएर प्राचार्यले मलाई उपहार दिनुभयो। गुरुहरूबाट मलाई निःशुल्क पठाउने घोषणा गरियो। घरमा आमा र बुबा अत्यन्त खुसी हुनुभयो। क्याम्पस प्रशासनद्वारा मेरो अबको पढाइमा कुनै पनि शुल्क नलाग्ने जानकारी गराइयो।
	ख. मेरो भाइ कक्षा १० मा पढ्छ। उसका दुई जना दाजु पनि छन्। ऊ दाजु र भाइ दुवैलाई माया गर्छ। दाजु उसलाई पढाइमा सहयोग गर्नुहुन्छ। भाइ उसले अह्राएको काम मान्छ। उनीहरू मिलेर बसेका छन्।
८.	क. मैले त्रिभुवन विश्वविद्यालयको केन्द्रीय क्याम्पस कीर्तिपुरमा रक्तदान गरेको देखें। डाक्टरले रक्तदान गर्नेहरूलाई रक्तदानको महत्त्व सम्झाएका थिए। रक्तदानबाट जीवनदान हुन्छ भनी उनले आफ्नो मन्तव्यमा भनेका थिए। रक्तदान गर्दा दानीद्वारा रगतको आवश्यक पर्नेहरूको जीवन बचाउने प्रक्रियाबारे लेखिएका कार्डहरू पनि मैले त्यहाँ पढें। त्यस दिनदेखि म आफ्नो पायक पर्ने कार्यक्रममा जान्छु। हामीले दान गरेको रगत रक्त बैंकमा जम्मा गरी आवश्यक परेका बेला उपयोग हुने कुरा पनि मैले त्यहाँ थाहा पाएँ। ख. तिनीहरू विद्यार्थी हुन्। तिनीहरू कक्षा ११ मा पढ्छन्। म पनि तिनीहरूसँगै पढ्छु। तिनीहरू अध्ययनशील छन्। तिनीहरूले परीक्षामा धेरै अङ्क ल्याउने योजना बनाएका छन्। तिनीहरूको योजना सफल बनोस्।
९.	क. हाम्रो विद्यालयले आयोजना गरेको अतिरिक्त क्रियाकलापअन्तर्गत म क्रिकेट खेलमा सहभागी भएँ। मलाई मेरा टिमका साथीहरूले ठूलो साथ दिए। हाम्रो टिमद्वारा अर्को टिमलाई हामीले सहजै हरायौं। प्राचार्यको हातबाट हामीले प्रमाणपत्रका साथै शिल्ड पनि प्राप्त गऱ्यौं। क्याम्पसमा हाम्रो टिमलाई सबैले स्वागत गर्नुका साथै बधाई पनि दिनुभयो। ख. मेरी बहिनीले कविता लेखेकी छ। उसले कवितामा मानवीय सौन्दर्य पस्केकी छ। उसका कवितामा नेपालको तस्वीर पाइन्छन्। मैले उसलाई प्रोत्साहन दिएको छु। उसका सिर्जनाले निरन्तरता पाउनुपर्छ। हामी यसैमा खुसी हुन्छौं।
१०.	क. **पद — कारक** म — कर्ता कारक खेतमा — अधिकरण कारक कोदालीले — करण कारक धान — कर्म कारक त्यसले — कर्ता कारक लट्ठीले — करण कारक आलीबाट — अपादान कारक खाल्टामा — अधिकरण कारक दिनदेखि — अपादान कारक उनीहरूलाई — सम्प्रदान कारक मलाई — सम्प्रदान कारक काम — कर्म कारक ख. मेरा दाइ क्याम्पसमा पढाउनुहुन्छ। उहाँले विज्ञानमा स्नातकोत्तर गर्नुभएको छ। उहाँका साथीहरू पनि क्याम्पसमा नै पढाउनुहुन्छ। भाइजूले दाइका साथीहरूलाई राम्ररी चिन्नु भएको छ। समय-समयमा घरमै बोलाएर खाना खुवाउने भएकाले भाउजूसँग सबै खुसी छन्। भाउजूले माया र सहयोग पाएकामा दाइ पनि मक्ख हुनुहुन्छ।
११.	क. मेरी बहिनीले दश जोड दुईको परीक्षामा उत्कृष्ट अङ्क ल्याइन्। बुबाआमाको अपेक्षाअनुरूप नै उनले आफ्नो पढाइलाई प्रभावकारी रूपमा अगाडि बढाएकी थिइन्। शिक्षकहरूद्वारा उनको पढाइको खुबै तारिफ गरिन्थ्यो।

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परीक्षामा प्राप्त अङ्कले गर्दा मामाघरबाट पनि उनको तारिफ गरियो। उनले एमबीबीएस परीक्षामा पनि धेरै राम्रो गर्ने विश्वास लिएकी छिन्। उनको पढ्ने कलादेखि विद्यालयका शिक्षक तथा उनका साथीहरू पनि प्रभावित भएका छन्।

ख. रिमा बजार गई। उसले सामानहरू किनी। बजारमा साथीले उसलाई भेटेछ। तपाईं त विदेश हुनुहुन्थ्यो कहिले आउनुभयो भनी प्रश्न गर्छ। उनीहरू लामो समयपछिको भेटमा रमाए।

१२.

क.

पद	कारक
म	कर्ता कारक
मानिस	कर्ता कारण
घर	अपादान कारण
मोटरसाइकल	करण कारक
साथी	कर्म कारक
मोबाइल	करण कारक
ऊ	कर्ता कारण
अस्पताल	अधिकरण कारक
सडक	अधिकरण कारक
घाइते	सम्प्रदान कारक
भ्याल	करण कारक
हिजो	अपादन कारक

ख. उसकी बहिनी 'बौलाहा काजीको सपना' नाटक हेर्न गएकी छे। उसको भाइ पनि त्यहीं जाँदै छ। कान्छी दिदी पनि जाने कुरा गर्नुहुन्थ्यो। तँ पनि जान्छस् ? जाने भए मसँगै हिँड। म पनि केही बेरपछि त्यतै जान्छु।

१३.

क. विद्यार्थीहरू परीक्षा हलमा पसे। उनीहरूले आफ्नो बस्ने ठाउँ खोजे। निरीक्षक आउनुभयो। उहाँले विद्यार्थीहरूलाई आआफ्नो ठाउँमा बस्न भन्नुभयो निरीक्षकले प्रश्न बाँड्नुभयो। विद्यार्थीहरू खुसी भए।

ख. मेरो परिवारले सबै सदस्यहरू मिलेर बस्ने निर्णय गरेको छ। मेरो परिवारका सदस्यहरू एकअर्कालाई सहयोग गर्दछन्। भूकम्प आएदेखि मेरो परिवाका सदस्यहरू छुट्टिनै मान्दैनन्। छिमेकीद्वारा मेरो परिवारको प्रशंसा गरिन्छ। मेरो परिवारका सम्पूर्ण सदस्य गएको हप्ता बसबाट पोखरा घुम्न गयौं। पोखरामा रहेको प्राकृतिक सौन्दर्यले मेरो परिवारका सबै सदस्यलाई लोभ्यायो।

१४.

क.

पद	कारक
पशुपति	अधिकरण कारक
मानिसहरू	कर्ता कारक
पूजा	सम्प्रदान कारक
फूल	कर्म कारक
हात	अधिकरण कारक
गौशाला	अपादान कारक
मोबाइल	करण कारक
भक्तजन	कर्म कारक
गँजडी	कर्म कारक
डण्डा	करण कारक
सङ्घसंस्था	कर्ता कारक
श्रद्धालु	सम्प्रदान कारक

ख. मेरी भाउजू बैङ्कमा काम गर्नुहुन्छ। उहाँले व्यवस्थापनमा स्नातकोत्तर गर्नुभएको छ। उहाँका दुईजना साथी पनि बैङ्कमा नै काम गर्छन्। ठूली दिदीले भाउजूका ती दुईजना साथीलाई राम्ररी चिन्नुहुन्छ। दिनभर कार्यालयको काममा व्यस्त हुने भएकाले भाउजूलाई सबैले सहयोग गरेका छन्। सबैको माया र सहयोग पाएकामा भाउजू मक्ख हुनुहुन्छ।

१५.

क.

पद	कारक
काकाले	कर्ता कारक
पोखराबाट	अपादान कारक
बसद्वारा	करण कारक
सुन्तला	कर्म कारक
गाउँलेलाई	सम्प्रदान कारक
छोराछोरीका	सम्प्रदान कारक
घरमा	अधिकरण कारक
सुन्तला	कर्म कारक
चोरले	कर्ता कारक
झोलामा	अधिकरण कारक
उसलाई	सम्प्रदान कारक
भुइँमा	अधिकरण कारक

ख. दिदी र बहिनी तीजमा माइत आए। उनीहरूले तिज रमाइलो गरी मनाए। बुबा खुशी हुनुभयो। आमा हर्षले गद्गद् हुनुभयो। चाँडपर्वले नेपालीलाई एकै ठाउँ जुटाउँछ। त्यसैले मलाई चाडपर्व मनपर्छ।

१६.

क.

पद	कारक
चामेले	कर्ता कारक
गाँथलीलाई	कर्म कारक
लात्तीले	करण कारक
पिठिउँ	अधिकरण कारक
ओछ्यान	अधिकरण कारक
दराजबाट	अपादान कारक
झोलामा	अधिकरण कारक
छिमेकीलाई	कर्म कारक
हलोले	करण कारक
चामेलाई	कर्म कारक
इसाराले	करण कारक
घरदेखि	अपादान कारक

ख. मेरो भाइ चकचके छ। कल्पनाको भाइ पनि चकचके छ। उनीहरू सबै एकै ठाउँमा भए भने झगडा गरिहाल्छ। मेरी आमा ती दुवैलाई झगडा नगर्न सम्झाउनुहुन्छ। उहाँ सम्झाए पनि उनीहरू झगडा गर्न छाड्दैनन्। झगडा नै केटाकेटीहरूको बानी नै हो।

१७.

क. यस स्वर्णिम धर्तीमा आमाले मलाई जन्म दिनुभयो। बाल्यकालदेखि नै आमाले मलाई विद्वान् बन्नुपर्छ भनेर बारम्बार अर्ती उपदेश दिनुहुन्थ्यो। उहाँबाट म जीवनमा धेरै प्रभावित छु। आमाद्वारा नै मैले जीवनमा ठूलो प्राप्ति हासिल गर्न सफल भएँ। ममा भएको आमाको सत्प्रेरणा कहिल्यै पनि मेटिँदैन। मेरा हरेक गतिविधि देखेर आमा मदेखि निकै हर्षित हुनुहुन्छ।

ख. राजु र सुमित्रा दसैंमा घर आए। उनीहरू बुबाआमालाई भेट्न पाउँदा धेरै खुसी भए। मैले पनि उनीहरूलाई भेट्न पाएँ। मलाई भेटेर राजु र सुमित्रा खुसी भए। दसैंपछि उनीहरू विदेश फर्के। अहिले तिनीहरू विदेशमै बस्छन्।

१८.

क. शैक्षिक भ्रमणबाट फर्कदा हामीले सडक दुर्घटना देख्यौं। राजविराजबाट विपरीत दिशाबाट आएको बस माइक्रोलाई ठक्कर दिएको थियो। पुलिसबाट घटनाको अध्ययन गरिँदै थियो। एम्बुलेन्सद्वारा घाइते यात्रुहरूलाई क्रमैसँग अस्पताल पुऱ्याइँदै थियो। मैले पनि मनमनै अबदेखि कहिल्यै यस्तो दृश्य देख्न नपरोस् भनें। अस्पतालमा घाइतेहरूलाई हेर्नेको भिँड लागेको थियो।

ख. मैले आमालाई ढोगि दिएँ। आमाले मलाई आशीर्वाद दिनुभयो। तिमीले पनि आमालाई ढोग्यौ ? मेरो भाइले पनि ढोग्यो। आमाको आशीर्वाद हामी सन्तानलाई अवश्य लाग्छ। आमाको आशीर्वाद पाउनु सौभाग्यको कुरा हो।

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१९.

क. मैले रोबोटको आविष्कार गरें। मलाई बधाईको ओइरो लाग्यो। साथीहरूका साथै गुरुहरूबाट पनि मलाई शुभकामना व्यक्त गरियो। रोबोटको आविष्कार पछि अमेरिकाद्वारा बोलाइयो। म अमेरिकामा गएँ। एक महिना पछि अमेरिकादेखि म नेपाल फर्किएँ।

ख. मेरी बहिनी बुटवलमा बस्छे। मेरो भतिजो चाहिँ विराटनगरमा बस्छ। तपाईं बुटवल जानुहुन्छ ? म पनि बहिनी भेट्न बुटवल जाँदै छु। हामी दुवै सँगै जाऔंला।

एकाइ ८: वाक्यान्तरण

१.

क. १. गाउँगाउँमा सडक सञ्जाल जोड्नुपर्छ।
२. देशको विकास तीव्र गतिमा हुन्छ।
३. गाउँमा यातायात पुग्छ।
४. उत्पादनले बजार पाउँछ।
५. किसानहरू खेतीपातीमा संलग्न हुन्छन्।
६. खेतीपातीबाट राम्रो आम्दानी गर्न सकिन्छ।
७. कृषि उत्पादन बढ्यो।
८. युवाहरू कृषितर्फ आकर्षित हुन्छन्।

ख. आलु र गोलभेँडाको जन्म जराबाट र हाँगाबाट भएको भन्ने तर्क हावा गफ हो भन्ने मलाई लाग्छ।

ग. रमेशले भन्यो, "तिमी विद्यालय नजाने ?" मैले भनें, "म आज विद्यालय जान्न।" उसले भन्यो, "तिमी विद्यालय किन नजाने ?" मैले भनें, "मेरो आज घरमा धेरै काम छ।"

२.

क. ढकमक्क फुलेको फूलमा मौरी उड्दै आएर फूलमाथि बसेर टन्न चुस्यो।

ख. लुम्बिनी गइयो। उद्वारा होटलमा बसियो। उद्वारा साथीहरू भेटिए। उनीहरूद्वारा बौद्धविहार भ्रमण गरियो। गुरुद्वारा उपदेश दिइयो। सबैद्वारा उपदेश कापीमा टिपियो। बेलुका साथीहरूसँग बिदा भइयो। घर पुगेर प्रार्थना गर्न थालियो।

ग. हरि मिहिनेत गरेर पढ्दैनथ्यो। उसका साथीहरूले भने राम्ररी पढेछन्। त्यसैले हरिले परीक्षामा सफलता पाएन। अरु उसका साथीहरू परीक्षामा उत्तीर्ण भए। अब हरि कलेज नपढ्ला। उसका साथीहरू अब पढ्लान्। हरिको जीवन सफल नबन्ला। उसका साथीहरूको जीवन सुखद बन्ला।

३.

क. १. नेपालीहरू इमान्दार छन् भनेर विदेशीहरू भन्छन्।
२. तपाईं अरूबाट राम्रो व्यवहार चाहानुहुन्छ भने तपाईं अरूलाई त्यस्तै व्यवहार गर्नुहोस्।
३. मलाई मेरो देशमा रोजगारी पाइने वातावरण चाहिएको छ त्यसैले मेरो देशको उन्नतिमा मेरो भविष्य लुकेको छ।
४. सपना साकार पार्न सम्भव छ तर हाम्रा सपना साझा हुनुपर्छ।

ख. विद्यालय गइँदै छ। विद्यालयमा बसबाट पुगिन्छ। विद्यालयद्वारा उत्कृष्ट विद्यार्थीलाई पुरस्कार दिइन्छ। खुसी भइन्छ। उद्वारा राम्ररी पढिएको छ। उद्वारा नयाँ किताब, कापी र कलम किनिएका छन्। उद्वारा प्रतापलाई समेत सहयोग गरिएको छ। परोपकारमा रमाइन्छ।

ग. - गुरुले भन्नुभयो, "केदारनाथ अनुशासित विद्यार्थी हो।"
- विद्वानहरू भन्छन्, "मानिसमा मानवताको कमी हुँदै गएको छ।"
- हजुरबुबाले भन्नुभयो, "घमण्डी मानिसहरू अत्यन्त क्रूर हुन्छन्।"
- गुरुले भन्नुभयो, "देश विकासमा लाग्नुपर्छ।"

४.

क. १. वर्षायाम सुरु हुन्छ।
२. तराईमा महामारी रोगहरू देखा पर्न थाल्छन्।
३. वर्षायाममा स्वास्थ्यलाई ख्याल गर्नुपर्छ।
४. खानपानमा ध्यान दिनुपर्छ।
५. घर वरपर पानी जम्न दिनुहुँदैन।
६. राति सुत्दा झुल टाँगेर सुत्नुपर्छ।
७. मानिसहरू स्वास्थ्यप्रति सचेत हुन्छन्।
८. विभिन्न रोगहरूले सताइ रहन्छन्।

ख. सम्पदा कहिल्यै विद्यालय जान्न। उसलाई साथीहरू कत्तिपनि मन पराउँदैनन्। ऊ पढ्नमा ध्यान दिन्न। ऊ नयाँ कुरा जान्न खोज्दिन। काम नगरे सफल भईदैन भन्ने कुरा उसले बुझेकी छैन। उसको बानी देखेर बुबाआमा दुःखी छन्। उसलाई धेरै गाली गर्छन्। ऊ बुबाआमाले भनेको मान्दिन।

ग. बाबुआमाबाट अनुशासनको पाठ पढेकी असल र मिहिनेती विद्यार्थी मीमांसाले नृत्य प्रतियोगितामा भाग लिएर प्रथम पुरस्कार प्राप्त गरी।

५.

क. पढाइ लेखाइमा अब्बल मिहेनती विद्यार्थी व्यवस्थापन विषय लिएर भविष्यमा आफ्नो विषयमा दक्ष बन्नेछन्।

ख. मैले जीवनमा हरेक किसिमका मानिसहरूको साथ गरें। सबैसँग मिलेर बसें। आफ्नै जीवनबाट धेरै कुरा सिकें। जीवन सङ्घर्षलाई गुरु मानें। मद्वारा आज अनौठो अनुभूतिको गरिएको छ। भोलिका बारेमा सोचिँदै छ। समयसँग अत्यन्त डराइन्थ्यो। मद्वारा सचेत बनी जीवनका पाइला अगाडि बढाइनेछन्।

ग. धनजितेले गुमानेलाई कुलामा पछार्‍यो। गुमाने पनि बलशाली थियो। दुवैले धेरै बाझाबाझ गरे। धर्मानन्दले दुवैलाई उस्काए। त्यसपछि उनीहरूका घरमा आवतजावत भएन। धनजिते बिरामी पर्दा गुमाने गयो। त्यसपछि उनीहरूले कहिल्यै पनि झगडा गरेनन्। दुवैले एकअर्कालाई दोषारोपण गरेनन्।

६.

क. चलाख रमेशले मिहिनेत गरी परीक्षामा उच्च अङ्क ल्याएकाले उसको भविष्य उज्ज्वल छ।

ख. श्यामले उनीहरू काम गर्दैनन् भनी भन्यो। मैले भने, "आज गर्मी हुन्छ।" हरिले भन्यो, "म ज्ञानी छु।" उहाँले अध्यक्षज्यूलाई कार्यक्रम आरम्भ गर्ने सुझाव दिनुभयो।

ग. डोल्माको डाक्टर बन्ने चाहना छैन। उनी मिहिनेत गरेर पढ्दिन। उसँग प्रशस्त पैसा छ। पैसा सदुपयोग गर्ने विचार उसँग छैन। उसका आमा बुबा खुसी छैनन्। ऊ कहिल्यै गृहकार्य गर्दिन। उसलाई साथीहरूको वास्ता छैन। उसको जीवन सुखी बन्दैन।

७.

क. म जनकपुर गएँ। जनकपुरलाई नजिकबाट देखें। जनकपुरबासी मिहेनती छन्। तिनीहरू लोकप्रिय छन्। जनकपुरमा स्वदेशी तथा विदेशी पर्यटक आउँछन्। जनकपुर जानुहुन्छ। जनकपुरको सौन्दर्य आफैं देख्नुहुन्छ।

ख. हामीलाई परीक्षा दिन गाह्रो नहुनुको कारण व्याकरण, बोध र अभिव्यक्ति र साहित्य पढेकाले हो।

ख. हामीद्वारा सबै पाठहरू पढियो। सबै अभ्यास गरिएको छ। हामीले यस पटक किताब समयमै पाएका थियौं। हामी केही दिन शैक्षिक भ्रमण गयौं। हामीले रमाइलो गर्‍यौं। अबचाहिँ माथिल्लो कक्षामा पुगिएला। हामी मित्रता नतोडौं।

८.

क. १. म पहिलो पटक पोखरा गएँ र अत्यन्तै रमाएँ।
२. तपाईं प्राकृतिक सुन्दरतामा रमाउन चाहनुहुन्छ भने एक चोटि पोखरा पुगनुहोस्।
३. जब उसले पोखराको सराङकोटबाट सूर्योदयको दृश्यावलोकन गऱ्यो तब उसले स्वर्गीय आनन्दको अनुभव गऱ्यो।
४. पोखराले विभिन्न ताल गुफा र हरियालीका कारणले लाखौं पर्यटकको मन जितेको छ त्यसैले स्थानीय मान्छेहरूका लागि स्वरोजगारको अवसर सिर्जना गरेको छ।

ख. आफू त यस पटक दसैंमा मामाघर गइन्छ। मद्वारा आमाबुबा भेटिनुहुन्छ। मद्वारा उहाँहरूका हातबाट दसैंको टीका लगाइन्छ। आशीर्वाद थापिन्छ। आमाद्वारा मिठामिठा परिकार बनाइन्छन्। हामीद्वारा आपसमा बाँडेर ती परिकारहरू खाइन्छन्। गाउँघर डुलिन्छ। धेरै रमाइन्छ।

ग. भइ गो, फर्किसक्नुभएको मानिसले किन फेरि दुःख गर्ने भनेर शिवनारानले डाक्टर गोदत्तप्रसादलाई भने। नानीथकुले रुँदै अब मैले तपाईंलाई पाउन नसक्ने भएँ भनी भनिन्। डाक्टरले रञ्जनालाई हिँड, जाँदै गर म आउँछु भने। ठिक छ, आमाले ठिक भन्नुभयो भनेर पुननारान, हर्षनारान दुबै जनाले एकै स्वरमा भने।

९.

क. १. बिहानै उठें।
२. हातमुख धोएँ।
३. बिहानी भ्रमण सकें।
४. पसलबाट पत्रिका किनें।
५. बाटोमा दुध र पाउरोटी किनें।
६. म घर आइपुगें।
७. सात बजेको समाचार सुनें।
८. खाना खाएँ।

ख. तिमीले भनेको कुरा मिल्यो। मेरो साथी त पढ्दै रहेनछ। ऊ खेल्न गएको थियो। तिमीले झुट बोलेनछौ। म तिमीसँग रिसाइनँ। म भन्न सक्छु। उसको प्रयास सफल भएनछ। ऊ आत्तिएको छ।

ग. "कथा सानो आँखीभ्याल हो" देवकोटाले परिभाषा गरे। उनले लेखेका छन्, "मानिस जातले होइन दिलले ठूलो हुन्छ।" देवकोटा, "सबै मानिस ईश्वर हुन्" भन्छन्। उनले "ईश्वर बाहिर आँखाले भेटिँदैन" भनेका छन्।

१०.

क. १. विद्यार्थीहरू राम्रो पठनपाठनका निम्ति निजी विद्यालयमा भर्ना भए।
२. उनीहरूले सोचेजस्तो पढाइ भएन।
३. विद्यालय प्रशासनले सुधारको पहल गऱ्यो।
४. समस्या यथावत् नै रह्यो।
५. अभिभावकले समस्या थाहा पाए।
६. अभिभावकहरूले विद्यार्थीलाई विद्यालयबाट निकाले।
७. विद्यार्थीहरू घट्दै गए।
८. निजी विद्यालय सङ्कटमा पर्ने निश्चित छ।

ख. सुयशले भन्यो, "आज म स्कुल जान्नँ।" दाइले सुयशलाई सोध्नुभयो, "किन स्कुल नजाने ?" सुयशले दाइलाई भन्यो, "आज मलाई सन्चो छैन।" दाइले भन्नुभयो, "आज घरमै बसेर आराम गर।"

ग. सुखदुःख चक्र झैं घुमेर आइरहने मानवजीवनमा कहिले हाँस्ने, कहिले रूने स्वाभाविक प्रक्रिया हुन्।

११.

क. अ. जुन विद्यार्थीले मिहिनेत गरेका छन् तिनीहरूले राम्रो अङ्क ल्याउने छन्।
आ. जहाँ फूल फुलेको छ त्यहाँ भमरो बसेको छ।
इ. जुन गोरूको सिङ छैन त्यो गोरूको नाम तिखे हो।
ई. जब देशको संविधान बन्छ तब देशमा विकास हुन्छ।

ख. हामीद्वारा नेपाली पढिएको छ। हामीले परीक्षाको राम्रो तयारी गरेका छौं। हामीले आफ्नै विद्यालयमा पटक पटक परीक्षा दिएका छौं। परीक्षासँग डराईदैन। केन्द्रमा राम्रो वातावरण पाइएको छ। तसर्थ अब परीक्षा दिन्छौं त्यसपछि साथीसँग घर जान्छौं।

ग. १. नेपाल बहुभाषिक देश हो।
२. नेपालको स्वरूप बहुसांस्कृतिक छ।
३. नेपालको सांस्कृतिक परम्परा नेपालीको पहिचान हो।
४. नेपालको सांस्कृतिक परम्पराले हामीलाई एकतामा बाँधेको छ।
५. संस्कृतिको दृष्टिले हामी सम्पन्न छौं।
६. हाम्रो उन्नति संस्कृतिबाटै हुन्छ।
७. हामीले संस्कृतिको संरक्षण गर्नुपर्छ।
८. संस्कृति हाम्रो सम्पत्ति हो।

१२.

क. १. पूर्णिमाले लोकसेवा पास गरी र सरकारी नोकरी पाई।
२. उसको पढाइ राम्रो थियो त्यसैले सफल हुँदै गई।
३. उसको आम्दानी राम्रो छ र परिवार राम्ररी चलेको छ।
४. उ दिनरात काम गर्छे तर कहिल्यै थाकेँ भन्दिन।

ख. पेम्बाको जीवन सुखी छैन। उसले दुःखकष्ट झेलेको छ। उसको बाल्यकाल पनि सुखद थिएन। उसले दुःखको अनुभव गऱ्यो। उसले अरुलाई सहयोग गर्न सकेको छैन। उसले अरुबाट सहयोग लिनुपरेको छ। अहिलेसम्म उसको जीवन सुखमा बितेको छैन। उसले आफ्नो भविष्यको चिन्ता लिनुपरेको छ।

ग. नेपालको अन्नभण्डार तराइमा उर्वर माटो हुनाका साथै सिंचाइको उचित प्रबन्ध भएकोले प्रशस्त मात्रामा अन्न उब्जन्छ।

१३.

क. म यस पटकको बिदामा वृद्धाश्रम जान्छु। त्यहाँ वृद्धहरूको सेवा गर्छु। फलफूल बाँड्छु। कपडा किनेर वितरण गर्छु। म उनीहरूको सरसफाइमा ध्यान दिन्छु। यो कुरा प्रशासनमा भन्ने छु। म यसरी नै अरुलाई पनि समाज सेवा गर्न प्रेरित गर्ने छु। म यसैमा आनन्द पाउने छु।

ख. १. जब हावाहुरी चल्यो तब पानी पऱ्यो।
२. कृषकहरू रमाए र खेततिर लागे।
३. जब कृषकहरूले खेत खने तब खेती लगाए।
४. कृषकहरू मेहनत गर्छन् तर त्यसको फल सबैले पाउँछन्।

ग. जिल्लाबासीहरूले भने, "हामी मिलेर पिकनिक जाने सूचना आजको पत्रिकामा छापिएको छ।" रमाले रमेशलाई भनिन्, "ऊ नगए पनि मचाहिँ वनभोज जान्छु।" प्रशंसकहरूले प्रार्थना गरे, "नेपालले विश्व क्रिकेटमा नाम राखोस्।" बुबाले मलाई सम्झाउनुभयो, "नजाने गाउँको बाटो नसोध्नू।"

१४.

क. १. मेघ गर्जेर पानी पऱ्यो।
२. किसानहरू खुसीले दङ्ग पर्दछन्।
३. पानी पर्छ।
४. अन्नबाली उब्जन्छ।
५. किसानहरू आफूले उब्जाएको अन्न प्रशस्त मात्रामा बजारमा पुऱ्याउँछन्।
६. हामी बजारबाट सहज रूपमा अन्न किनेर ल्याउन सक्छौं।
७. किसानहरू दिनरात मिहिनेत गर्दछन्।
८. हामीले आजसम्म खाद्य सङ्कटको सामना गर्नु परेको छैन।

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	ख. हामी नियमित रूपमा कलेज गयौं। एकदिन पनि कलेज छोडेनौं। सधैं गृहकार्य गरेर बुझायौं। परीक्षाको तयारी राम्रोसँग गर्‍यौं। कुरा नछुटाई उत्तर लेख्यौं। विशिष्ट श्रेणीमा उत्तीर्ण भयौं। गुरुहरूबाट स्याबासी पनि पायौं। कुलको इज्जत समेत बढायौं। ग. गुरुले विद्यार्थीको पहिचान नै उसको अनुशासन भएको बताउनुभयो। विद्यार्थीले आफू अनुशासित हुने प्रयत्न गर्ने कुरा बतायो। गुरुले स्वाबास् भन्नुभयो। यो त मेरो कर्तव्य नै हो भनेर विद्यार्थीले भन्यो।
१४.	क. हामी परीक्षा सकेर पोखरा घुम्न जान्छौं। त्यहाँका रमणीय ठाउँहरूको अवलोकन गर्छौं। साथीभाइसँग भेटघाट पनि गर्छौं। फोटाहरू खिच्छौं। साँझ नाचगान गरी रमाइलो मनाउँछौं। फर्कदा मनकामनाको दर्शन पनि गर्छौं। केबुलकार चढेर आनन्द लिन्छौं। भोलिपल्ट मात्र घर फर्कन्छौं। ख. सुयोग विदेश गएन। ऊ बुबाआमाले भनेको मान्दैन। ऊ यहाँ बस्न चाहन्छ। विदेशको दुःख उसलाई थाहा छ। काम गर्दा जहाँ पनि पैसा कमाइन्छ। पैसा नै सबै कुरा होइन। पैसाभन्दा शान्ति महत्त्वपूर्ण कुरा हो। यो कुरा उसलाई थाहा छैन। ग. भाषाको देशमा लवजको दशा, शब्दहरू दुब्ला पातला र शब्दको अपभ्रंश भएकाले तिनीहरूको प्राचीन महत्त्व उडेको छ।
१५.	क. १. लोडसेडिङ घट्ने अवस्था भएन। २. देशको आर्थिक उन्नति हुँदैन। ३. देशमा आर्थिक मन्दी छाउँछ। ४. जनता गरिबीको मारमा पर्दै जान्छन्। ५. सरकारले लोडसेडिङ हटाउन पहल गर्नुपर्दछ। ६. सरकारले विद्युत गृहहरूको निर्माण कार्य निर्धारित समयमै पूरा गर्नुपर्दछ। ७. सरकार लोडसेडिङ हटाउन सक्षम भयो। ८. देशको चौतर्फी विकास हुने कुरा निश्चित छ।
	ख. हामी हिजो चौरमा भकुण्डो खेल्यौं। तरिका मिलाएर भकुण्डो हान्यौं। खेल पनि जित्यौं। प्रथम पुरस्कार पायौं। त्यस अवसरमा खुसियाली मनायौं। नाचगानका कार्यक्रमहरू सम्पन्न गर्‍यौं। बाजाहरू बजायौं। ट्रफी उचालेर नगर परिक्रमा पनि गर्‍यौं। ग. ग्रामीण महिलाहरू सालको पात टिप्न जाने र गोठालाहरू गाईबाख्रा चराउन जाने नजिकैको जङ्गलमा ठुल्ठूला रुखहरू छन्।
१७.	क. स्वतन्त्रता प्रेमी, इमान्दार हामी नेपाली विश्वमा प्रख्यात छौं। ख. सम्झनाको इञ्जिनियर बन्ने चाहना छैन। उनी मिहेनत गरी पढ्दिनन्। उनका धेरै साथी छन्। अतिरिक्त काममा उनी रुचि राख्छिन्। अनुसन्धानमा कहिल्यै संलग्न हुँदिनन्। प्रयोगशाला बाहिर बस्छिन्। पाठ्यक्रमभन्दा बाहिरका पुस्तक पढ्छिन्। उनको भविष्य उज्यालो देखिँदैन। ग. मैले वर्षभरि पढें। विद्यालय नियमित रूपमा गइयो। त्यहाँ असल साथीहरू भेटिए। उनीहरूसँग गफगाफ गरियो। मैले अतिरिक्त क्रियाकलापमा भाग लिएँ। म साथीहरूसँग घुमें। मैले पत्रपत्रिकाहरू पढें। वर्षदिन रमाइलोसँग बिताइयो।

Physics

NEW SYLLABUS

Teaching hours: 150T +50P
Nature of course: Theory +Practical

Full marks: 100 (75T + 25 P)
Pass Marks: 27T + 8P

Course Contents

Unit-1 Waves and Optics

Waves

1. **Wave motion-** Wave motion; Longitudinal and transverse waves; Progressive and stationary waves; Mathematical description of a wave.
2. **Mechanical waves-** Speed of wave motion; Velocity of sound in solid and liquid; Velocity of sound in gas; Laplace's correction; Effect of temperature, pressure, humidity on velocity of sound.
3. **Wave in pipes and strings-** Stationery waves in closed and open pipes; Harmonics and overtones in closed and open organ pipes; End correction in pipes; Resonance Tube experiment; Velocity of transverse waves along a stretched string; Vibration of string and overtones; Laws of vibration of fixed string.
4. **Acoustic phenomena-** Sound waves: Pressure amplitude; Characteristics of sound: Intensity, loudness, quality and pitch, Beats; Doppler's effect; Infrasonic and ultrasonic waves; Noise pollution: Sources, health hazard and control.

Physical Optics

1. **Nature and propagation of Light-** Nature and sources of light; Electromagnetic spectrum; Huygen's principle. Reflection and Refraction according to wave theory; Velocity of light: Foucault's method; Michelson's method.
2. **Interference-** Phenomenon of Interferences; Coherent sources; Young's two slit experiment; Newton's ring
3. **Diffraction-** Diffraction from a single slit; Diffraction pattern of image; Diffraction grating; Resolving power of optical instruments
4. **Polarization-** Phenomenon of polarization; Brewster's law; transverse nature of light; Polaroid

Unit-2 Electricity and Magnetism

Current Electricity

1. **D.C. Circuit-** Electric Currents; Drift velocity and its relation with current; Ohm's law; Electrical Resistance; Resistivity, Conductivity; Super conductors; Perfect Conductors; Current-voltage relations; Ohmic and Non-Ohmic resistance. Resistances in series and parallel, Potential Divider, Conversion of galvanometer into voltmeter and ammeter, Ohmmeter; Electromotive force: Emf of a source, internal resistance; Work and power in electrical circuits; Joule's law and its verification.
2. **Electrical circuits-** Kirchhoff's laws; Wheatstone bridge circuit; P.O.Box, Meter Bridge; Potentiometer; Comparison of e.m.f's., measurement of internal resistance of a cell.
3. **Thermoelectric Effect-** Seebeck Effect; Thermocouples, Peltier effect: Variation of thermoelectric emf with temperature, Thermopile, Thomson effects.
4. **Chemical effect of current-** Faraday's laws of electrolysis; Faraday's constant, Verification of Faraday laws of electrolysis.

Magnetic Field of current

1. **Magnetic Field-** Magnetic field lines and magnetic flux; Oersted's experiment; Force on moving charge, Force on Conductor; Force and Torque on rectangular coil, Moving coil galvanometer; Hall effect; Magnetic field of a moving charge; Biot and Savart law and its application to (i) a circular coil (ii)a long straight conductor (iii) a long solenoid. Ampere's law and its application to (i)a long straight conductor (ii) a straight solenoid (iii) a toroidal solenoid; Forces between two parallel conductors carrying current- definition of ampere.
2. **Magnetic properties of materials-** Elements of earth magnetism and their variation; Dip and Dip circle; Flux density in magnetic material; Relative permeability; Susceptibility; Hysteresis, Dia–, Para– and Ferro-magnetic materials.
3. **Electromagnetic Induction-** Faraday's laws; Induced electric fields; Lenz's law, Motional electromotive force; AC generators; eddy currents; Self inductance and Mutual inductance; Energy stored in an inductor; Transformer.
4. **Alternating Currents-** Peak and RMS Value of AC current and Voltages, AC through resistor, capacitor and inductor. Phasor diagram, Series circuits containing combination of resistor, capacitor and inductor; Series Resonance, Quality factor; Power in AC circuits: Power factor; choke coil.

Unit-3 Modern Physics

1. **Electrons and Photons-** Electrons: Milikan's oil drop experiment, Gaseous discharge at various pressure; Cathode rays; Motion of electron beam in electric and magnetic fields; Thomson's experiment to determine specific charge of electrons. Photons: Quantum nature of radiation; Einstein's photoelectric equation; Stopping potential; Measurement of Plank's constant, Milikan's experiment
2. **Solids and Semiconductor devices-** Structure of solids; Energy bands in solids (qualitative ideas only); Difference between metals, insulators and semi-conductors using band theory; Intrinsic and extrinsic semi-conductors; P-N Junction; Semiconductor diode: Characteristics in forward and reverse bias; Full wave rectification; Filter circuit; Zener diode; Transistor: Common emitter characteristics, Logic gates; NOT, OR, AND, NAND and NOR, Nanotechnology (introductory idea)

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3. **Quantization of energy-** Bohr's theory of hydrogen atom; Spectral series; Excitation and ionization potentials; Energy level, Emission and absorption spectra, De Broglie Theory; Duality; Uncertainty principle. **Lasers:** He- Ne laser, Nature and production, properties and uses. **X-rays:** Nature and production; uses: X-rays, X-rays diffraction, Bragg's law. LH9
4. **Nuclear physics-** Nucleus: Discovery of nucleus; Nuclear density; Mass number; Atomic number; Atomic mass; Isotopes, Einstein's mass-energy relation, Mass Defect; Binding energy; Fission and fusion. LH6
5. **Radioactivity-** Alpha-particles; Beta-particles, Gamma rays; Laws of radioactive disintegration; Half-life and decay constant, Geiger-Muller Tube; Radio carbon dating; Medical use of nuclear radiation; Health hazards and safety precautions. LH7
6. **Nuclear energy and other sources of energy-** Sources of energy; Conservation and degradation of energy; Transformation of energy. Nuclear energy: Energy released from fission and fusion; Thermal and Hydroelectric power, Wind energy, Biofuels; Solar energy; Solar constant; Solar devices; Global energy consumption pattern and demands; Energy use in Nepal. Fuels and pollution: Global Warming; Acid rain. LH9
7. **Particle physics and cosmology-** particles and antiparticles, Quarks and Leptons, baryons, mesons. Universe- Hubble's law; Big Bang; Critical density; Dark matter LH3

Practical

A student will perform at least 24 experiments from the given list:

Introduction

General instruction: Students are expected to learn general ideas of errors, order of accuracy and graphical analysis. Students are also expected to learn the physical principles and theory of experiments on magnetism not covered in the theory curriculum.

List of Experiments

A. Wave and Optics

1. Determination of the wavelength of sodium light by measuring the diameter of Newton's rings.
2. Determination of the wavelength of a given monochromatic source of light by passing a plane diffraction grating.
3. Determination of the refractive index of a given transparent medium and calculation of the speed of the light in the medium.
4. Uses of laser beams:
   i. Determination of the wavelength of He-Ne laser light
   ii. Determination of the diameter of a given hair
5. Uses of Sonometer:
   i. Determination of the frequency of a given tuning fork
   ii. Comparison of frequencies of two tuning forks
6. Determination of the frequency of A.C. Mains.
7. Use of Resonance tube:
   i. Determination of velocity of sound in air at NTP
   ii. Comparison of frequencies of two tuning forks
8. Determination of the end correction of the resonance tube apparatus.

B. Electricity

9. Verification of Ohm's Law
10. Use of P.O. Box:
    i. Determination of the resistively of the material of a given wire
    ii. Verification of the laws of series and parallel resistances
11. Use of meter bridge:
    i. Comparison of resistances of two given wires
    ii. Determination of the resistively of the material of a given wire
    iii. Verification of the laws of series and parallel resistances
12. Determination of high resistance by substitution method.
13. Determination of the capacitance of the capacitor by charging and discharging a capacitor.
14. Use of potentiometer:
    i. Comparison of emf's of two cells
    ii. Comparison of resistances of two given wires
    iii. Determination of the internal resistance of a cell
15. Conversion of given galvanometer into an ammeter and a voltmeter of desired range.
16. Calibration of a given ammeter and voltmeter.
17. Determination of the half-life of a circuit containing a pure capacitor in series with a resistance in a D. C. circuit.
18. Uses of a series LCR circuit:
    i. Determination of the resonant frequency of a series LCR circuit
    ii. Determination of the quality factor of a series LCR circuit

C. Magnetism

19. Determination of the pole strength and magnetic moment of a bar magnet by locating the neutral points keeping:
    i. North pole pointing towards the geographical south
    ii. North pole pointing towards the geographical north

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20. Use of deflection magnetometer:
    i. Determination of the pole strength and magnetic moment of a bar magnet
    ii. Comparison of the magnetic moments of two bar magnets
21. Use of oscillation magnetometer:
    i. Determination of the pole strength and magnetic moment of a bar magnet
    ii Comparison of the magnetic moments of two bar magnets
22. Use of dip circle: Determination of the angle of dip in the laboratory

D. Modern Physics

23. Study the characteristics of a junction diode.
24. Study the characteristics of a transistor.
25. Study the characteristics of a Zener diode.
26. Determination of Planck's constant using a photocell

List of Activities

1. To assemble a household circuit comprising three bulbs, three switches, a fuse and a power source. Measure curre and voltage across each component and then interpret the data.
2. Use of multimeter to (a) identify base of transistor and terminal of IC (b) Check whether a given electronic compone (e.g. diode, transistor, and IC) is in working order.
3. To study the relation between frequency and length of a given wire under constant tension using sonometer.
4. Study of AND, OR, and NOT gates.
5. To identify the difference between emf and p.d. of a cell.

Note: *The above are only the specimens of activities. In order to arouse creativity, the students must be encouraged to tak up new activities (other than mentioned above) in consultation with the teacher concerned.*

Laboratory Manual

i. Certificate Level Physics Practical Guide, U.P. Shrestha, Ratna Pustak Bhandar, Kathmandu
ii. Elementary Practical Physics, Dr. Narayan Hari Joshi, Taleju Prakashan

Teaching Strategies

- Lecturing
- Group interaction
- Problem solving
- Demonstration
- Evaluation

Instructional materials

OHP, LCD, demonstration kits, writing boards etc.

Evaluation Scheme

Unit	Teaching hours	LAQ	SAQ	NP	Mart Distribution			Total
					LAQ	SAQ	NP	
Waves and Optics	23 +17	1/2 +1/2	3/3	1/1 +1/1	4+4	6	3+3	20
Electricity and magnetism	55	3/4	4/6	2/3	4+4+4	8	5+3	28
Modern physics	55	3/4	4/6	2/2	4+4+4	8	4+3	27
Total	**150**	**8/12**	**10/15**	**6/7**	**32**	**22**	**21**	**75**

Note: LAQ: Long Answer Questions; SAQ: Short Answer Questions; NP: Numerical Problems

a. Q.No. 1, 4 and 8, the first questions of group A, B, and C respectively, should contain 3, 6 and 6 conceptual questions each carrying 2 marks, out of which students should give answers as indicated in the table.
b. In the table numerator denotes the number of questions to be attempted and denominator denotes the number of questions asked. For example, 3/4 means 3 questions are to be answered out of 4 questions.
c. Short answer questions should cover the entire course as far as possible. These questions should be of conceptua type.
d. Each of the questions numbering 2, 3, 5, 6, 9 and 10 contains a long answer theory question and a numerical problem carrying marks as specified in the table. Q. No. 7 and 11 contain only a long answer theory question.
e. There should be two short answer questions from wave unit and one from optics unit.
f. There will be only one specific 'or' choice in one of th e questions of LAQ type in each group.
g. There will be only one specific 'or' choice for numerical problems in mechanics.

Practical

Every student will perform at least 20 experiments and 4 activities during the academic year.

Evaluation Scheme for Practical examination:

One experiment	12 Marks
One activity	3 Marks
Practical record of experiments and activities	5 Marks
Viva on experiment and activity	5 Marks
Total	**25 Marks**

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NEW MODEL QUESTIONS - 2066

Time 3 hours
(All answers of numerical problems should be expressed in S.I. system)

Full Marks: 75
Pass Marks: 27

Group A

1. Attempt any FOUR questions: [4×2=8]

a. Two wires, one of copper and other of iron, have the same diameter and carry the same current. In which wire will the drift velocity of electrons be more?
b. Differentiate between fuse wire and a heating wire.
c. Why are the pole-pieces of magnets cut into cylindrical form in a galvanometer?
d. Hall voltage is much more measurable in semi-conductor than in metals. Why?
e. Explain why two parallel wires carrying current in the opposite direction repel each other?
f. 220V a.c. is more dangerous than 220V d.c., why?

2. Attempt any Four questions: [4×2=8]

a. If the discharge tube is filled up with various gases in turn, will the discharge in all gases take place at the same electrode potential?
b. A photon and an electron have got the same de-Broglie wave length. Explain which has greater total energy.
c. How is NOT gate realised?
d. It is said that a very powerful crane is required to lift a nuclear mass of microscopic size. Comment on this.
e. Comment on the statement "a nucleus contains no electrons and yet can eject them."
f. What are the effects of pollution on living organisms?

3. Attempt any ONE question: [1×2=2]

a. How can bats fly around without colliding with objects that come in their way?
b. Longitudinal waves cannot he polarized. Why?

4. Attempt any ONE question: [1×2=2]

a. Differentiate between wave-front and wavelet?
b. What is the difference between Fresnel and Fraunhoffer diffraction?

Group B

5. Attempt any THREE questions: [3×4=12]

a. State Biot and Savart's law and use it to obtain an expression for the magnetic field at the centre of the circular coil.
b. What are the categories in which magnetic materials are classified? Explain their differences.
c. State Faraday's laws of electrolysis. How will you verify Faraday's second law experimentally?
d. Show that Lenz's law is an example of conservation of energy.

6. Attempt any THREE questions: [3×4=12]

a. Show, in Bohr's model, that radii of electronic orbits increase as n^2, where n is the quantum number of the orbit.
b. Define decay constant of a radioactive element. How is it related to half-life?
c. Discuss a zener diode and its use as voltage stabilizer.
d. Describe a theory which accounts for the origin and evolution of the universe.

7. Attempt any ONE question: [1×4=4]

a. Show that both harmonics, odd and even, can he produced in an organ pipe open at both ends.
b. What is Doppler's effect? Obtain an expression for the apparent pitch when a source moves towards a stationary observer.

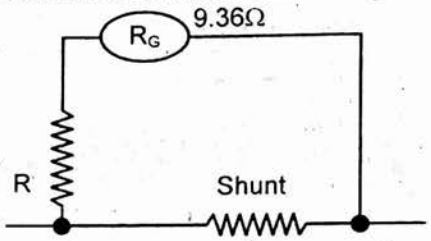
8. Attempt any ONE question: [1×4=4]

a. Show that in Young's double slits experiment widths of dark and bright fringes are equal.
b. Describe Focault's method of determining the speed of light.

Group C

9. Attempt any TWO questions: [2×4=8]

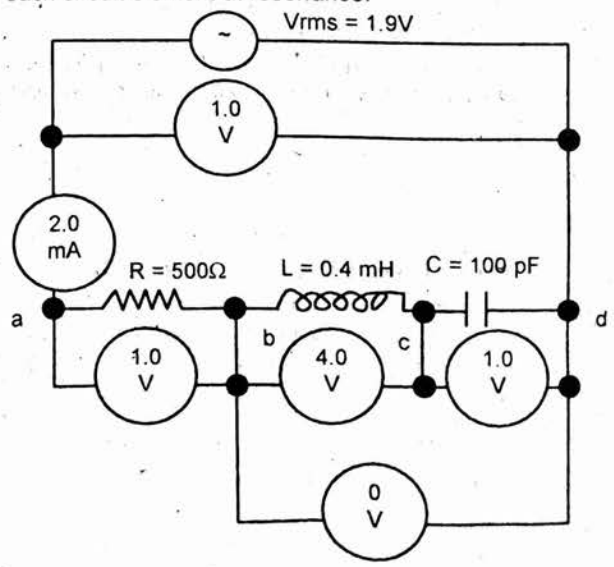
a. The resistance of the coil of a pivoted-coil galvanometer is 9.36 Ω and a current of 0.0224 A causes it to deflect full scale. We want to convert this galvanometer to an ammeter reading 20.0 A full-scale. The only shunt available has a resistance of 0.025 Ω. What resistance R must be connected in series with the coil?



Ans: 12.94 Ω

b. A standard cell of 1.0185 V, when used in a one meter long slide wire potentiometer balances at 60 cm. Calculate the percentage error in a voltmeter which balances at 65 cm when reading is 1.1 volt. Ans: 0.31%

c. The series circuit in figure is a similar to arrangements that are sometimes used in radio tuning circuits. The circuit is connected to the terminals of on a.c. source with a constant r.m.s. terminal voltage of 1.9 V and a variable frequency. Find (i) the resonance frequency (ii) the inductive reactance and the impedence at the resonance frequency (iii) the r.m.s. current at the resonance and (iv) the r.m.s. voltage across each circuit element at resonance.



Ans: (i) $\omega_0 = 5.0 \times 10^6$ rad s^{-1} (ii) $X_L = 2000\Omega$; $X_C = 2000\ \Omega$
(iii) $I_{rms} = 2.0$ mA (iv) $V_{R-rms} = 1$ V, $V_{L-rms} = 4$V; $V_{C-rms} = 4$V

10. Attempt any TWO questions: [2×4=8]

a. A city requires 10^8 watts of electrical power on the average. If this is to be supplied by a nuclear reactor of efficiency 20% using $^{235}_{92}U$ as the fuel. Calculate the amount of fuel required for one day's operation. (Given: energy released per fission of $^{235}_{92}U$ 200 MeV).

Ans: 0.527 kg

b. A clean nickel surface of work function 5.1 eV is exposed to light of wavelength 235 nm. What is the maximum speed of the photoelectrons emitted from this surface?

Ans: 2.52×10^6 ms^{-1}

c. An electron moving with a speed of 10^7 m/s is passed into a magnetic field of intensity 0.1×10^{-2}T normally. What is the radius of the path of the electron inside the field? If the strength of the magnetic field is doubled, what is the new radius of the path? (e/m = 1.8×10^{11} C.kg^{-1})

Ans: 5.56×10^{-2} m, 2.78×10^{-2} m

11. What is the difference between the speed of longitudinal waves in air at 27°C and their speed at -13°C? What is the speed at 0°C?

Ans: 23.96 ms^{-1}; V_o= 331.1 ms^{-1}

12. Light traveling in water strikes a glass plate at all angle of incidence of 53°, part of the beam is refracted and part is reflected. If the refracted and reflected portions make an angle of 90° with each other, what is the index of refraction of glass? [3]

Ans: μ_g = 1.76 assuming μ_w = 1.33

CHAPTER BASED QUESTIONS

UNIT-1 WAVES AND OPTICS

A. WAVES

1. WAVE MOTION

FORMULAE

1. Some Relations:
   i. $v = f\lambda$ ii. $\lambda = vT$
   iii. $k = \frac{2\pi}{\lambda} = \frac{2\pi f}{v} = \frac{\omega}{v}$ iv. $\omega = 2\pi f = \frac{2\pi}{T}$
2. The forms of progressive wave equations are
   $y = a \sin(\omega t - \phi)$ $y = a \sin 2\pi\left(\frac{t}{T} - \frac{x}{\lambda}\right)$
   $y = a \sin(\omega t - kx)$ $y = a \sin\frac{2\pi}{\lambda}(vt - x)$
3. Stationary wave: $y = A \sin \omega t$, where $A = 2a \cos kx$ is the amplitude of the stationary wave.

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 3a | 2076 GIE Set B Q.No. 3a How do transverse waves differ from longitudinal waves? [2]
2. 2076 Set B Q.No. 3a Can longitudinal wave be polarized? Explain. [2]
3. 2076 Set C Q.No. 3a How are stationary waves formed? [2]
4. 2075 GIE Q.No. 3a | 2072 Set D Q.No. 3a Distinguish between progressive waves and stationary waves. [2]
5. 2075 Set A Q.No. 3a We can't hear echo in a small room. Why? [2]
6. 2075 Set B Q.No. 3a Frequency is the most fundamental property of a wave. Why? [2]
7. 2073 Supp Q.No. 3a | 2058 Q.No. 1 c If you are walking on the moon surface, can you hear the cracking sound behind you? Explain. [2]
8. 2069 Set A Old Q.No. 1d Why echo cannot be heard in a small room? [2]
9. 2069 Set B Q.No. 3b A radio station broadcasts at 800 KHz. If the radio waves (em-waves) travel with a speed of 3×10^8 m/s, what will be the wavelength of the wave? [2]
10. 2068 Can. Q.No. 3a Distinguish between light waves and sound waves. [2]
11. 2068 Old Q.No. 1 c Can two persons on moon hear the sound of each other? Explain. [2]
12. 2067 Sup Q.No. 3b Longitudinal waves cannot be polarized. Why? [2]
13. 2063 Q.No. 1 c Which types of wave propagate in liquid? explain. [2]
14. 2062 Q.No. 2 c Do sound waves undergo reflection, refraction and polarization phenomena? Explain. [2]
15. 2055 Q.No. 1 b How are stationary waves formed? [2]

Long Answer Questions [4 Marks]

16. 2074 Set B Q.No. 7a | 2070 Set D Q.No. 7 a How is a progressive wave different from a stationary wave? Derive an equation for a progressive wave. [4]
17. 2072 Set C Q.No. 7a What is a wave motion? Derive progressive wave equation in a medium. [4]
18. 2072 Set E Q. No. 7a | 2066 Supp Q. No. 5a Define progressive waves. Derive an equation to represent the wave. [4]
19. 2070 Supp. Set A Q.No. 7 b | 2068 Q.No. 7 b What is the principle of superposition of waves? Discuss the result of superposing two waves of equal amplitude and same frequency travelling in opposite direction. [4]
20. 2070 Set C Q.No. 7 a What are stationary waves? Prove that the distance between any two consecutive nodes in a stationary wave is $\frac{\lambda}{2}$. [4]
21. 2068 Old Can. Q.No. 5a What do you mean by progressive wave equation? Derive progressive wave equation in terms of its wave vector and displacement. [1+3]
22. 2063 Q.No. 6 a State and explain the stationary wave. [4]
23. 2061 Q.No. 5 a Use the principle of superposition of two waves to find the position of nodes and antinodes in a standing wave. [4]

Numerical Problems [4 Marks]

24. 2053 Q.No. 3 OR A wave has the equation (x in metres and in seconds)
$Y = 0.02 \sin(30t - 4x)$
Find
(i) its frequency, speed and wave length.

(ii) The equation of wave with double amplitude but traveling in the opposite direction. [4]

Ans: 4.77 Hz, 1.57 m, 7.5 ms^{-1}, y = 0.04 sin (30t + 4x)

2. MECHANICAL WAVES

FORMULAE

1. Speed of sound, $v = \sqrt{\frac{E}{\rho}} = \frac{\text{Elasticity}}{\text{Density}}$
2. Speed of longitudinal wave,

   In solid, $v = \sqrt{\frac{E}{\rho}}$, In liquid, $v = \sqrt{\frac{K}{\rho}}$,

   In gas, $v = \sqrt{\frac{\gamma P}{\rho}}$, $\gamma = \frac{C_p}{C_v}$
3. Factors affecting the speed of sound in gas,

   i. Temperature, $v \propto \sqrt{T}$, so $\frac{v_1}{v_2} = \sqrt{\frac{T_1}{T_2}}$

   ii. Pressure, no effect at constant temperature

   iii. Density, $v \propto \frac{1}{\sqrt{\rho}}$, so $\frac{v_1}{v_2} = \sqrt{\frac{\rho_1}{\rho_2}}$ (for different gases)

   iv. Molar mass, $v \propto \frac{1}{\sqrt{M}}$, so $\frac{v_1}{v_2} = \sqrt{\frac{M_2}{M_1}}$

   v. Humidity, $v_{humid} > v_{dry}$
4. Temperature coefficient of speed of sound,

   $\frac{v_1}{v_0} = \sqrt{\frac{273 + \theta}{273}} = v_0\left(1 + \frac{1}{2}\alpha\theta\right)$

   Where, α temperature coefficient of speed of sound
5. Speed of transverse wave in a stretched string,

   $v = \sqrt{\frac{T}{\mu}}$,

   where T = tension on string and μ = mass per unit length

Short Answer Questions [2 Marks]

1. 2074 Set B Q.No. 3a Velocity of sound in solids is more than that in liquids, why? [2]
2. 2073 Set C Q.No. 3b The velocity of sound in solid is generally greater than that in gas at STP. Why? Give reason. [2]
3. 2072 Set C Q.No. 3b When sound waves travel through a medium, does the temperature at various points remain constant? Explain. [2]
4. 2071 Set D Q.No. 3 a 2066 Supp Q.No. 1c Why does sound travel faster in metals than in air? [2]
5. 2070 Supp. Set B Q.No. 3 a The speed of sound in humid air is more than that in dry air, why? [2]
6. 2070 Set C Q.No. 3 a 2063 Q.No. 2 a Although the density of solid is high, the velocity of sound is greater in solid, explain. [2]
7. 2069 Supp Set B Q.No. 3 b Is it possible that the velocity of sound is greater in solid than that in a gas at STP? Justify your answer. [2]
8. 2066 Q.No. 1c Velocity of sound increases on a cloudy day. Why? [2]
9. 2065 Q.No. 1 c 2060 Q.No. 2 c 2052 Q.No. 1 c Sound at a distance can be heard distinctly at night than in the day time. Why? [2]
10. 2064 Q.No. 2 d Explain why the velocity of sound in solids is greater than that in gases, though the densities of solids are greater than that of gases. [2]
11. 2062 Q.No. 1 c Do sound waves need a medium to travel from one point to other point in space? What properties of the medium are relevant? [2]
12. 2056 Q.No. 1 c Why are sounds heard better on a wet day than on a dry day? [2]
13. 2054 Q.No. 1 b Is velocity of sound more in damp air or in dry air? Explain. [2]

Long Answer Questions [4 Marks]

14. 2076 GIE Set B Q.No. 7a Discuss Newton's formula for the velocity of sound in air and explain why and how this formula was modified by Laplace. [4]
15. 2076 Set B Q.No. 7a Does the propagation of sound wave cause change in thermodynamic condition of medium? Derive Laplace formula of velocity of sound in air. [4]
16. 2075 GIE Q.No. 7a 2068 Can. Q.No. 7a 2067 Sup Q.No. 7b Discuss Newton's formula for the velocity of sound in a gas medium with Laplace's correction. [4]
17. 2074 Supp Q.No. 7a Describe Laplace's correction in Newton's formula for velocity of sound in air. Also discuss the effect of temperature and pressure in the velocity of sound in air. [4]
18. 2074 Set A Q.No. 7a Describe Newton's formula for the velocity of sound in air. Explain why and how this formula is modified by Laplace. [4]
19. 2073 Set C Q.No. 7b What correction was made in Newton's expression for the velocity of sound? Also explain, how change of temperature and pressure affect the velocity of sound. [4]
20. 2072 Supp Q.No. 7a Write the Newton's formula for the velocity of sound in air. Explain why and how this formula is modified by Laplace. [4]
21. 2072 Set D Q.No. 7a 2071 Supp. Q.No. 7a Write down the Newton's formula for the velocity of sound in air. Explain why this formula has to be modified. Discuss Laplace's correction on it. [4]
22. 2071 Set C Q.No. 7 a Describe the Newton's formula for velocity of sound in air with Laplace's correction. [4]
23. 2070 Supp. Set A Q.No. 7 a Deduce Newton's formula for velocity of sound in a gas. Why was the correction needed? What correction made by Lap lace? [4]
24. 2069 Supp Set B Q.No. 7 a Describe Laplace's correction to find the velocity of sound and discuss how the velocity of sound is affected by different physical parameters. [4]
25. 2069 Set A Old Q.No. 5a What is the Newton's formula for the velocity of sound? What correction was made by Laplace? [1+3]
26. 2069 Set B Q.No. 7b Discuss the significance of Laplace's correction to Newton's formula for the velocity of sound. Also explain how different factors affect the velocity of sound. [4]
27. 2068 Old Q.No. 5 a Write an expression for the speed of sound in an ideal gas. Discuss the effect of change in temperature on the speed of sound. [1+3]
28. 2067 Old Q.No. 5a Discuss the Laplace's correction for the velocity of sound in air. [4]

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29. 2066 Q.No. 5 a Write down the factors on which the velocity of sound in air depends with necessary explanation. [4]

30. 2065 Q.No. 5 a OR Explain the significance of Laplace's correction of Newton's formula for the velocity of sound and derive the corrected formula. [1+3]

31. 2061 Q.No. 5 a OR State Newton's formula for the velocity of sound in gases. What correction was done by Laplace on it?[1+3]

32. 2060 Q.No. 5 a Derive an expression for the velocity of sound in a medium by dimensional method. Discuss the effect of change in pressure and temperature on the velocity of sound in air. [2+2]

33. 2056 Q.No. 2 Discuss Laplace's correction and derive the formula for the velocity of sound in a gas. [4]

34. 2055 Q.No. 2 Describe Newton's expression for the velocity of sound in a gas with Laplace correction. [4]

35. 2053 Q.No. 2 What is Newton's formula for the velocity of sound? What correction was made by Laplace? [4]

36. 2052 Q.No. 2 Discuss the effect of pressure, temperature and density of elastic medium on the velocity of sound. [4]

Numerical Problems [4 Marks]

37. 2077 Set D Q.No. 3c At what temperature, the velocity of sound in air is increased by 60% to that at 27°C? [4]
Ans: 495° C

38. 2076 GIE Set A Q.No. 11 In a stormy day a person observes a lightning flash which is followed by a thunder 3s later. How would you estimate the distance of the lightning striking from the person.
[velocity of sound = 340 m/s, velocity of light = 3×10^8 m/s][4]
Ans: 1020 m

39. 2076 Set C Q.No. 11 A source of sound of frequency 550Hz emits waves of wavelength 60 cm in air at 20°C. What would be the wavelength of sound from the source in air at 0°C? [4]
Ans: 0.58 m

40. 2075 Set A Q.No. 11 What is the difference between the speed of longitudinal waves in air at 27°C and at – 13°C? What is the speed at 0°C? [4]
Ans: 23.96m /sec, 331.1 m/sec

41. 2075 Set B Q.No. 11 2058 Q.No. 5 b At what temperature, the velocity of sound in air is increased by 50% to that at 27°C? [4]
Ans: 675 K

42. 2074 Supp Q.No. 11 In a resonance air column apparatus, the first and second resonance positions were observed at 18 cm and 56 cm respectively. The frequency of tuning fork used was 480 Hz. Calculate the velocity of sound in air and end correction of the tube. [4]
Ans: 364.8 m/sec and 0.01 m

43. 2073 Set D Q.No. 11 Calculate the bulk modulus of a liquid in which longitudinal waves with frequency of 250 Hz have the wavelength of 8 m if the density of liquid is 900 kg m^{-3} [4]
Ans: 3.6×10^9 N/m^2

44. 2072 Set E Q.No. 11 A source of sound produces a note of 512 Hz in air at 17°C with wavelength 66.5 cm. Find the ratio of molar heat capacities at constant pressure to constant volume at NTP. Densities of air and mercury at NTP are 1.293 kg/m^3 and 13600 kg/m^3 respectively. [4]
Ans: 1.36

45. 2071 Set D Q.No. 11 A Source of sound of frequency 512 emits waves of wavelength 64.5 cm in air at 20°C. W would be the velocity of sound at 0°C?
Ans: 318.77 m

46. 2070 Supp. Set B Q.No. 11 In a stormy day a boy obser a lightning flash which is followed by a thunder 3 sec l How would you estimate the distance of the lightning st from the boy. (given velocity of sound on that day = 332 velocity of light c = 3×10^8m/s)
Ans: 996 m from

47. 2069 Set A Q.No. 11 When a detonator is exploded o railway line, an observer standing on the rail 2 km a hears two sounds. What is the time interval between the (Young's modulus of steel = 2×10^{11}Nm^{-2}, density of ste 8×10^3 kg m^{-3}, density of air = 1.4 kgm^{-3}, γ- for air = atmospheric pressure = 10^5Nm^{-2})
Ans: 5.92

48. 2064 Q.No. 5 b A source of sound of frequency 512 Hz em waves of wavelength 670 mm in air at 20°C. What is velocity of sound in air at this temperature? What would the wavelength of sound from the source in air at 0°C?
Ans: 343.04 ms^{-1}, 646.7 x 10

49. 2057 Q.No. 5 b A man standing at one end of a clos corridor 57 m long blow a short blast on a whistle. He fou that the time from the blast to the sixth echo was 2 second If the temperature was 17°C, what was the velocity of sou at 0°C?
Ans: 331.8 m

50. 2052 Q.No. 3 OR The interval between the flash of light and the sound of thunder is 2 seconds, when temperature 10°C. How far is the storm if the velocity of sound in a 0°C is 330m s^{-1}?
Ans: 67

3. WAVE IN PIPES AND STRINGS

FORMULAE

1. Waves in Pipe:

i. The fundamental frequency in closed organ pipe,

$$f_1 = \frac{v}{4l} = \frac{1}{4l}\sqrt{\frac{\gamma P}{\rho}} = \frac{1}{4l}\sqrt{\frac{\gamma RT}{M}}$$

ii. The fundamental frequency of organ pipe,

$$f_1 = \frac{v}{2l} = \frac{1}{2l}\sqrt{\frac{\gamma P}{\rho}} = \frac{1}{2l}\sqrt{\frac{\gamma RT}{M}}$$

iii. End correction:

a. (i) $e = \frac{l_2 - 3l_1}{2}$

(ii) e = 0.3d, d = diameter of resonance tube

b. Fundamental frequency in closed organ pipe,

$$f_1 = \frac{v}{4(l + e)}$$

2. Waves in string:

i. The fundamental frequency, $f_1 = \frac{1}{2l}\sqrt{\frac{T}{\mu}}$

The speed of transverse vibration , $v = \sqrt{\frac{T}{\mu}}$

ii. For a cylindrical wire,

$\mu = A.\rho = \frac{\pi d^2}{4} . \rho$ or $\pi r^2 . \rho$,

where ρ= Mass per unit length

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Short Answer Questions [2 Marks]

1. 2074 Set B Q.No. 3b 2068 Can. Q.No. 3b The frequency of a fundamental note of a closed organ pipe and that of an open organ pipe are the same. What is the ratio of their lengths? [2]
2. 2073 Set C Q.No. 3a 2073 Set D Q.No. 3b By what factor does the velocity of transverse wave in the string change when the tension in the stretched string in increased by four times [2]
3. 2072 Supp Q.No. 3a The six strings of a guitar are of the same length and are under nearly the same tension, but have different thickness. On which string do waves travel the fastest? [2]
4. 2072 Supp Q.No. 3b How does the pitch of an organ pipe change with temperature? [2]
5. 2071 Supp. Q.No. 3a Does the frequency of sound produced by an organ pipe change with its diameter? Explain. [2]
6. 2071 Set C Q.No. 3 b 2069 Set A Q.No. 2b What happens to the frequency of transverse vibration of a stretched string if its tension is halved and the area of cross section of the string is doubled? [2]
7. 2071 Set D Q.No. 3 b A tuning fork produces a feeble sound. But when it is pressed against a table, a loud sound is heard. Why? [2]
8. 2070 Set C Q.No. 3 b Why is sounding board used in a string instrument? [2]
9. 2070 Set D Q.No. 3 a When the tension in a given string is increased by four times, by what factor does the velocity of wave in the string change? [2]
10. 2069 Supp Set B Q.No. 3 a Explain, with figure, the formation of second overtone of waves in an open organ pipe. [2]
11. 2068 Old Can. Q.No. 1c A loud sound in heard at resonance. Why? [2]
12. 2068 Q.No. 3 b Is it possible to have a longitudinal wave on a stretched string? Why or why not? [2]
13. 2067 Q.No. 3a Would you expect the pitch of an organ pipe to change with an increase in temperature? How? [2]
14. 2067 Q.No. 3b Is the wave speed the same as the speed of any part of the string for transverse waves? Explain the difference between these two speeds. [2]
15. 2067 Old Q.No. 1d Why are the bells made of metal not of wood? [2]
16. 2067 Sup Q.No. 3a When the tension in a given stretched string is increased by four times, by what factor does the velocity of transverse wave in the string change? [2]
17. 2066 Q.No. 2 c Why are all string instruments provided with hollow boxes? [2]
18. 2066 Supp Q.No. 2c What is the use of sounding board on stringed musical instrument? [2]
19. 2061 Q.No. 2 c How does the temperature affect the frequency of an organ pipe? [2]
20. 2059 Q.No. 2 d One of the 'Nine Jewels' of Emperor Akbar, widely known as Tansen, the king of Music was able to break a glass by singing the appropriate note. What physical phenomenon could account for this? [2]
21. 2057 Q.No. 1 d What do you mean by resonance? [2]
22. 2056 Q.No. 1 a Why is sonometer box hollow from inside? [2]
23. 2055 Q.No. 1 a Relate the fundamental note with overtones for an open pipe. [2]
24. 2054 Q.No. 1 a Why is an end correction necessary for an organ pipe? [2]
25. 2053 Q.No. 1 a The frequency of organ pipe changes with temperature. Does it increase with increase in temperature? [2]
26. 2053 Q.No. 1 c Explain why soldiers are ordered to break steps while crossing a bridge. [2]
27. 2052 Q.No. 1 a The frequency of fundamental note of an open organ pipe is double than for closed pipe of same length. Why? [2]
28. 2052 Q.No. 1 b Differentiate between forced vibration and free vibration. [2]

Long Answer Questions [4 Marks]

29. 2077 Set D Q.No. 2c Prove, with necessary diagrams, that both types of harmonics odd and even can be obtained in an organ pipe open at both ends. What is end correction of a pipe? [4]
30. 2076 GIE Set A Q.No. 7a What is meant by end correction? Discuss the vibration of air column of open organ pipe and show that both harmonics are praoduced on it. [4]
31. 2076 Set C Q.No. 7a 2074 Supp Q.No. 7b 2070 Set C Q.No. 7b Define end correction of a pipe. Prove that both odd and even types of harmonics can be obtained from an organ pipe open at both ends. [4]
32. 2075 GIE Q.No. 7b State the laws of transverse vibration in a stretched string. Describe various modes of vibration in a stretched string. [4]
33. 2075 Set A Q.No. 7a 2065 Q.No. 5a What do you understand by harmonics and overtones in the case of organ pipes? Prove that only odd harmonies are produced in closed organ pipes. [4]
34. 2075 Set B Q.No. 8a 2069 Set A Old Q.No. 5a OR What are harmonics? Explain the formation of overtones in an open and a closed organ pipe. [4]
35. 2074 Set A Q.No. 7b 2073 Supp Q.No. 7a 2067 Q.No. 7a Describe an experiment with the necessary theory by which the speed of sound in air is determined by using resonance tube method. [4]
36. 2073 Set D Q.No. 7a What is the difference between an open and a close pipes? Explain with proper sketches for the formation of second overtones in each case. Also express the length of pipes in terms of the wavelength of sound. [4]
37. 2072 Set D Q.No. 7b What is end correction of a pipe? Describe the different modes of vibration of air column in an organ pipe closed at one end. [4]
38. 2071 Supp. Q.No. 7b Prove, with necessary diagrams, that both types of harmonics odd and even can be produced in an organ pipe open at both ends. [4]
39. 2071 Set D Q.No. 7 a What is resonance? Describe an experiment to determine the velocity of sound in air and end correction of the tube by resonance method. [4]

40. 2069 Supp Set B Q No. 7 b Write the laws of transverse vibration of string. Explain how the law of length is verified experimentally [4]

41. 2069 Set A Q No. 7a Show that both harmonics, odd and even can be produced in an open organ pipe. What is end correction? [4]

42. 2068 Old Can. Q.No. 5a OR What is a closed pipe? Describe the natural modes of vibration of air in an organ pipe closed at one end. Also explain the term 'end correction'. [1+2+1]

43. 2068 Q.No. 7 a What is meant by resonance? Explain in detail how you would use sonometer to determine frequency of a given tuning fork. [4]

44. 2068 Old Q.No. 5 a Or What are harmonics? Explain the formation of the overtones in a closed organ pipe. [4]

45. 2067 Old Q.No. 5a OR Describe the resonance tube experiment to determine the velocity of sound in Laboratory and obtain the expression of end correction. [3+1]

46. 2064 Q.No. 5a OR State and explain principle of superposition and formation of stationary waves. Show that the frequency of the fundamental note of a closed organ pipe is half as compared to that of an open pipe of the same length. [2+2]

47. 2063 Q.No. 6a OR 2057 Q.No. 5a OR Discuss the different modes of vibrations of air column in closed pipe. [4]

48. 2062 Q.No. 6a OR State the laws of transverse vibration of string. Describe an experiment to verify the law of mass, and law of length. [4]

49. 2059 Q.No. 5 a OR State the laws of transverse vibrations of string. Using only dimensions, show that the speed of propagation of a transverse wave depends only on tension and mass per unit length. [1+3]

50. 2058 Q.No. 5 a OR Prove that both types of harmonics, odd and even, can be produced in an organ pipe open at both ends. [4]

51. 2054 Q.No. 2 Describe the various modes of vibrations of the air column in an organpipe. [4]

Numerical Problems [4 Marks]

52. 2076 GIE Set B Q.No. 11 One day when speed of sound is 340 m/s the fundamental frequency of a closed organ pipe is 220 Hz (a) How long is this pipe? (b) The second overtone of this pipe has the same wavelength as third harmonic of an open pipe. How long is the open pipe? [4]

Ans: 0.386 m, 0.31 m

53. 2076 Set B Q.No. 11 A wire whose mass per unit length is 10^{-3} kg/m is stretched by a load of 4 kg over the two bridges of a sonometer wire 1 m apart. It is struck at its middle point, what would be the wavelength and frequency of its fundamental vibration? [4]

Ans: 100 Hz

54. 2074 Set B Q.No. 11 A steel wire of length 20 cm and mass 5 gram is under the tension of 500N and is tied down at both ends. Calculate the frequency of fundamental mode of vibration. [4]

Ans: 353.55 Hz

55. 2071 Supp Q.No. 11 2069 Supp Set B Q. No 11 A pianoforte wire having a diameter of 0.90 mm is replaced by another wire of the same material but with diameter 0.93 mm. If the tension of the wire is as before, what is percentage change in the frequency of fundamental note? [4]

Ans: 3.2

56. 2072 Supp Q.No. 11 On a day when the speed of sound is 345 m/s, the fundamental frequency of a closed organ pipe is 220 Hz. The second overtone of this pipe has the same wave length as the third harmonic of an open pipe. How long is the open pipe? [4]

Ans: 0.47 m

57. 2072 Set C Q.No. 11 A wire with mass 40 g is stretched so that its ends are tied down at points 80 cm apart. The wire vibrates in its fundamental mode with frequency 60 Hz. Calculate the speed of propagation of transverse waves in the wire and the tension in the wire. [4]

Ans: 96 m/sec, 460.8 N

58. 2071 Supp. Q.No. 11 A cord of length 1.5 m is fixed at both ends. Its mass per unit length is 1.2g/m and the tension is 12N.

a. What is the frequency of fundamental oscillation?
b. What tension is required if the n = 3 mode has frequency of 0.50 kHz? [4]

Ans: (a) 33.33 Hz, (b) 300 N

59. 2071 Set C Q.No. 11 2070 Set D Q.No. 11 In a resonance tube experiment, the first and the second resonance positions were observed at 17cm and 52.6cm respectively. The tuning fork used was frequency 512Hz and the temperature was 27°C. Calculate the velocity of sound in air at 0°C and the end correction of the tube. [4]

Ans: 347.75 m/sec and 0.008 m

60. 2069 Set B Q.No. 11 2068 Q.No. 11 2067 Sup Q.No. 11 An open pipe 30 cm long and a closed pipe 23 cm long, both of the same diameter, each sounds their first overtone. If they are in resonance find the end correction of these pipes. [4]

Ans: 1 cm

61. 2068 Can. Q.No. 11 A piano string 1.5m long is made of steel of density 7800 kg/m³ and Young's modulus 2×10^{11}N.m². It is maintained at a tension which produced an elastic strain of 1% in the string. Calculate the frequency of transverse vibration of the string when it is vibrating in second mode of vibration. [4]

Ans: 168.79 Hz, 337.6 Hz

62. 2066 Q.No. 5 b A uniform tube 60 cm long stands vertically with its lower end dipping into water. When the length above the water is 14.8cm and again when it is 48 cm, the tube resounds to a vibrating tuning fork of frequency 512Hz. Find the lowest frequency to which the tube will resound when it is open at both ends. [5]

Ans: 267.27 Hz

63. 2066 Supp Q.No. 5b A steel wire of length 40 cm and of diameter 0.25 mm vibrates in unision with a tube, open at both ends and of effective length 60 cm, when each is sounding its fundamental notes. The air temperature is 27° C. Find the tension in the wire. Given – velocity of sound in air at 0° C = 332 ms⁻¹ and density of steel = 7800 kg m⁻³ [5]

Ans: 20.6 N

64. 2061 Q.No. 5 b 2055 Q.No. 3 A piano string has a length of 2.0m and a density of 8000 kgm^{-3}. When the tension in the string produces a strain of 1%, the fundamental note obtained from the string in transverse vibration is 170 Hz. Calculate the Young's modulus value for the material of string. [4]
Ans: 3.7×10^{10} Nm^{-2}

65. 2060 Q.No. 5 b 2053 Q.No. 3 A wire of diameter 0.04 cm and made of steel of density 8000 kgm^{-3} is under a constant tension of 80N. What length of this wire should be plucked to cause it to vibrate with a frequency of 840 Hz? [4]
Ans: 0.168 m

66. 2056 Q.No. 3 OR An organ pipe is turned to a frequency of 440 Hz when the temperature is 27°C. Find its frequency when the temperature drops to 0°C. Assume both ends of the pipe open. [4]
Ans: 419.73 Hz

67. 2052 Q.No. 3 A steel wire of 2m long whose mass is 3g is under tension of 500N and is tied down at bothends. Calculate the frequency and wavelength for fundamental mode of vibration. [4]
Ans: 144.3 Hz, 4m

4. ACOUSTIC PHENOMENA

FORMULAE

1. Intensity

i. $I = \frac{\text{Power transfer}}{\text{surface area}} = \frac{P}{A} = 2a^2f^2a^2\rho v = \frac{P^2_{max}}{2\rho v}$

ii. $\frac{I_1}{I_2} = \frac{r_2^2}{r_1^2}$ (inverse square law)

iii. Threshold of hearing, $L_0 = \log I_0$, $I_0 = 10^{-12}$ Wm^{-2}

iv. Intensity level, $\beta = 10 \log \frac{I}{I_0}$ (decibel)

v. Comparison, $\Delta\beta = \beta_1 - \beta_2 = 20 \log \left(\frac{r_2}{r_1}\right)$.

vi. Energy density, $U = \frac{\text{Energy transfer}}{\text{volume}}$

viii. Intensity, point source (spherical wave) $I = \frac{P}{4\pi r^2}$, $a \propto \frac{1}{\sqrt{r}}$

2. Beats: The beat frequency, $f_b = f_1 - f_2$ (for $f_1 > f_2$) and $f_b = f_2 - f_1$ (for $f_2 > f_1$)

3. Doppler's effect:

i. Apparent frequency heard by the observer, $f' = \frac{v \pm v_0}{v \pm v_s}$

ii. Apparent frequency heard by driver moving towards a hill (i.e. reflector)

$f' = \frac{v + v_0}{v - v_s} \times f$

iii. Apparent frequency of echo of horn of his car heard by driver moving towards the hill (i.e. reflector)

$f' = \frac{v + v_0}{v - v_s} \times f$

iv. Doppler's effect in light: Apparent frequency of light received by an observer, $f' = \left(\frac{c \pm v}{c}\right) f$

Positive sign is chosen when the source and the observer are approaching each other and negative sign is chosen when the source and the observer are receding away.

Short Answer Questions [2 Marks]

1. 2077 Set D Q.No. 1d What is quality of sound? [2]
2. 2076 GIE Set A Q.No. 3b Can you distinguish two notes, one produced by violin and the other by a sitar, having the same frequency? Explain. [2]
3. 2076 GIE Set B Q.No. 3b How can bats fly around without colliding with objects that come in their way? [2]
4. 2076 Set B Q.No. 3b 2073 Supp Q.No. 3b 2070 Set D Q.No. 3b 2058 Q.No. 2d An empty vessel sounds more than a filled one when it is struck. Why? [2]
5. 2076 Set C Q.No. 3b Sound waves are called pressure waves. Why? [2]
6. 2075 GIE Q.No. 3b 2074 Set A Q.No. 3b 2072 Set E Q.No. 3b What is the threshold of hearing? Define one bel. [2]
7. 2075 Set A Q.No. 3b Justify the proverb "An empty vessel makes much noise". [2]
8. 2075 Set B Q.No. 3b Why is the voice of a woman more intelligible than that of a man? [2]
9. 2074 Supp Q.No. 3a 2074 Set A Q.No. 3a Why are longitudinal waves called pressure waves? [2]
10. 2074 Supp Q.No. 3b 2054 Q.No. 1 c What are ultrasonic and infrasonic waves? [2]
11. 2073 Set D Q.No. 3a 2055 Q.No. 1 c Explain the difference in characteristics between ultrasonic and supersonic waves. [2]
12. 2072 Set C Q.No. 3a 2071 Set C Q.No. 3a 2060 Q.No. 1c Whistle of an approaching train is shriller, why? [2]
13. 2072 Set D Q.No. 3b If the pressure amplitude of a sound wave is halved, by what factor does the intensity of the wave change? [2]
14. 2072 Set E Q.No. 3a A tuning fork has two prongs. Why? [2]
15. 2071 Supp. Q.No. 3b How can we consider sound waves as pressure waves? [2]
16. 2070 Supp. Set A Q.No. 3 a 'An empty vessel makes much noise'. How would you justify the proverb? [2]
17. 2070 Supp. Set A Q.No.3 b Bats catch their prey in the dark even when they don't see the prey. How can this happen? [2]
18. 2070 Supp. Set B Q.No. 3 b How can we recognize a person just by hearing her voice without seeing her face? [2]
19. 2069 Set A Q.No. 3a An empty vessel sounds more than a filled one. Why? [2]
20. 2069 Set A Old Q.No. 2c 2053 Q.No. 1b How are beats produced? What is beat frequency? [2]
21. 2069 Set B Q.No. 3a Is there a physical difference between intensity and intensity level of a wave? How are these quantities related? [2]
22. 2068 Old Can. Q.No. 2c Two notes, one produced by violin and the other by a sitar, may have the same frequency, yet we can distinguish between them. Why? [2]
23. 2068 Q.No. 3 a Which has a more direct influence on the loudness of a sound wave: the displacement amplitude or the pressure amplitude? Explain your reasoning. [2]
24. 2068 Old Q.No. 2 c What is meant by threshold of hearing? [2]
25. 2065 Q.No. 2 d Explain with a figure, the meaning of beats. [2]
26. 2064 Q.No. 1 c Bells are made of metal and not of wood, why? [2]

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27. 2061 Q.No. 1 c Define beats and beat frequency. [2]
28. 2059 Q.No. 1 c What do you mean by the term threshold of hearing? [2]
29. 2057 Q.No. 2 d Why is the roaring of a lion different than the sound of a mosquito? [2]
30. 2056 Q.No. 1 b How is it that one can recognize a friend from his voice without seeing him? [2]

Long Answer Questions [4 Marks]

31. 2076 GIE Set A Q.No. 7b Define intensity of sound and show that $I = \frac{1}{2} \rho V r^2 \omega^2$ where symbols have their usual meaning. [4]
32. 2076 GIE Set B Q.No. 7b Describe sound wave as a pressure wave and deduce an expression for the pressure amplitude. [4]
33. 2076 Set B Q.No. 7b 2057 Q.No. 5 a What is Doppler's effect? Derive an expression for the apparent frequency received by a stationary observer when a source of sound is moving away from the observer. [4]
34. 2076 Set C Q.No. 7b 2075 Set B Q.No. 8b 2074 Set B Q.No. 7b 2073 Set D Q.No. 7b 2072 Supp Q.No. 7b What is Doppler's effect? Derive an expression for the apparent frequency when a source of sound and the observer are moving towards each other. [4]
35. 2075 Set A Q.No. 7b What is Doppler's effect? Obtain an expression for the apparent pitch when a source moves away from a stationary observer. [4]
36. 2073 Supp Q.No. 7b 2064 Q.No. 5 a Define intensity of sound. Show that the intensity of sound for a given frequency is directly proportional to the square of amplitude of vibration. [4]
37. 2073 Set C Q.No. 7a How are beats formed when two waves are superimposed? Deduce expression for the frequency of beats so formed. [4]
38. 2072 Set C Q.No. 7b Describe sound wave as a pressure wave and deduce an expression for the pressure amplitude. [4]
39. 2072 Set E Q.No. 7b What is Doppler's effect? Find the change in frequency when an observer moves towards a stationary source and then moves away from the source. [4]
40. 2071 Set C Q.No. 7 b Define intensity of sound. Prove that it is proportional to the square of the amplitude of vibration for the given source of sound. [4]
41. 2071 Set D Q.No. 7 b 2069 Set A Q.No. 7b 2059 Q.No. 5 a What is Doppler's effect in sound? Obtain an expression for the apparent frequency of the sound when an observer moves towards a stationary source of sound. [4]
42. 2070 Set D Q.No. 7 b 2060 Q.No. 5 a OR What are beats? Show that the number of beats heard per second is equal to the difference between the frequencies of two superposing waves. [4]
43. 2070 Supp. Set B Q.No. 7 a 2067 Sup Q.No. 7a What are beats? Obtain an expression for the beat frequency produced by the superposition of two waves of slightly different frequencies. [4]
44. 2070 Supp. Set B Q.No. 7 b Define Doppler's effect. Derive an expression for the change in frequency observed by a stationary observer when a moving source just crosses the observer. [4]
45. 2069 Set B Q.No. 7a How does the frequency of sound change when sound source is moving:
    i. towards the stationary listener and
    ii. away from the stationary listener.
46. 2068 Can. Q.No. 7b What is Doppler's effect? Deduce an expression for the apparent frequency heard by a stationary observer when a source approaches towards him. [4]
47. 2067 Q.No. 7b Define intensity and deduce it in terms of amplitude of vibration, density of medium, angular velocity and velocity of the wave. [4]
48. 2066 Q.No. 5 a OR Define the intensity of sound and prove that $I = 1/2\ \rho V r^2 \omega^2$ where the symbols have their usual meaning. [4]
49. 2066 Supp Q.No. 5a OR What is the Doppler effect in sound? Obtain an expression for the apparent frequency of the sound when the source and observer both move in the same direction. [1+3]
50. 2062 Q.No. 6 a Discuss the phenomenon of Doppler's effect. Find the change in frequency when a moving source of sound passes a stationery observer. [4]
51. 2058 Q.No. 5 a What do you mean by intensity and intensity level of sound? Define bel and decibel. [4]
52. 2055 Q.No. 2 OR Deduce the expression for the frequency heard by an observer, when the observer is approaching the stationary sound source. [4]

Numerical Problems [4 Marks]

53. 2075 GIE Q.No. 11 A train is approaching a cliff at 20 m/s. The driver sounds a whistle of frequency 800 Hz. What will be the frequency of echo as heard by the driver? Velocity of sound in air is 350 m/s. [4]
    Ans: 896.97 Hz
54. 2074 Set A Q.No. 11 A car is approaching towards a cliff at a speed of 20m/s. The driver sounds a whistle of frequency 800 Hz. What will be the frequency of the echo as heard by the car driver? Velocity of sound in air = 350m/s. [4]
    Ans: 896.97 Hz
55. 2073 Set C Q.No. 11 A car travelling with a speed of 60 Kmhr^{-1} sounds a horn of frequency 500Hz. The sound is heard in another car travelling behind the first car in the same direction with a speed of 80 Kmhr^{-1}. What frequencies will the driver of the second car hear before an after overtaking the first car if the velocity of sound is 340ms^{-1}? [4]
    Ans: 507.8 Hz and 491.4 Hz
56. 2072 Set D Q.No. 11 A stationary motion detector sends sound waves of 150 KHz towards a truck approaching at a speed of 120 km/hr. What is the frequency of wave reflected back to detector? (Velocity of sound in air = 340 m/s) [4]
    Ans: 182.6 KHz
57. 2070 Supp. Set A Q.No. 11 A car traveling at 20ms^{-1} blows its horn which has a frequency of 600Hz. A stationary observer notices that the frequency of the horn changes considerably as the car passes by him. Calculate the change in frequency heard by the observer as the car approaches and moves away from the observer. (Given velocity of sound = 330ms^{-1}) [4]
    Ans: 73 Hz

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58. 2070 Set C Q.No. 11 A car, sounding a horn and producing a note of 500 Hz, approaches and then passes a stationary observer at a steady speed of 20ms^{-1}. Calculate the change in frequency heard by the observer. Velocity of sound is 340 ms^{-1}. [4]
Ans: 59 Hz

59. 2069 Set A Old Q.No. 5b When a jet plane is flying on elevation of 1000m the sound level on the ground is 4.0db. What would be the intensity level on the ground when its elevation is as low as 100m? [3]
Ans: 24 db

60. 2068 Old Can. Q.No. 5b A source of sound generates sound waves which travel with a speed of 340ms^{-1}. The frequency of the source is 500 Hz. Find the frequency of the sound heard if:
i. The source is moving towards the stationary observer with a speed of 30 ms^{-1}.
ii. The observer is moving towards the stationary source with a speed of 30ms^{-1}.
iii. Both source and observer move with a speed of 30ms^{-1} and approach one another. [3]
Ans: 550 Hz, 545.45 Hz, 600 Hz

61. 2068 Old Q.No. 5 b When a jet plane is flying at an elevation of 1000m the sound level on the ground is 4.0 db. What would be the intensity level on the ground when its elevation is as low as 50 m? [3]
Ans: 30 dB

62. 2067 Q.No. 11 2067 Old Q.No. 5b An observer traveling with constant velocity of 20 m/s, passes close to a stationary source of sound and notices that there is a changes of frequency of 50 HZ as he passes the source. What is the frequency of the source? Speed of the sound in air = 340 m/s.[4]
Ans: 425 Hz

63. 2065 Q.No. 5 b A car is moving away from a stationary listener with a velocity of 20m/s. If the horn is sounding at frequency 512 Hz, calculate the change in pitch of the sound received by the listener. (Velocity of sound in air = 330ms^{-1})[3]
Ans: 29.26 Hz

64. 2063 Q.No. 6 b The intensity level from a loud speaker is 100 dB at a distance of 10m. What is its intensity level at a distance of 200m?
Ans: 74 dB

65. 2062 Q.No. 6 b The intensity level from a loud speaker is 100 dB at a distance of 10 m. What is its intensity level at a distance of 100 m? [4]
Ans: 80 dB

66. 2059 Q.No. 5 b A note produces 2 beat/s with a tuning fork of frequency 480 Hz and 6 beats/s with a tuning fork of 472 Hz. Find the frequency of the note. [4]
Ans: 478 Hz

67. 2056 Q.No. 3 The noise from an airplane engine 25.0 m from an observer is found to have an intensity of 45.0 db. What will be the intensity in decibel when the plane flies overhead at an attitude of 2.0 km? [4]
Ans: 6.94 dB

68. 2054 Q.No. 3 A column of air is set into vibration and the note emitted gives 10 beats per second when a tunning fork of frequency 440 Hz is sounded, the temperature being 20°C. The frequency of beats decreases when the tunning fork is loaded with a small piece of wax. At what temperature will the unloaded fork and the air column will be in unison? [4]
Ans: 306.33 K

69. 2054 Q.No. 3 OR Two observers A and B are provided with source of sound of frequency 500 Hz. A remains stationery and B moves away from him at a velocity of 1.8ms^{-1}. How many beats per second are observed by B, the velocity of sound in air being 330 ms^{-1}? Ans: 27 beats/S [4]

B. PHYSICAL OPTICS

1. NATURE AND PROPAGATION OF LIGHT

FORMULAE

1. Speed of light in vaccum, $c = 3 \times 10^8$ ms^{-1}.
2. Foucault's method: Speed of light, $c = \frac{4\pi fa}{\theta} = \frac{8\pi\, fa^2x}{(a+b)\,y}$
3. Michelson's method: speed of light, c = 2mfd, for octagonal mirror, c = 16fd.
4. Refractive index: $\eta = \frac{\text{wavelength of light in vacuum}}{\text{wavelength of light in medium}} = \frac{\lambda}{\lambda'}$

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 4b 2073 Supp Q.No. 4a 2062 Q.No. 2 d Differentiate between a plane wave front and a spherical wave front. [2]
2. 2076 GIE Set B Q.No. 4a What are meant by wave front and wavelets? [2]
3. 2076 Set B Q.No. 4a 2067 Sup Q.No. 4a State Huygen's principle. Does it apply to sound wave in air? [2]
4. 2076 Set C Q.No. 4a 2075 Set A Q.No. 4a 2075 Set B Q.No. 4a 2074 Supp Q.No. 4a 2072 Set C Q.No. 4a 2071 Set C Q.No. 4a 2070 Set C Q.No. 4 b Differentiate wave front and wavelet. [2]
5. 2074 Set A Q.No. 4a Explain with proper sketch, the differences between wavefronts and wavelets. [2]
6. 2073 Set D Q.No. 4a What is the difference between wave front and wavelets in the explanation of Huygen's wave theory? [2]
7. 2072 Set E Q.No. 4a Explain with proper sketch, the differences between wavefronts and wavelets. [2]
8. 2071 Supp. Q.No. 4a If light travels from one medium to another, its velocity changes? Is it due to change in frequency or wavelength? Explain. [2]
9. 2070 Supp. Set B Q.No. 4 a A normally incident wave front does not deviate, when it travels from one medium to another. Explain. [2]
10. 2069 Supp Set B Q.No. 4 b Can Snell's law be verified from wave theory? Explain with figure only. [2]
11. 2069 Set A Old Q.No. 2g 2068 Q.No. 4 b What is wavefront? [2]
12. 2067 Q.No. 4b What is Huygens's principle? [2]
13. 2067 Old Q.No. 2c When monochromatic light incidents on a surface, the reflected and refracted wave will have same frequency. Why? [2]
14. 2063 Q.No. 2 c Which parameters of light does not change on refraction? [2]

Long Answer Questions [4 Marks]

15. 2077 Set D Q.No. 2d State and explain Huygen's construction and use it to verify laws of refraction. [4]
16. 2076 GIE Set A Q.No. 8a Explain laws of reflection of light on the basis of wave theory. [4]

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17. 2076 Oct Set B Q.No. 8a 2076 Set B Q.No. 7a 2072 Set E Q.No. 8a 2071 Set C Q.No. 8a 2069 Supp Set B Q.No. 8b 2067 Q.No. 8a Describe Michelson's method to measure velocity of light. [4]

18. 2076 Set D Q.No. 8b 2075 Set A Q.No. 8b 2070 Supp. Set A Q.No. 8a 2069 Set A Q.No. 8a 2068 Q.No. 8a Describe Foucault's method of determining the speed of light. [4]

19. 2076 Set C Q.No. 8a 2072 Set D Q.No. 8a State and explain Huygen's principle and use it to verify laws of reflection on the basis of wave theory. [4]

20. 2075 Oct Q.No. 8a 2071 Supp Q.No. 8a What is meant by wave front? Verify Snell's law on the basis of wave theory. [4]

21. 2074 Set B Q.No. 8a What is a wavefront? Using Huygen's principle prove that for a parallel beam of light incident on a reflecting surface, the angle of incidence is equal to angle of reflection. [4]

22. 2073 Set C Q.No. 8b Describe Huygen's principle with figure to prove the laws of reflection and refraction of light. [4]

23. 2072 Supp Q.No. 8a What is Huygen's principle? Show how refraction of light at a plane interface can be explained on the basis of wave theory of light. [4]

24. 2071 Set D Q.No. 8 a State and explain Huygen's principle and use it to verify Snell's law. [4]

25. 2070 Supp. Set A Q.No. 8 b State Huygen's principle of wave theory of light and also use this principle to verify the laws of reflection of light. [4]

26. 2070 Supp. Set B Q.No. 8 b State and use Huygen's principle of wave theory of light to verify the laws of refraction of light. [4]

27. 2070 Set D Q.No. 8 a State and explain Huygen's principle. Use it to prove Snell's law. [4]

28. 2069 Set B Q.No. 8b Describe Foucault's experimental method for the measurement of the velocity of light with necessary theory. [4]

29. 2068 Can. Q.No. 8a 2066 Supp Q.No. 6a State and explain Huygen's principle. Use the principle to show that a plane wave incident obliquely on a plane mirror is reflected as a plane wave so that the angle of incidence is equal to the angle of reflection. [4]

30. 2067 Sup Q.No. 8b Describe Michelson's method to determine the speed of light. Write advantages of the method over foucault's method. [3+1]

31. 2064 Q.No. 6 a State and explain Huygen's principle. Use the principle to verify the laws of refraction of light on the basis of wave theory. [1+3]

32. 2063 Q.No. 5 a OR Define Huygen's principle and prove Snell's law by the help of wave theory of light. [4]

33. 2061 Q.No. 6 a Prove the laws of reflection of light using the wave theory. [4]

34. 2060 Q.No. 6 a State and explain Huygen's principle. Use the principle to show that a plane wave front incident obliquely on a plane mirror is reflected as a plane wave front so that the angle of incidence is equal to the angle of reflection. [2+2]

Numerical Problems [4 Marks]

35. 2074 Supp Q.No. 12 In Michelson's rotating prism method the distance between the rotating prism and the distant mirror is 45 km. A minimum speed of 416.7 revolutions per second is needed to view the source in the same position when the prism is at rest. Calculate the speed of light. [3]
Ans: 3×10^8 m/s

36. 2074 Set A Q.No. 12 A plane mirror is placed at the centre of a concave mirror having radius of curvature 40 m. The plane mirror rotates at the speed of 2600 revolutions per second. Calculate the angle between ray incidents on the plane mirror and then reflected from it after the light has travelled to the concave mirror and back to the plane mirror. Given speed of light is 3×10^8 m/s. [3]
Ans: 0.9

37. 2073 Supp Q.No. 12 The radius of curvature of the curved mirror is 200m and the plane mirror is rotated at 20 rev s^{-1}. Calculate the angle in degrees between ray incidents on the plane mirror and then reflected from it after the light has travelled to the curved mirror and back to the plane mirror. ($C = 3 \times 10^8$ ms^{-1}) [3]
Ans: 0.0192 degree

38. 2072 Set C Q.No. 12 2070 Supp. Set B Q.No. 12 A beam of light after reflection at a plane mirror, rotating 2000 times per minute, passes to a distant reflector. It returns to the rotating mirror from which it is reflected to make an angle of 1° with its original direction. If the distance between the mirrors is 6250 m, calculate the velocity of light. [3]
Ans: 3×10^8 m/sec

39. 2071 Supp. Q.No. 12 In a Michelson experiment for measuring speed of light, the distance travelled by light between two reflections from the rotating mirror is 4.8km. The rotating mirror has a shape of regular octagon. At what frequency of rotation of mirror the image is formed at the position where non-rotating mirrors forms it? [3]
Ans: 7812.5 rev/sec

40. 2070 Set C Q.No. 12 2067 Old Q.No. 6b A beam of light is reflected by a rotating mirror on to a fixed mirror, which sends it back to the rotating mirror which it is again reflected making an angle of 18° with its original direction. The distance between the two mirrors is 10 km and the rotating mirror is making 375 revolutions per second. Calculate the velocity of light. [4]
Ans: 3×10^8 m/sec

41. 2063 Q.No. 5 b A beam of light is reflected by a rotating mirror onto a fixed mirror which sends back to the rotating mirror from which it is again reflected and then makes an angle of 3.6° with the original direction. The distance between the two mirrors is 1 km and the rotating mirror is make 750 $revs^{-1}$. Calculate the velocity of light.
Ans. 3×10^8 m/s

42. 2058 Q.No. 6 b The radius of curvature of the curved mirror is 20 m and the plane mirror is rotated at 20 $revs^{-1}$, calculate the angle in degrees between a ray incident on the plane mirror and then reflected from it after the light has travelled to the curved mirror and back to the plane mirror ($c = 3 \times 10^8$ m s^{-1}).
Ans: 1.92×10^{-3} degree

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2. INTERFERENCE

FORMULAE

1. The resultant amplitude in interference of two waves, $a = \sqrt{a_1^2 + a_2^2 + 2a_1a_2 \cos\phi}$
2. Intensity of resultant wave, $I = I_1 + I_2 + 2\sqrt{I_1I_2}\cos\phi$, Where ϕ is the phase difference between two waves
3. Constructive interference is obtained, when $\phi = 2n\pi$ and $x = n\lambda$, where, $n = 0, 1, 2, \ldots$
4. Destructive interference is obtained, when $\phi = (2n-1)\pi$ and $x = (2n-1)\frac{\lambda}{2}$, where $n = 1, 2, 3, \ldots$
5. Relation between optical path and geometric path: Optical path (L) = refractive index (η) × geometric path (x)
6. $\phi = \frac{2\pi}{\lambda}x$
7. The angular width of a fringe produced by Young's double slit experiment, $\theta = \frac{\beta}{D} = \frac{\alpha}{D} = \frac{\lambda D}{dD} = \frac{\lambda}{d}$
8. The fringe width for both bright and dark pattern is $\alpha = \beta = \frac{\lambda D}{d}$
9. Radius of n^{th} dark Newton's ring, $r_n = \sqrt{n\lambda R}$
10. Radius of n^{th} bright Newton's ring, $r_n = \sqrt{(2n+1)\frac{\lambda}{2}R}$
11. Wavelength of light by Newton's Ring Method, $\lambda = \frac{D_{n+m}^2 - D_n^2}{4mR}$

Short Answer Questions [2 Marks]

1. 2075 GIE Q.No. 4a What happens on the interference fringes in a Young's double slit experiment when (i) the screen is moved away (ii) the source is replaced by another source of shorter wavelength? [2]
2. 2074 Set B Q.No. 4a What are coherent sources of light? Can two different bulbs, similar in all respects, act as coherent sources? [2]
3. 2073 Set C Q.No. 4a Two waves are represented in usual notation as $y_1 = a_1 \sin\omega t$ and $y_2 = a_2 \cos\omega t$. Their intensities are I_1 and I_2. What would be the ratio of their amplitudes when $I_1 = 2I_2$? [2]
4. 2072 Supp Q.No. 4a A two-slit interference experiment is setup and the fringes are displayed on a screen. Then the whole apparatus is immersed in a water. How does the fringe pattern change? [2]
5. 2072 Set D Q.No. 4a Does the interference of light waves obey the law of conservation of energy? Explain. [2]
6. 2071 Set C Q.No. 4 b What are the conditions for constructive and destructive interference of light waves? [2]
7. 2070 Supp. Set A Q.No. 4 b Is the law of conservation of energy obeyed in case of interference of light? Explain. [2]
8. 2070 Set C Q.No. 4 a What should be the path difference between two interfering waves for constructive interference and destructive interference? [2]
9. 2068 Can. Q.No. 4a 2066 Supp Q.No. 2d In Young's double slit experiment, how is the fringe width altered if the separation between the slits is doubled and the distance between the slits and the screen is halved? [2]
10. 2068 Old Q.No. 1d 2065 Q.No. 2c What do you mean by coherent sources of light? [2]
11. 2067 Old Q.No. 1c What are the conditions for sustained interference of light? [2]
12. 2064 Q.No. 1 d Distinguish between interference and diffraction. [2]
13. 2058 Q.No. 2 c Why have the two sources of light to be close to each other for the production of good interference pattern? [2]
14. 2057 Q.No. 2 c Can two independent sources of light produce interference? [2]

Long Answer Questions [4 Marks]

15. 2076 GIE Set B Q.No. 8b Discuss Young's double slit experiment and show that bright and dark fringes are of equal width. [4]
16. 2076 Set B Q.No. 8a Describe Newton's ring experiment and derive expression for wavelength of light. [4]
17. 2075 Set A Q.No. 8a Discuss the Young's double slit experiment and show that the width of bright and dark fringes are equal. [4]
18. 2074 Supp Q.No. 8a 2074 Set D Q.No. 8b Describe Young's double slit experiment and obtain an expression for the fringe width. [4]
19. 2074 Set A Q.No. 8a Define coherent sources of light. Prove that the dark and bright fringes are equally spaced in Young's double slit experiment. [4]
20. 2073 Supp Q.No. 8a 2069 Set A Q.No. 8b 2068 Old Can. Q.No. 6a OR 2067 Sup Q.No. 8a Prove analytically that the bright and dark fringes in Young's double slit experiment are equally spaced. [4]
21. 2073 Set C Q.No. 8a 2072 Set C Q.No. 8a 2070 Set D Q.No. 8b What are coherent sources of light? Describe double slit experiment to find the fringe width from the experiment performed with light waves. [4]
22. 2072 Supp Q.No. 8b What are the conditions for constructive and destructive interference of light waves? Show that in Young's double slit experiment, the dark and bright fringes are equally spaced. [4]
23. 2070 Supp. Set B Q.No. 8 a Discuss the Young's double slit experiment and determine the expression for fringe width. [4]
24. 2069 Supp Set B Q.No. 8 a Describe Young's double slit experiment of interference to estimate the fringe width of the pattern. [4]
25. 2069 Set A Old Q.No. 6a What do you mean by constructive and destructive interference of light? Describe Young's double slit experiment for the measurement of wavelength of monochromatic source of light. [1+3]
26. 2069 Set B Q.No. 8a What are the main characteristics of coherent sources? Describe Young's double slit interference experiment to determine the wavelength of the source of light. [4]
27. 2068 Old Q.No. 6 a Or Describe Young's double slit experiment, in brief, for the measurement of wave-length of a monochromatic source of light. [4]
28. 2066 Q.No. 6 a Describe Young's double slits experiment for the interference of light and show that widths of bright and dark fringes are the same. [1+3]
29. 2062 Q.No. 5 a What do you understand by interference of light? Derive an expression for the fringe width in a Young's double slit experiment. [4]

30. 2057 Q.No. 6 a Derive the fringe width from Young's double slit experiment. [4]

Numerical Problems [3 or 4 Marks]

31. 2077 Set D Q.No. 3d In a Newton's rings experiment, the diameter of 15th ring was found as 0.594 cm and that of 5th ring was 0.332 cm. Calculate the radius of curvature of the plano-convex lens if the wavelength of light used is 5890Å. [4]
Ans: 1.03 m

32. 2076 GIE Set A Q.No. 12 In Young's experiment two slits spaced 0.45 mm apart are placed 75 cm from a screen. What is the distance between second and third dark lines in the interference pattern on a screen when slits are illuminated with light of 500nm? [3]
Ans: 0.833×10^{-3} m

33. 2076 Set C Q.No. 12 In a Young's double slit experiment, the separation of four bright fringes is 2.5 mm. The wavelength of light used is 6.2×10^{-7} m. If the distance from the slits to the screen is 80 cm, calculate the separation of two slits. [3]
Ans: 5.95×10^{-4}m

34. 2075 GIE Q.No. 12 The distance between two coherent sources in Young's double slit experiment is 0.3 mm and the interference pattern is observed on a screen 60 cm from the sources. If the wavelength of light used is 6×10^{-7} m, calculate the fringe width of the interference pattern. [3]
Ans: 1.0×10^{-3} m

35. 2075 Set B Q.No. 12 In a Newton' rings experiment, the diameter of 15th ring was found as 0.590 cm and that of 5th ring was 0.336 cm. Calculate the radius of curvature of the plano-convex lens if the wavelength of light used is 5880A. [3]
Ans: 100 cm

36. 2074 Set B Q.No. 12 In a Young's double slit experiment, the separation of four bright fringes is 2.5 mm. The wavelength of light used is 6.2×10^{-5} cm and the distance from the slits to the screen is 80 cm. Calculate the separation of slits. [3]
Ans: 5.95×10^{-4} m

37. 2073 Set D Q.No. 12 The separation between the consecutive dark fringes in a Yourn's double slit experiment is 1 mm. The screen is placed at a distance of 2 m from the slits 1.0 mm separation. What is the wavelength of light used in the experiment? [4]
Ans: 5×10^{-7} m

38. 2072 Set D Q.No. 12 In young's double slit experiment, the slits are 0.03 cm apart and the screen is placed 1.5 m away. The distance between the central bright fringe and fourth bright fringe is 1 cm. Calculate the wave length of light used. [3]
Ans: 5×10^{-7} m

39. 2072 Set E Q.No. 12 Two coherent sources A and B of radio waves are 5m apart. Each source emits waves with wavelength 6m. Consider points along the line between two sources, at what distances, if any, from A is the interference constructive. [3]
Ans: 2.5 m

40. 2068 Can. Q.No. 12 Two slits spaced 0.45 mm apart are placed 75 cm from a screen. What is the distance between the second and third dark lines of the interference pattern on the screen when the slits are illuminated with monochromatic light of wavelength 500 nm? [3]
Ans: 0.833 mm

41. 2068 Q.No. 12 In a Young's slits experiment, the separation of four bright fringes is 2.5 mm when the wavelength used is 6.2×10^{-7}m. The distance from the slits to the screen is 0.80m. Calculate the separation of the two slits. [3]
Ans. 0.794 mm

42. 2067 Q.No. 12 In a two-slit interference experiment, the slits are 0.200 mm apart, and the screen is at a distance of 1.0 m. The third bright fringe is found at 9.49 mm from the central fringe. Find wavelength of the light used. [3]
Ans: 6.33×10^{-7} m

43. 2064 Q.No. 6 b In a Young's double slit experiment, the separation between the first and fifth bright fringes is 2.5 mm when the wavelength of light used is 6.2×10^{-4} mm. The distance from the slits to the screen is 80 cm. Calculate the separation of the two slits. [4]
Ans: 8×10^{-4} m

44. 2060 Q.No. 6 b In an experiment using Young's slits the distance between the centre of the interference pattern and the tenth bright fringe on either side is 3.44 cm. Distance between the slits and the screen is 2.0 m. If the wavelength of the light used is 5.89×10^{-7} m, determine the slit separation and the angle made by the central bright fringe at the slit. [4]
Ans: 3.42×10^{-4} m, 1.72×10^{-3} radian

45. 2059 Q.No. 6 b Two slits are 0.3 mm apart and placed 50 cm from a screen. What is the distance between the second and third dark lines of the interference pattern when the slits are illuminated with a light of 600 nm wavelengths?
Ans: 10^{-1} m

3. DIFFRACTION

FORMULAE

1. Condition of n^{th} minimum is, $d \sin\theta = n\lambda$, where $n = 1, 2, 3, \ldots$
2. Condition of n^{th} secondary maximum, $d \sin\theta = (2n + 1)\frac{\lambda}{2}$, where $n = 1, 2, 3, \ldots$
3. The angular position of n^{th} minimum, $\theta_n = \frac{n\lambda}{d}$
4. The distance of n^{th} minimum from the center of the screen, $x_n = \frac{n\lambda D}{d}$
5. The angular position of n^{th} secondary maximum, $\theta_n' = (2n + 1)\frac{\lambda}{2d}$
6. Distance of n^{th} secondary maximum from the center of the screen $x_n' = \left(\frac{2n + 1}{2}\right)\frac{\lambda D}{d}$
7. Width of central maximum, width $\beta_0 = 2\beta = \frac{2\lambda D}{d}$
8. Angular spread of central maximum on either side, $\theta = \pm\frac{\lambda}{d}$.
9. Total angular spread of central maximum $2\theta = \frac{2\lambda}{d}$.
10. The resolving power $= \frac{1}{\text{limit of resolution}}$.
11. Limit of resolution, $\theta = \frac{1.22\lambda}{D}$.

The resolving power = $\frac{D}{1.22\lambda}$.

12. Grating equation, $\sin\theta_n = Nn\lambda$, where, $N = \frac{1}{(a+b)}$.

Short Answer Questions [2 Marks]

1. 2074 Supp Q.No. 4b | 2069 Set A Q.No. 4a Why is diffraction of sound waves easier to observe than that of light waves? [2]
2. 2072 Supp Q.No. 4b Light waves undergo diffraction around an edge. Can sound wave diffract around an edge? Explain. [2]
3. 2071 Set D Q.No. 4 a | 2068 Old Can. Q.No. 2d The diffraction of sound waves is more evident in daily experience than that of light waves. Why? [2]
4. 2070 Supp. Set A Q.No. 4 a Why can we readily observe diffraction effects for sound waves but not for light? [2]
5. 2070 Set D Q.No. 4 a | 2067 Sup Q.No. 4b Radio waves diffract around buildings but not light waves, why? [2]
6. 2069 Supp Set B Q.No. 4 a What is the fundamental physical difference between interference and diffraction? Explain with figures. [2]
7. 2069 Set B Q.No. 4a What are the characteristic elements associated with a diffraction grating? How is plane transmission grating constructed? [2]
8. 2068 Q.No. 4 a Describe what happens to the single slit diffraction pattern when the width of the slit is less than the wave length of the wave. [2]
9. 2062 Q.No. 1 d What is diffraction of light? [2]
10. 2059 Q.No. 2 c Diffraction grating is better than a two-slit set up for measuring the wave length of a monochromatic light. Explain. [2]

Long Answer Questions [4 Marks]

11. 2076 GIE Set A Q.No. 8b Describe the diffraction of light through a single slit. Find the conditions of formation of maxima and minima. [4]
12. 2076 Set C Q.No. 8b | 2075 GIE Q.No. 8b | 2075 Set B Q.No. 7b | 2074 Set B Q.No. 8b | 2071 Set C Q.No. 8 b Discuss Fraunhofer diffraction at a single slit. [4]
13. 2074 Set A Q.No. 8b What is diffraction grating? Discuss the formation of diffraction pattern due to a diffraction grating. [4]
14. 2073 Supp Q.No. 8b | 2061 Q.No. 6 a OR Describe the diffraction of light at a single slit and find the condition for secondary maxima and minima. [4]
15. 2073 Set D Q.No. 8a What is diffraction of light? Explain the case of diffraction at a single slit. Hence show the intensity distribution is the figure. [4]
16. 2072 Set C Q.No. 8b Define Fraunhofer diffraction. How is transmission grating constructed? Describe necessary theory of diffraction grating. [4]
17. 2072 Set D Q.No. 8b Discuss the formation of maxima and minima due to Fraunhofer diffraction at a single slit. [4]
18. 2072 Set E Q.No. 8b What do you mean by diffraction of light? Explain the diffraction pattern due to a single slit to find the angular width of the central band. [4]
19. 2071 Supp. Q.No. 8b Explain the formation of maxima and minima due to diffraction through a single slit. [4]
20. 2070 Set C Q.No. 8 a Discuss the theory of diffraction of light at single slit. [4]
21. 2068 Can. Q.No. 8b What is the basic difference between interference and diffraction? Discuss Fraunhofer diffraction at a single slit. [4]
22. 2068 Q.No. 8 b What is Fraunhoffer diffraction? Explain the formation of maxima and minima due to diffraction? Show that the width of central maxima is inversely proportional to the distance between the two slits. [4]
23. 2067 Q.No. 8b Describe diffraction of light through a single slit. [4]
24. 2065 Q.No. 6 a OR What are the differences between interference and diffraction? Explain the theory of diffraction of light through a sihge slit. [1+3]
25. 2058 Q.No. 6 a OR What is diffraction of light? How does it differ from interference of light? [4]

Numerical Problems [3 or 4 Marks]

26. 2076 GIE Set B Q.No. 12 How wide is the central diffraction peak on a screen 5 m behind 0.010 mm slit illuminated by 450 nm light? [3]
Ans: 0.45 m
27. 2076 Set B Q.No. 12 How wide is the central diffraction peak on a screen 5 m behind a 0.01 mm slit illuminated by 500 nm light source? [3]
Ans: 0.5 m
28. 2075 Set A Q.No. 12 | 2062 Q.No. 5 b How wide is the central diffraction peak on a screen 3.5 m behind a 0.01 mm slit illuminated by 500 nm light source? [3]
Ans: 0.35 m
29. 2073 Set C Q.No. 12 A plane transmission grating having 500 lines per mm is illuminate normally by light source of 600 nm wavelength. How many diffraction maxima will be observed on a screen behind the grating? [4]
Ans: 3
30. 2071 Set D Q.No. 12 | 2069 Supp Set B Q.No. 12 | 2069 Set B Q.No. 12 A parallel beam of sodium light is incident normally on a diffraction grating. The angle between the two first order spectra on either side of the normal is 27°42'. Assuming that the wavelength of light is 5.893×10^{-7}m, find the number of rulings per mm on the grating? [3]
Ans: 406 lines/mm
31. 2069 Set A Q.No. 12 A diffraction grating has 400 lines per mm and is illuminated normally by a monochromatic light of wavelength 6000 Å. Calculate the grating spacing, the angle at which first order maximum is seen and the maximum number of diffraction maxima obtained. [3]
Ans: 0.25×10^{-6}m, 13.90, n = 4
32. 2068 Old Can. Q.No. 6b A Parallel beam of sodium light of wavelength 5.893×10^{-7}m is incident normally on a diffraction grating. The angle between the two first order spectra on either side of the normal is 28°. Find the number of ruling lines per mm on the grating. [3]
Ans: 410 lines/mm

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4. POLARIZATION

FORMULAE

1. Malus law: $I \propto \cos^2\theta$
2. Brewster's law: $\eta = \tan\theta_p$

Where, $\eta = \frac{c}{v}$ = refractive index and θ_p = polarizing angle

Short Answer Questions [2 Marks]

1. 2077 Set D Q.No. 1e Can sound waves be polarized? Explain. [2]
2. 2076 GIE Set A Q.No. 4a State Brewster's law. [2]
3. 2076 GIE Set B Q.No. 4b 2076 Set C Q.No. 4b 2074 Set B Q.No. 4b 2060 Q.No. 1d Can sound wave be polarized? Justify your answer. [2]
4. 2076 Set B Q.No. 4b Differentiate unpolarized and polarized light. [2]
5. 2075 GIE Q.No. 4b 2074 Set A Q.No. 4b 2073 Supp Q.No. 4b 2070 Set D Q.No. 4 b 2068 Can. Q.No. 4b What is polarizing angle? Does it depend on the wavelength of light used? [2]
6. 2075 Set A Q.No. 4b Does the polarizing angle for a transparent medium depend upon the wavelength of the light? [2]
7. 2075 Set B Q.No. 4b Can ultrasonic waves be polarized? [2]
8. 2073 Set C Q.No. 4b Are light waves longitudinal? Justify your answer. [2]
9. 2073 Set D Q.No. 4b State and explain Brewster's law of polarization. [2]
10. 2072 Set C Q.No. 4b Define polarizing angle. How is it related with the refractive index of the medium? [2]
11. 2072 Set D Q.No. 4b What is polarized light? How is it represented? [2]
12. 2072 Set E Q.No. 4b 2069 Set A Q.No. 4b 2066 Q.No. 1d Is polarization possible for longitudinal waves? Justify. [2]
13. 2071 Supp. Q.No. 4b Does polarizing angle depend on wavelength of light? [2]
14. 2071 Set D Q.No. 4 b 2067 Q.No. 4a Light waves can be polarized. What about sound waves? Explain. [2]
15. 2070 Supp. Set B Q.No. 4 b In which medium is the angle of polarization greater, rarer or denser? [2]
16. 2069 Set B Q.No. 4b Is there any difference between an analyzer and a polarizer? Explain. [2]
17. 2068 Old Q.No. 2 d The polarising angle for a transparent medium is 60°. What is the refractive index of the medium? [2]

Long Answer Questions [4 Marks]

18. 2074 Supp Q.No. 8b What is polarization of light? Discuss polarization by reflection and prove Brewster's law. [4]
19. 2073 Set D Q.No. 8b What is polarization? Prove that light is a transverse wave. [4]
20. 2070 Set C Q.No. 8 b What is polarization of light? State and prove Brewster's law. [4]
21. 2067 Old Q.No. 6a OR What is polarising angle? Derive the relation between the polarising angle and the refractive index of the medium. [1+3]
22. 2066 Supp Q.No. 6a OR What do you mean by polarization of electromagnetic wave? Discuss the polarization of light by reflection and show that $\mu = \tan\theta_p$, where the symbols have their usual meanings. [1+3]
23. 2062 Q.No. 5 a OR Distinguish between a plane polarized and unpolarized light.
Show that: $\tan\theta_p = n$
n = refractive index of the medium.
p = angle of polarization or polarizing angle. [4]

Numerical Problems [3 or 4 Marks]

24. 2072 Supp Q.No. 12 The polarizing angle for a medium is 60°. Calculate the velocity of light in the medium. [3]
Ans: 1.73×10^8 m/sec
25. 2071 Set C Q.No. 12 A beam of light is incident at polarizing angle on a piece of transparent material of refractive index 1.62. What is the angle of refraction for the transmitted beam? [3]
Ans: 31.7°
26. 2070 Supp. Set A Q.No. 12 The critical angle for light in a certain substance is 45°. What is the polarizing angle? [3]
Ans: 54.7°
27. 2070 Set D Q.No. 12 Calculate the polarizing angle for the light traveling from water of refractive index 1.33 to glass of refractive index 1.53. [3]
Ans: 49°
28. 2067 Sup Q.No. 12 A parallel beam of unpolarized light in air is incident at an angle of 55° on a plane glass surface. If the reflected beam is completely plane polarized, find the refractive index of the glass and the angle of refraction of the transmitted beam. [3]
Ans: 1.428, 35°

UNIT-2 ELECTRICITY AND MAGNETISM

A. CURRENT ELECTRICITY

1. D.C. CIRCUIT

FORMULAE

1. Electric current (I) = $\frac{dq}{dt} = \frac{Ne}{t}$, where N is total number of charge particles.
2. Drift Velocity, $I = v_d enA$, Where, v_d is drift velocity of electron.
3. Current density (J): $J = \frac{I}{A} = nev_d$
4. Combination of resistors:
   i. Series combination: $R = R_1 + R_2 + R_3 + \ldots$
   ii. Parallel combination, $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots$
   iii. The equivalent resistance of n equal resistors of equal resistance (r) when connected in series is R = nr.
   iv. The equivalent resistance of n equal resistors of equal resistance (r) when connected in parallel, $R = \frac{r}{n}$.
   v. The ratio of n identical resistors of equal resistance when connected in series to parallel is,
   $\frac{R_{series}}{R_{parallel}} = n^2$
5. Variation of resistance with temperature:

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i. The resistance at 0°C, $R_\theta = R_0(1 + \alpha\theta)$,
where
R_0 = resistance of conductor at 0°C and
α = temperature coefficient of resistance = $\frac{R_\theta - R_0}{R_0\theta}$

6. Conversion of galvanometer into ammeter
i. Internal resistance of ammeter is very small, $R_a = \frac{GS}{G+S}$
ii. Value of shunt is, $S = \frac{I_g G}{I - I_g}$

7. Conversion of galvanometer into voltmeter:
i. Internal resistance is very large; $R_V = R + G$
ii. Value of multiplier, $R = \frac{V}{I_g} - G$

8. Electric power: $P = \frac{qV}{t} = IV = I^2R = \frac{V^2}{R}$

9. Electric energy: $(E) = I^2Rt = VIt = Pt = \frac{V^2t}{R}$

10. Emf, terminal potential and internal resistance:
i. Relation, $E = V + Ir$
ii. Efficiency of a source of emf, $\eta = \frac{P_0}{P_i} = \frac{V}{E} = \frac{R}{R+r}$

11. Terminal potential difference,
i. While charging, $V > E$, $E = V - Ir$
ii. While discharging, $V < E$, $E = V + Ir$

Short Answer Questions [2 Marks]

1. **2076 GIE Set A Q.No. 1a** Derive relationship between current density and electric field intensity. [2]
2. **2076 GIE Set A Q.No. 1b** Can terminal p.d. be greater than emf of a cell? Justify your answer. [2]
3. **2076 GIE Set A Q.No. 1e** Compare the resistances of an ideal ammeter with that of an ideal voltmeter. Which has larger resistance? Why? [2]
4. **2076 GIE Set B Q.No. 1a** Can potential difference between the terminals of a battery ever be opposite in direction to the emf? If it can, give an example. If it cannot, explain why not? [2]
5. **2075 GIE Q.No. 1a** Two resistors R_1 and R_2 are connected in parallel to an emf source. What happens to the current through R_1 when R_2 is removed from the circuit? [2]
6. **2075 Set A Q.No. 1a** A wire is stretched to double its length. What will happen to its resistivity and resistance? [2]
7. **2075 Set A Q.No. 1b** Differentiate between a fuse wire and a heating wire. [2]
8. **2074 Supp Q.No. 1a** Two wires, one of copper and another of iron, have the same diameter and carry the same current. In which wire the drift velocity of electrons will be more? [2]
9. **2074 Set A Q.No. 1a** **2058 Q.No. 10 a** You are given n wires, each of resistance R. What is the ratio of maximum to minimum resistance obtainable from these wires? [2]
10. **2074 Set B Q.No. 1a** Resistors R_1 and R_2 are connected in parallel to an emf source that has negligible internal resistance. What happens to the current through R_1 when R_2 is removed from the circuit? [2]
11. **2073 Supp Q.No. 1a** **2069 Supp Set B Q.No. 1 a** Is there any difference between 'resistance of a wire' and 'resistivity of a wire"? Explain. [2]
12. **2073 Supp Q.No. 1d** **2072 Set E Q.No. 1b** **2063 Q.No. 10 a** The element of heater is very hot while the wire carrying current are not. Why? [2]
13. **2073 Set C Q.No. 1f** How can a galvanometer be converted into voltmeter? Explain. [2]
14. **2073 Set C Q.No. 1a** Will the drift velocity of electrons change if the diameter of a connecting wire is halved? Why? [2]
15. **2073 Set C Q.No. 1b** Five bulbs are connected in series across 220 volt line. If one bulb is fused, the remaining bulbs are again connected across the same line. Which one of the arrangements will be more illuminated? Justify your answer. [2]
16. **2072 Supp Q.No. 1a** Explain the difference between resistance and resistivity of a wire. [2]
17. **2072 Set D Q.No. 1a** Resistors R_1 and R_2 are connected in series to an emf source that has negligible internal resistance. What happens to the current through R_1 when a third resistor R_3 is connected in parallel with R_2? [2]
18. **2072 Set E Q.No. 1a** Batteries are always labeled with their emf; for instance, an A flashlight battery is labeled '1.5 volts'. Would it also be appropriate to put a label on batteries stating how much current they provide? Why or why not? [2]
19. **2071 Supp. Q.No. 1a** Ammeters often contain fuses that protect them from large currents while voltmeters seldom do. Explain. [2]
20. **2071 Set C Q.No. 1 a** What is the difference between an emf and a potential difference? Under what circumstances are the potential difference between the terminals of a battery and the emf of the battery equal to each other? [2]
21. **2071 Set D Q.No. 1 a** A voltmeter has high resistance. Explain why? [2]
22. **2070 Supp. Set A Q.No. 1 a** A cylindrical rod has resistance R. If we double its length and diameter, what is its resistance interms of 'R'? [2]
23. **2070 Supp. Set A Q.No. 1 b** **2070 Set C Q.No. 1 b** Why does an electric bulb nearly always burn out just as you turn on the light, almost never while the light is shining? [2]
24. **2070 Supp. Set B Q.No. 1 a** Can the potential difference between the terminals of a battery ever be opposite in direction to the emf? [2]
25. **2070 Supp. Set B Q.No. 1 b** "Good thermal conductors are also good electrical conductor" If so, why don't the connecting wires that are used to connect heaters get hot by conduction of heat from the heating element? [2]
26. **2070 Set C Q.No. 1 a** Two copper wires of different diameters are joined end-to-end. If a current flows in the wire combination, what happens to the drift velocity of the electrons when they move from the larger-diameter wire to the smaller-diameter wire? [2]
27. **2070 Set D Q.No. 1 a** When the ends of a wire are connected to a battery, initially the current is slightly larger, but soon it decreases slowly and becomes steady at a lower value although the emf of the battery remains unchanged. Explain. [2]
28. **2069 Supp Set B Q.No. 1 b** Two bulbs of different wattage are connected in series. Which bulb will glow brighter? Why? [2]
29. **2069 Set A Q.No. 1a** Batteries are always labeled with their emf. Would it also be appropriate to put a label on batteries stating how much current they provide? Why or why not? [2]

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30. 2069 Set B Q.No. 1a Give an example of non-ohmic conductor and present its current voltage characteristic graph. [2]

31. 2068 Can. Q.No. 1a What is the ratio of maximum to minimum resistance obtainable from n wires of resistance R each?

32. 2068 Can. Q.No. 1b Why is it essential that the resistance of a voltmeter be very high? [2]

33. 2068 Old Q.No. 10 a 2056 Q.No. 10 a An ammeter is always connected in series. Why? [2]

34. 2068 Old Q.No. 10 b Distinguish between resistance and resistivity of a material. [2]

35. 2068 Q.No. 1 a Long-distance, electric power, transmission lines always operate at very high voltage, some time as much as 750 kV. What are the advantages of such high voltages? [2]

36. 2067 Q.No. 1a The energy that can be extracted from a storage battery is always less than the energy that goes into it while charging. Why? [2]

37. 2067 Sup Q.No. 1a The resistance of an ammeter must essentially be very small. Why ? [2]

38. 2067 Sup Q.No. 1b Water boils in an electric kettle in 15 minutes after being switched on. Using the same main supply. Should the length of the heating element be increased or decreased if the water is to boil in 10 minutes? Explain. [2]

39. 2066 Old Q.No. 10 a A wire is stretched to double its length. What happens to its resistance? [2]

40. 2064 Q.No. 10 a Why heat is generated across a resistor when the electric field is applied? [2]

41. 2064 Q.No. 10 b Why do electrons acquire a steady drift velocity? [2]

42. 2064 Q.No. 10 c Why ammeter is always connected in series? [2]

43. 2063 Q.No. 10 c You are given 2 wires each of resistance R. What is the ratio of maximum to minimum resistance that can be obtained from these wires? [2]
Ans: 4:1

44. 2062 Q.No. 10 a Explain the significance of a shunt with a diagram. [2]

45. 2061 Q.No. 10 b A large number of free electrons are present in metals. Why is there no current in the absence of electric field across it? [2]

46. 2060 Q.No. 10 a Why are alloys constantan and manganin used to make standard resistors? [2]

47. 2059 Q.No. 10 b Why is a voltmeter always connected in parallel with the load resistance? [2]

48. 2059 Q.No. 10 c Two bulbs have the filament of the same length. If one is of 40 watt and the other 60 watt, which one has thicker filament? [2]

49. 2058 Q.No. 10 c Is terminal p.d. always greater than its emf? [2]

50. 2057 Q.No. 10 a What are the factors on which the resistance of a conductor depend? [2]

51. 2057 Q.No. 10 b Can the potential difference across a battery be greater than its emf? [2]

52. 2057 Q.No. 10 c Two bulbs of 60 W and 100 W are connected in series and this combination is connected across the mains. Which bulb will glow more brightly? Give reason. [2]

53. 2056 Q.No. 10 b Why do we use connecting wires made of copper?

Long Answer Questions [4 Marks]

54. 2076 GIE Set B Q.No. 5a What is meant by current density? Obtain an expression showing the relation between the drift velocity of free electrons and the current passing in a conductor.

55. 2076 Set B Q.No. 5a 2066 Old Q.No. 11a 2063 Q.No. 11a 2057 Q.No. 11a OR What do you mean by shunt? Describe its use in converting a galvanometer into an ammeter.

56. 2076 Set B Q.No. 5b 2072 Supp Q.No. 5a 2061 Q.No. 11a State Joule's law of heating and verify it experimentally.

57. 2076 Set C Q.No. 5a 2060 Q.No. 11a Discuss how the current is established in a conductor when it is connected across a source of e.m.f. Derive the relation $J = nev$, where the symbols have their usual meanings.

58. 2075 GIE Q.No. 5a 2074 Set A Q.No. 5a 2071 Set C Q.No. 5a 2069 Set A Q.No. 5a 2068 Can. Q.No. 5a Describe the mechanism of metallic conduction. Deduce a relation between current density and drift velocity of the electrons.

59. 2075 Set B Q.No. 5a State and explain Joule's law of heating. Deduce an expression for heat developed in a conductor due to the passage of an electric current.

60. 2074 Supp Q.No. 5a What is a galvanometer? How can you convert it into a voltmeter? Why should the resistance of a voltmeter be high?

61. 2072 Set C Q.No. 5a Define drift velocity of electrons. Establish a relation between drift velocity of electrons and current density in the conductor.

62. 2072 Set D Q.No. 5b Describe an experiment to verify Joule's Laws of heating.

63. 2072 Set E Q.No. 5a Why has an ammeter a very low resistance? How can you convert a galvanometer into an ammeter?

64. 2071 Supp. Q.No. 5a Define emf, terminal p.d. and internal resistance. Derive the relation between them for the circuit drawing current.

65. 2069 Supp Set B Q.No. 5 d Explain the theory of a) series and b) parallel combinations of resistances in an electric circuit.

66. 2069 Set B Q.No. 5b What is the difference between an electromotive force and the terminal potential difference? How are they related?

67. 2068 Q.No. 5 d Distinguish between resistance and resistivity. Derive expressions for the effective resistance of number of resistors connected in series and parallel.

68. 2066 Old Q.No. 11 a or State and explain Joule's law of heating. Deduce an expression for the heat developed in a wire by the passage of an electric current? [2+3]

69. 2064 Q.No. 11 a State and explain Ohm's law. Two resistors are connected in parallel and third resistor be connected in series with the combination of parallel resistors. If this combination be connected with a battery of the negligible internal resistance, find the potential difference across each resistor.

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70. **2059 Q.No. 11 a** What is drift velocity of an electron? Derive a relation between the current through a metallic conductor and the drift velocity in terms of the number of free electrons per unit volume of the conductor. [1+4]

71. **2056 Q.No. 11 a** Deduce an expression for the heat developed in a wire by the passage of an electric current. [4]

Numerical Problems [4 Marks]

72. **2076 GIE Set A Q.No. 9a** A copper wire has a diameter of 10mm and carries a constant current of 2A. The density of free electron is 8.5×10^{28} m^{-3}. Find the magnitude of (i) the current density and (ii) the drift velocity. [4]
Ans: 2.55×10^4 A/m², 1.87×10^6 m/sec

73. **2076 GIE Set B Q.No. 9a** A moving coil meter has a resistance of 25Ω and indicates full scale deflection when a current of 4.0 mA flows through it. How could this meter be converted to a milliammeter having a full scale deflection for a current of 50mA? [4]
Ans: 2.14 Ω

74. **2076 Set B Q.No. 9a** Two resistors of resistance 1000Ω and 2000Ω are joined in series with a 100 V supply. A voltmeter of internal resistance 4000Ω is connected to measure the potential difference across 1000Ω resistor. Calculate the reading shown by the voltmeter. [4] **Ans: 28.57V**

75. **2076 Set C Q.No. 9a** The resistance of the coil of a galvanometer is 9.36Ω and a current of 0.0224 A causes it to deflect full scale. The only shunt available has a resistance 0.025Ω. What resistance must be connected in series with the coil to make it an ammeter of range 0 - 20A? [4]
Ans: 12.94 Ω

76. **2075 Set A Q.No. 9b** Two lamps rated 25 W – 220 V and 100 W – 220 V are connected to 220 V supply. Calculate the powers consumed by the lamps. [4]
Ans: 16W, 4W

77. **2075 Set B Q.No. 9a** Two resistance of 1000 Ω and 2000 Ω are placed in series with 50 V mains supply. What will be the reading on a voltmeter of internal resistance 2000 Ω when placed across the 1000 Ω resistor? What fractional change in voltage occurs when voltmeter is connected? [4]
Ans: 12 V, 25%

78. **2074 Set B Q.No. 9a** A copper wire has a diameter of 1.02 mm and carries a constant current of 1.67A. If the density of free electrons in copper is $8.5 \times 10^{28}/m^3$, calculate the current density and the drift velocity of the electrons. [4]
Ans: 1.5×10^{-4} m/sec and 2.04×10^6 A/m²

79. **2073 Supp Q.No. 9a** A battery of emf 1.5 V has a terminal p.d of 1.25 V when a resistor of 25Ω is joined to it. Calculate the current flowing, the internal resistance and terminal p.d. when a resistance of 10Ω replaces 25Ω resistor. [4]
Ans: 0.1 A, 5Ω, 1V

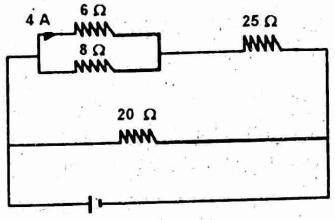
80. **2073 Set C Q.No. 9c** Resistance of a wire of length 1m, diameter 1 mm is 2.2Ω. Calculate its resistivity and conductivity. [4]
Ans: 1.727×10^{-6} Ωm and 579038.8 Ω^{-1} m^{-1}

81. **2073 Set D Q.No. 9a** An electric lamp consumes 60 W at 220V. How many dry cells of emf 1.5V and internal resistance 1Ω are required to glow the lamp? [4]
Ans: 179

82. **2072 Supp Q.No. 9c** A copper wire has a diameter of 1.02 mm, cross-sectional area 8.2×10^{-7} m^2 and resistivity 1.72×10^{-8} Ω m. It carries a current 1.67 A. Find the electric field magnitude in the wire and the potential difference between two points in the wire 50 m apart. [4]
Ans: 0.0350 V/m; 1.75 V

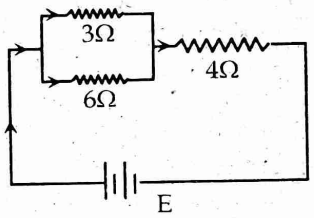
83. **2072 Set C Q.No. 9a** The resistance of a galvanometer coil is 9.36Ω, and the current required for full scale deflection is 0.0224A. We want to convert this galvanometer to an ammeter reading 20A full scale. The only shunt available has a resistance of 0.025Ω. What resistance must be connected in series with the coil. [4]
Ans: 12.94 Ω

84. **2071 Supp. Q.No. 9a** Consider the figure below. The current through 6Ω resistor is 4A in the direction shown. What are the currents through the 25Ω and 20Ω resistors? [4]



Ans: 7 A, 9.95 A

85. **2071 Set D Q.No. 9 b** In the given figure, the current through the 3 Ω resistor is 0.8 A. Find the potential drop across 4 Ω resistor. [4]



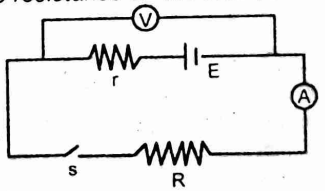
Ans: 4.8 V

86. **2070 Supp. Set A Q.No. 9 c** A cell of emf 18 V has an internal resistance of 3 Ω. The terminal p.d. of the battery becomes 15 V when connected by a wire. Find the resistance of the wire. **Ans: R = 15 Ω** [4]

87. **2070 Supp. Set B Q.No. 9 a** A potential difference of 4.5 V is applied between the ends of wire that is 2.5 m long and has radius of 0.654 mm. The resulting current through the wire is 17.6 A. What is the resistivity of the wire? [4]
Ans: 1.376×10^{-7} Ωm

88. **2070 Set C Q.No. 9 a** A tightly coiled spring having 75 coils, each 3.50 cm in diameter, is made of insulated metal wire 3.25 mm in diameter. An ohm meter connected across its opposite ends reads 1.74 Ω. What is the receptivity of the metal? [4]
1.75×10^{-6} Ωm

89. **2070 Set D Q.No. 9 a** A voltmeter coil has resistance 50 Ω and a resistor of 1.15 K Ω is connected in series. It can read potential differences upto 12 volts. If the same coil is used to construct an ammeter which can measure currents upto 2A, what should be the resistance of the shunt used? [4]



Ans: 0.25Ω

90. 2069 Set A Q.No. 9a In the given figure, when switch s is open, the voltmeter v reads 3.08v. When the switch is closed, the voltmeter reading drops to 2.97v, and the ammeter A reads 1.65A. Find the emf, the internal resistance of the battery and the resistor R. Assume that the two meters are ideal. Ans: r = 0.067Ω, R = 1.8Ω [4]

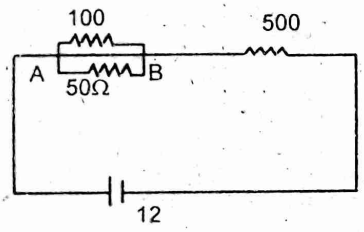
91. 2069 Set B Q.No. 9c The resistance of a conductor is 10 ohm at 50°C and 15 ohm at 100°C. Calculate its resistance at 0°C. Ans: 5Ω [4]

92. 2068 Can. Q.No. 9a An electric heating element to dissipate 480 watts on 240V mains is to be made from nichrome wire of 1mm diameter. Calculate the length of the wire required if the receptivity of nichrome is 1.1×10^{-6} ohm-meter. [4]
Ans: 85.7m

93. 2068 Q.No. 9 a A resistor of 500 Ohms and one of 2000 Ohms are placed in series with a 60 volt supply. What will be the reading on a voltmeter of internal resistance 2000 Ohms when placed across (i) the 500Ω resistor and (ii) the 2000Ω resistor? Ans: 10V and 40V [4]

94. 2068 Old Q.No. 11 b An electric heating element to dissipate 1.2 KW on 240 V mains is to be made from Nichrome ribbon 1mm wide and 0.05 mm thick. Calculate the length of the ribbon required if the resistivity of nichrome is $1.1\times10^{-6}\Omega$ m.[3]
Ans: 85.6 m

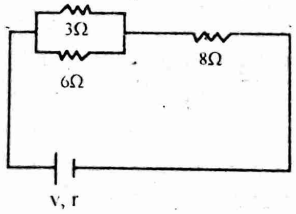
95. 2067 Sup Q.No. 9a What is the potential difference across 100Ω resistor in the circuit given below. [4]



Ans: 3/4 V

96. 2062 Q.No. 11 b Twelve cells each of emf 2V and of internal resistance 0.5 ohm are arranged in a battery of n rows and an external resistance 0.4 ohm is connected to the poles of the battery. Estimate the current flowing through the resistance in terms of n. [3]
Ans: $\frac{60\,n}{15+n^2}$

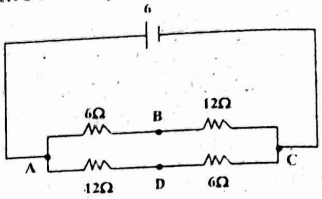
97. 2061 Q.No. 11 b As shown in the figure, a battery of emf 24v and internal resistance r is connected to a circuit containing two parallel resistors of 3Ω and 6Ω in series with an 8Ω resistor. The current flowing in the 3Ω is 0.8A. Calculate the current in the 6Ω resistor and the internal resistance of the cell. [3]



Ans: 0.4A, 10Ω

98. 2060 Q.No. 11 b A battery of emf 1.5 V has a terminal p.d. of 1.25 V when a resistor of 25Ω is joined to it. Calculate the current flowing, the internal resistance and terminal p.d. when a resistance of 10Ω replaces 25Ω resistor. [4]
Ans: 0.05A, 5Ω, 1V

99. 2058 Q.No. 11 b In the given circuit, calculate the potential difference between the points B and D.



Ans:

2. ELECTRICAL CIRCUITS

FORMULAE

1. Kirchhoff's first (current) law: Sum of incoming currents = sum of out going currents = 0, i.e. $\Sigma I = 0$
2. Kirchoff's second (Voltage) law: $\Sigma E - \Sigma IR = 0$
3. Wheat stone bridge circuit Principle: In balanced conditions, $\frac{P}{Q}=\frac{X}{R}$
4. Meterbridge: In balancing condition $\frac{R_1}{R_2}=\frac{l_1}{l_2}$
5. Potentiometer:
   i. Principle, $V \propto l$ (for I, A and ρ constant)
   ii. Comparison of emf: $\frac{E_1}{E_2}=\frac{l_1}{l_2}$
   iii. Determination of Internal resistance:
   $r=\left(\frac{E}{V}-1\right)R=\left(\frac{l_1}{l_2}-1\right)R$

Short Answer Questions [2 Marks]

1. 2077 Set D Q.No. 1a Draw a Wheatstone bridge circuit and mention the balance condition for it.
2. 2076 Set B Q.No. 1a State the principle of potentiometer and write down its one application.
3. 2075 GIE Q.No. 1b If the current flowing in the wire of the potentiometer be decreased, what will be the effect on the position of zero deflection in potentiometer? Explain.
4. 2075 Set B Q.No. 1a 2074 Set B Q.No. 1b Why do we prefer a potentiometer with longer wire?
5. 2074 Supp Q.No. 1b 2072 Set D Q.No. 1b Draw a circuit diagram of meter bridge to determine the resistance of a wire. Write the formula used.
6. 2074 Set A Q.No. 1b 2072 Set C Q.No. 1a 2070 Set D Q.No. 1b 2069 Set A Q.No. 1b Why do we prefer a potentiometer to measure emf of a cell rather than a voltmeter?
7. 2071 Set C Q.No. 1 b If the length of the wire be doubled what will be the effect on the position of zero deflection in a potentiometer?
8. 2071 Set D Q.No. 1 b State and explain Kirchhoff's laws of electric circuits.
9. 2069 Set B Q.No. 1d How would you convince that the principle of measurement of resistance of wire by meter bridge is based on Wheatstone bridge principle? Explain.
10. 2062 Q.No. 10 c State Kirchhoff's laws of electric circuits

Long Answer Questions [4 Marks]

11. 2076 GIE Set A Q.No. 5a 2075 Set B Q.No. 5b State Kirchhoff laws and use them to derive Wheatstone bridge principle.

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12. 2076 Set C Q.No. 5b | 2074 Set B Q.No. 5a | 2070 Set C Q.No. 5a State and explain Kirchhoff's laws and use these laws to find the balance condition in a wheatstone bridge circuit. [4]

13. 2075 Set A Q.No. 5b | 2073 Supp Q.No. 5a | 2070 Supp. Set A Q.No. 5 a | 2070 Set C Q.No. 5 a State the principle of potentiometer. Discuss the application of potentiometer to determine the internal resistance of a cell. [4]

14. 2073 Set C Q.No. 5a State and apply Kirchoff's rule of electrical circuits to measure the unknown resistance of a wire by metre bridge with necessary theory and circuit. [4]

15. 2072 Set C Q.No. 5b State principle of meter bridge. Describe how it is used to determine the resistance of a wire. [4]

16. 2071 Set D Q.No. 5 a What is the principle of a potentiometer? Explain with necessary theory how you would determine the internal resistance of a cell using this principle. [4]

17. 2070 Set D Q.No. 5a | 2068 Old Q.No. 11a | 2059 Q.No. 11 a OR What is Wheatstone bridge? Use Kirchhoff's laws of current and voltage to obtain balance condition of it. [4]

18. 2069 Supp Set B Q.No. 5 a State the principle of potentiometer. How do you compare the internal resistances of two cells by using a potentiometer? [4]

19. 2069 Set B Q.No. 5c Explain Kirchoff's laws. How are the conditions of balance in Wheatstone bridge established through these laws? [4]

20. 2068 Can. Q.No. 5d What is internal resistance of a cell? How can you measure the internal resistance of a cell by using potentiometer? [1+4]

21. 2068 Q.No. 5 c What is a Wheatstone bridge? Obtain the balanced condition for the bridge. Explain how resistance can be measured by a meter bridge. [4]

22. 2067 Q.No. 5a What is potentiometer? How can you use it to measure internal resistance of a cell? [4]

23. 2067 Sup Q.No. 5d What is the principle of potentiometer? Describe a method to measure the internal resistance of a cell by using potentiometer. [1+3]

24. 2062 Q.No. 11 a OR Explain the principle of potentiometer. How is this used to measure the internal resistance of a cell? [2+3]

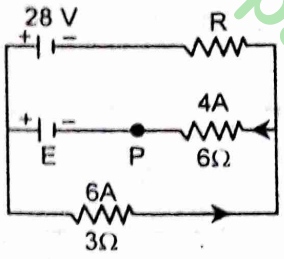
25. 2061 Q.No. 11 a OR Discuss the principle of the potentiometer and use it to compare the emf's of two cells. [2+3]

26. 2060 Q.No. 11 a OR Discuss the principle of potentiometer and use it to determine the internal resistance of a cell. [2+3]

27. 2058 Q.No. 11 a What is a potentiometer? Explain how do you compare the emfs of two cells using a potentiometer. [4]

Numerical Problems [4 Marks]

28. 2075 GIE Q.No. 9a Using Kirchhoff's rules in the circuit, find [4]
   i. the current in resistor R
   ii. the resistance R
   iii. the unknown emf E
   iv. If the circuit is broken at P, what is the current in resistor R?

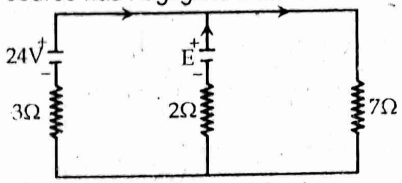


Ans: 2A, 5Ω, 42V, 3.5A

29. 2074 Supp Q.No. 9a A potentiometer is 10 m long. It has a resistance of 20 Ω. It is connected in series with a battery of 3 V and a resistance of 10 Ω. What is the potential gradient along with wire? [4]

Ans: 0.2 V/m

30. 2074 Set A Q.No. 9a What must be the emf E in the circuit so that the current flowing through the 7Ω resistor is 1.80A? Each emf source has negligible internal resistance. [4]



Ans: 8.6 V

31. 2072 Supp Q.No. 9a A simple potentiometer circuit is setup as in fig Q(1), using a uniform wire AB, 1.0 m long, which has a resistance of 2Ω. The resistance of the 4V battery is negligible. If the variable resistor R were given a value of 2.4Ω, what would be the length AC for zero galvanometer deflection? [4]

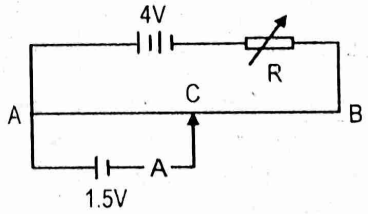


Fig. Q (1)

Ans: 0.825 m

32. 2072 Set D Q.No. 9a A battery of 6V and internal resistance 0.5Ω is joined in parallel with another of 10V and internal resistance 1Ω. The combination sends a current through an external resistance of 12Ω. Find the current through each battery. [4]

Ans: I_1 = 2.27A, I_2: 2.86A

33. 2072 Set E Q.No. 9a The total length of the wire of a potentiometer is 10m. A potential gradient of 0.0015 V/cm is obtained when a steady current is passed through this wire. Calculate, [4]
   i. the distance of null point on connecting standard cell of 1.018V.
   ii. the unknown p.d. if the null point is obtained at a distance of 940 cm, and
   iii. the maximum p.d. which can be measured by this instrument.

Ans: (I) 6.8 m (II) 1.41 V (III) 1.5 V

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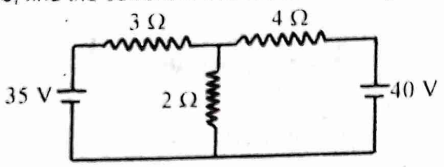
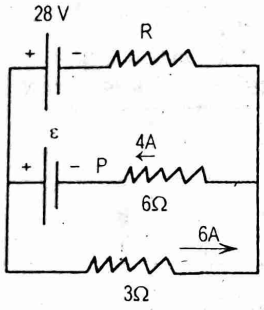
34. 2071 Set C Q.No. 9 a Using Kirchhoff's laws of current and voltage, find the current in 2Ω resister in the given circuit: [4]



Ans: 10A

35. 2067 Q.No. 9a In the adjacent circuit find:
   i. the current in resistor R:
   ii. resistance R,
   iii. the unknown emf ε,
   iv. if the circuit is broken at P, what is the current in resistor R? [4]



Ans:(i) 2A (ii) 5Ω (iii) 42V (iv) 3.5A

36. 2064 Q.No. 11 b The driver cell of a potentiometer has an emf of 2V and negligible internal resistance. The potentiometer wire has a resistance of 3 ohm. Calculate the resistance needed in series with the wire if a p.d. 5.0 mV is required across the whole wire. The wire is 100.0 cm long and a balanced length of 60 cm is obtained for a thermocouple of emf E. What is the value of E? [4]

Ans: 1197.2 Ω, 3mV

37. 2063 Q.No. 11 b The driver cell of a potentiometer has an emf 2V and negligible internal resistance. The potentiometer wire has a resistance of 3Ω. Calculate the resistance needed in series with the wire if a p.d. of 5mV is required across the whole wire. [4]

Ans: 1197 Ω

38. 2059 Q.No. 11 b The emf of a battery A is balanced by a length 75.0 cm on a potentiometer wire. The emf of a standard cell 1.02 volt is balanced by a length of 50.0 cm. What is the emf of A? Ans: 1.53V [4]

39. 2056 Q.No. 11 b The driving cell of a potentiometer has an emf of 2V and negligible internal resistance. The potentiometer wire has a resistance of 3Ω. Calculate the resistance needed in series with the wire of a p.d. of 1.5m V is required across the whole wire. [4]

Ans: 3997 Ω

3. THERMOELECTRIC EFFECT

FORMULAE

1. The neutral temperature, $\theta_n = \frac{\theta_c + \theta_i}{2}$, where θ_c is the temperature of cold junction and θ_i is the temperature of inversion.
2. The thermo emf, $E = \alpha\theta + \frac{1}{2}\beta\theta^2$, where, α and β are constants.

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 1d Differentiate between Seebeck Effect and Peltier Effect.
2. 2076 GIE Set B Q.No. 1b What is the cause of Seebeck effect?
3. 2076 Set B Q.No. 1b 2059 Q.No. 10 a What is thermoelectric effect?
4. 2076 Set C Q.No. 1b If the temperature of cold junction of thermocouple is lowered, what will be the effect on neutral temperature and the temperature of inversion?
5. 2075 Set A Q.No. 1c 2073 Supp Q.No. 1b 2070 Supp. Set Q.No. 1 f 2068 Q.No. 1 b Does the thermoelectric effect obey the law of conservation of energy? Justify?
6. 2075 Set B Q.No. 1b Why is Lead (Pb) used as a standard reference metal in thermo-electricity?
7. 2074 Supp Q.No. 1c 2069 Set A Q.No. 1c 2068 Can. Q.No. 1c What is temperature of inversion? On what factors does it depend?
8. 2074 Set B Q.No. 1c What is temperature of inversion? How does it change, if temperature of cold junction decreases?
9. 2073 Set C Q.No. 1d Point out the difference between Peltier and Seebeck effect in brief.
10. 2073 Set D Q.No. 1f What is Seebeck effect? How is this effect different from Peltier effect? Explain.
11. 2072 Supp Q.No. 1e On what factors does the temperature of inversion depend?
12. 2072 Set E Q.No. 1d Is seebeck effect reversible effect? Explain.
13. 2071 Set D Q.No. 1 c What is neutral temperature? On what factors does it depend?
14. 2070 Set C Q.No. 1 c Define temperature of inversion. If the temperature of cold junction of a thermocouple is lowered what will be the effect on it?
15. 2069 Supp Set B Q.No. 1 f 2069 Set B Q.No. 1c Peltier effect is the converse of Seebeck effect. Explain
16. 2068 Old Q.No. 10 c What do you mean by thermoelectric effect?
17. 2067 Q.No. 1b What are the factor on which thermo-emf depend?
18. 2066 Old Q.No. 10 c How does thermo emf change in a thermocouple when the temperature of the hot junction is changed?
19. 2062 Q.No. 10 b How is Seebeck effect different from Peltier effect? Explain.
20. 2061 Q.No. 10 a What are the factors on which the thermo emf produced in a thermocouple depends?
21. 2060 Q.No. 10 c Why is Sb-Bi thermocouple preferred to Fe-Cu thermocouple?
22. 2058 Q.No. 10 b What do you mean by Peltier's effect?

Long Answer Questions [4 Marks]

23. 2077 Set D Q.No. 2a Define thermoelectric effect. How does the emf of a thermocouple vary with the temperature of hot junction?

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24. 2075 GIE Q.No. 5b 2072 Set D Q.No. 5a What is Seebeck effect? How does the thermo emf vary with the increase in temperature of hot junction, keeping cold junction at 0°c? Explain [4]
25. 2074 Set A Q.No. 5b What is Seebeck effect? Explain the variation of thermo emf with gradual increase in the temperature of hot junction, keeping the cold junction at 0°c. [4]
26. 2071 Supp. Q.No. 5b What is seebeck effect? How does the emf of thermocouple vary with temperature of the hot junction? [4]
27. 2071 Set C Q.No. 5 b What is a thermocouple? Define neutral temperature and temperature of inversion of a thermocouple. Are they constant for a given thermocouple? [4]
28. 2070 Supp. Set B Q.No. 5 a 2067 Sup Q.No. 5a What is thermo electric effect? Discuss the variation of thermo emf with the change in temperature of the hot junction. [4]
29. 2070 Set D Q.No. 5 b Define Seebeck effect. Discuss the variation of thermoelectric emf in a thermocouple with the increase of temperature of hot junction. [4]
30. 2063 Q.No. 11 a OR 2057 Q.No. 11 a What is Seebeck effect? How does the thermo emf of a thermocouple vary with temperature of the hot junction? [4]
31. 2056 Q.No. 11 a OR Explain what do you mean by Seebeck Effect? How does thermoelectric emf varies with the temperature? [4]

Numerical Problems [4 Marks]

32. 2073 Set D Q.No. 9c The thermo-emf $\in$ and the temperature of hot junction θ satisfy a relation $\in = a\theta + b\theta^2$ where a= 4.1×10^{-5} V $(°C)^{-1}$ and b = -4.1×10^{-8} V$(°C)^{-2}$. If the cold junction temperature is 0°C find the neutral temperature. [4]
Ans: 500 °C

4. CHEMICAL EFFECT OF CURRENT

FORMULAE

1. Faraday's first law of electrolysis, $m = Zq = ZIt$
   Z is called electrochemical equivalent. Its unit is gC^{-1}.
2. Faraday's second law of electrolysis, $\frac{m_1}{m_2} = \frac{E_1}{E_2}$
   Where, E is chemical equivalent and m is the deposited mass of electrolytes.
3. Chemical equivalent (E) = $\frac{\text{Atomic weight}}{\text{Valency}}$
4. Faraday's second law of electrolysis in alternative way,
   $Z \propto E$
   $Z = \frac{1}{F}E$
   $\therefore F = \frac{E}{Z} = \frac{E}{m/q} = \frac{Eq}{m}$
   Where, F is called Faraday's constant and
   $1\ F = N_A e = 96500 \frac{C}{\text{gram equivalent}}$

Short Answer Questions [2 Marks]

1. 2076 GIE Set B Q.No. 1c Why is the conductivity of an electrolyte low in comparison to a metal? [2]
2. 2076 Set B Q.No. 1c 2067 Sup Q.No. 1c Distinguish between ionic and electronic conduction. [2]
3. 2076 Set C Q.No. 1a 2074 Set B Q.No. 1f 2072 Set C Q.No. 1b The conductivity of an electrolyte is low as compared to that of metal at room temperature. Why? [2]
4. 2075 GIE Q.No. 1c A voltameter measures current more accurately than an ammeter, why? [2]
5. 2075 Set B Q.No. 1c 2071 Set C Q.No. 1 e Why is the conductivity of an electrolyte low in comparison to that of metal? [2]
6. 2073 Set C Q.No. 1e State the Faraday's laws of electrolysis. [2]
7. 2072 Supp Q.No. 1b Explain electrochemical equivalent of a substance. [2]
8. 2072 Set E Q.No. 1c Why is the conductivity of an electrolyte very low as compared to a metal at room temperature? [2]
9. 2071 Supp. Q.No. 1f 2056 Q.No. 10 c What is meant by Faraday constant? [2]
10. 2070 Set C Q.No. 1 e The conductivity of an electrolyte is low as compared to a metal. Why? [2]
11. 2070 Set D Q.No. 1 e State and explain Faraday's laws of electrolysis. [2]
12. 2066 Old Q.No. 10 b Define one Faraday. [2]
13. 2063 Q.No. 10 b Why does voltameter measure current more accurately than an ammeter? [2]

Long Answer Questions [4 Marks]

14. 2075 Set A Q.No. 5c 2071 Set D Q.No. 5b 2069 Set A Q.No. 5c State Faraday's laws of electrolysis. How will you verify Faraday's second law experimentally? [4]
15. 2070 Supp. Set A Q.No. 5c 2062 Q.No. 11a State Faraday's laws of electrolysis and verify second law. [4]
16. 2069 Set B Q.No. 5a Verify Faraday laws of electrolysis. [4]
17. 2068 Old Q.No. 11 a or 2058 Q.No. 11 a OR State and explain Faraday's Laws of electrolysis and hence define Faraday's constant. [3+2]
18. 2064 Q.No. 11 a OR State Faraday's law of electrolysis. Discuss the experiment to verify them. [5]

Numerical Problems [4 Marks]

19. 2074 Supp Q.No. 9b It is desired to deposit 0.254 kg of copper on the cathode of a copper voltameter. How long will it take to deposit this amount if a steady current of 100 A is maintained? Relative Atomic mass of copper = 63.5 and Faraday's constant, F = 96500 C/mol. [4]
Ans: 7720 s
20. 2069 Supp Set B Q.No. 9 a Assuming Faraday constant to be 96500 C $(mole)^{-1}$ and relative atomic mass of copper 63, calculate the mass of copper liberated by 2 A current in 5 minutes. [4]
Ans: 0.196 gm
21. 2066 Old Q.No. 11 b In a copper plating system, an electrolysis current of 3 A is used. How many atoms of Cu^{2+} are deposited in 1.5 h? ($e = -1.6\times 10^{-19}$C). [3]
Ans: 5.06×10^{22}
22. 2057 Q.No. 11 b Calculate the charge needed to deposit 2g of Oxygen in the electrolysis of water.
(Relative molecular mass of Oxygen is 32, Faraday constant F is 965,000 C mol^{-1}). [3]
Ans: 24125 C

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B. MAGNETIC FIELD OF CURRENT

1. MAGNETIC EFFECT OF CURRENT

FORMULAE

1. Lorentz Force.

i. The magnitude of magnetic Lorentz force experienced by moving charge in magnetic field,

$F = q|\vec{v} \times \vec{B}| = Bqv \sin\theta$

ii. The magnitude of magnetic Lorentz force experienced by current carrying conductor in magnetic field B,

$F = I(\vec{l} \times \vec{B}) = BIl \sin\theta$.

2. Magnetic torque and moving coil meters:

i. The magnetic torque in a rectangular coil

$\tau = BINA \cos\theta$, where θ is the direction of the current with respect to uniform magnetic field.

ii. The magnetic moment of a current loop,

$\mu = IA$, I = current, A = Area of loop.

iii. The angular displacement of needle in moving coil meter, $\theta = \left(\frac{BNA}{k}\right) I$

Where k is restoring torque per units twist.

iv. The current sensitivity of coil meter, $\frac{\theta}{I} = \frac{BNA}{k}$

v. The voltage sensitivity of coil meter, $\frac{V}{I} = \frac{BNA}{kR}$

3. Biot and Savart law:

i. The magnitude of magnetic field dB due to a current element (Id*l*) is,

$dB = \frac{\mu_0}{4\pi} \frac{Idl \sin\theta}{r^2}$

ii. Magnetic Field at centre of circular current carrying coil,

$B = \frac{\mu_0 NI}{2r}$

iii. Magnetic Field at axis of circular current carrying coil,

$B = \frac{\mu_0 NIR^2}{2(R^2 + x^2)}$

iv. Magnetic Field due to an infinite long straight current carrying conductor, $B = \frac{\mu_0 I}{2\pi r}$

v. Magnetic Field due to an infinite long current carrying solenoid,

$B = \mu_0 nI$ (at the center) and $B = \frac{\mu_0 nI}{2}$ (at the end).

4. Magnetic force per unit length, due to two current carrying conductor, $\frac{F}{l} = \frac{\mu_0 I_1 I_2}{2\pi r}$

5. Hall effect:

i. Hall voltage, $V_H = \frac{BI}{net}$

ii. Hall coefficient $H_C = \frac{1}{ne} = \frac{E_H}{BJ}$

iii. Hall resistance, $R_H = \frac{BH_C}{t} = \frac{BH_C d}{A}$

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 1c Can a constant magnetic field set an electron at rest into motion? Explain. [2]
2. 2076 GIE Set B Q.No. 1f What do you mean by Hall Effect? Why is it more effective in semiconductors? [2]
3. 2076 Set B Q.No. 1d 2068 Q.No. 1 e An electron beam and a proton beam are moving parallel to each other in the beginning. Do they always maintain this status? Justify your answer. [2]
4. 2076 Set B Q.No. 1e Define one ampere current in terms of force. [2]
5. 2076 Set C Q.No. 1c How will the magnetic field intensity at the centre of a circular coil carrying current change, if the current through the coil is doubled and the radius of the coil is halved? [2]
6. 2076 Set C Q.No. 1d 2072 Set C Q.No. 1f Can a charged particle move through a magnetic field without experiencing any force? Explain. [2]
7. 2075 GIE Q.No. 1d Equal currents are flowing through two infinitely long parallel wires. What will be the magnetic field at a point mid-way, when the currents are flowing (i) in the same direction (ii) in the opposite direction? [2]
8. 2075 Set A Q.No. 1d 2075 Set B Q.No. 1d 2067 Sup Q.No. 1d A solenoid tends to contract when a current passes through it. Why? [2]
9. 2073 Supp Q.No. 1e 2060 Q.No. 2 e Define one Ampere in terms of the force between current carrying conductors. [2]
10. 2073 Set C Q.No. 1c How can the sensitivity of moving coil galvanometer be increased? Explain. [2]
11. 2073 Set D Q.No. 1b A charge particle carrying a charge 'q' moves in an electric field E. If its specific charge is 'S', write an expression of its acceleration in terms of above entities. [2]
12. 2073 Set D Q.No. 1c Magnetic field at the centre of a solenoid is double than that at its ends. Why? [2]
13. 2072 Supp Q.No. 1c Hall voltages are much larger for semi-conductors than for good conductors for comparable currents, fields and dimensions. Why? [2]
14. 2072 Set D Q.No. 1c Does a charged particle moving through a magnetic field always experience a force? Explain. [2]
15. 2072 Set E Q.No. 1e How will an electron move in a homogeneous magnetic field if the velocity of the electron at the initial moment forms an angle 'θ' with the force lines of the field? [2]
16. 2071 Supp. Q.No. 1d A uniform magnetic field directed upward exists in some region of space. In what directions could an electron be moving if its trajectory is (a) a straight line? (b) a circle? [2]
17. 2071 Set C Q.No. 1 c A current was sent through a helical coil spring. The spring contracted, as if it had been compressed. Why? [2]
18. 2070 Supp. Set A Q.No. 1 c If a magnetic force does no work on charged particles, how can it have any effect on the particles motion? [2]
19. 2070 Supp. Set B Q.No. 1 c Can a charged particle move through a magnetic field without experiencing any force? Explain the reason. [2]
20. 2069 Supp Set B Q.No. 1 c Two straight current carrying rods are replaced parallel to each other. How can 1(one) ampere of current be defined from this arrangement? [2]
21. 2068 Old Can. Q.No. 2e What will be the effect if the magnetic field in a moving coil galvanometer is not radial? [2]
22. 2068 Old Q.No. 2 e State Ampere's circuital theorem. [2]

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23. 2067 Q.No. 1e 2067 Old Q.No. 1e 2066 Supp Q.No. 2e A current carrying solenoid tends to contract. Why? [2]
24. 2065 Q.No. 2 e Explain how the direction of Lorentz force is determined. [2]
25. 2061 Q.No. 2 e How is magnetic field made radial in a moving coil galvanometer? [2]
26. 2060 Q.No. 1 e Why is the cylindrical core of soft iron used in moving coil galvanometer? [2]
27. 2057 Q.No. 2 e A proton moving in a straight line enters a strong magnetic field along the field direction. How will its path and velocity change? [2]
28. 2055 Q.No. 7 a Does a charged particle moving through a magnetic field experience a force? Express with conditions, maximum, and minimum force it experiences. [2]
29. 2054 Q.No. 7 d Under what conditions does a charge affect a magnet? [2]
30. 2054 Q.No. 7 h State Ampere's theorem. [2]

Long Answer Questions [4 Marks]

31. 2076 GIE Set A Q.No. 5b What is meant by Hall effect? Derive an expression of Hall voltage. [4]
32. 2076 GIE Set B Q.No. 5b State Ampere's law and use it to find magnetic field due to a long current carrying solenoid. [4]
33. 2076 Set B Q.No. 5c State Biot and Savart law. Derive an expression for the magnetic field at a point due to a long straight conductor carrying current. [4]
34. 2075 GIE Q.No. 5c 2074 Supp Q.No. 5b State Ampere's law and use it to find the magnetic field intensity due to a long solenoid. [4]
35. 2075 Set A Q.No. 5a State Biot's and Savart's law and used it to obtain an expression for the magnetic field at the center of a circular coil. [4]
36. 2075 Set B Q.No. 5c State Ampere's law and use it to find magnetic field due to a long straight current carrying conductor and toroid. [4]
37. 2074 Supp Q.No. 5d A rectangular coil of N turns is placed in a uniform magnetic field B with its plane parallel to the field. Derive an expression for the torque produced on the coil when a current I is passed through it. Define magnetic moment in terms of torque. [4]
38. 2074 Set A Q.No. 5c 2071 Set C Q.No. 5 c 2069 Set A Q.No. 5b State Biot-Savart law. Use this law, to find the magnetic field due to a current carrying circular coil at any point on the axis of the coil. [4]
39. 2074 Set B Q.No. 5b Derive an expression for the force per unit length between two infinitely long parallel straight wires carrying current in the same direction. Hence define one ampere. [4]
40. 2073 Supp Q.No. 5b 2072 Set D Q.No. 5c State and explain Biot-Savart law and use it to find magnetic field due to a long straight current carrying conductor. [4]
41. 2073 Set C Q.No. 5c State Ampere's law and deduce an expression for the force between two parallel current carrying wires. [4]
42. 2073 Set C Q.No. 5d 2073 Set D Q.No. 5d What is Hall effect? Explain and deduce expressions for Hall voltage and Hall electric field. [4]
43. 2073 Set D Q.No. 5a Explain the magnetic effect on a current carrying rectangular coil. Hence obtain expression for the torque on the coil. [4]
44. 2072 Supp Q.No. 5b Find an expression for the magnetic field on the axial line of a current carrying circular coil. [4]
45. 2072 Set C Q.No. 5c Derive an expression for the force per unit length acting on each of the two straight parallel metallic conductors carrying current in the same direction and kept near each other. Why do such current carrying conductors attract each other? [4]
46. 2072 Set E Q.No. 5b Derive an expression for the force per unit length between two parallel current carrying conductors. [4]
47. 2071 Supp. Q.No. 5d Derive an expression for the force per unit length between parallel conductors carrying current in the opposite direction. [4]
48. 2071 Set D Q.No. 5 c State and explain Ampere's theorem and use it to calculate the magnetic field due to a long solenoid. [4]
49. 2070 Supp. Set A Q.No. 5 b Deduce an expression for a magnetic field at a point along the axis of a solenoid and at the mid point of the solenoid. [4]
50. 2070 Supp. Set B Q.No. 5 b State Biot Savart law. Use this law to find the magnetic field intensity due to a current carrying straight conductor at a distance 'd' from it. [4]
51. 2070 Set C Q.No. 5 c What is Ampere's circuital law? Use this law to derive an expression for the magnetic field due to a long solenoid carrying current. [4]
52. 2070 Set C Q.No. 5 d Describe with the help of a diagram, the principle, construction and working of a moving coil galvanometer. [4]
53. 2070 Set D Q.No. 5 c Find an expression for the force per unit length between two long parallel conductors carrying currents and hence define one ampere. [4]
54. 2069 Supp Set B Q.No. 5 c State and explain Biot Savart law to find the magnetic field due to a current carrying solenoid at its centre. [4]
55. 2069 Set B Q.No. 5d State and explain Biot-Savart law to find magnetic field due to a long straight current carrying conductor. [4]
56. 2068 Can. Q.No. 5c State and explain Ampere's theorem and hence use it to find the magnetic field due to a long solenoid carrying current I. [4]
57. 2068 Old Can. Q.No. 7a OR State and explain Biot-Savart law and hence use this law to find the magnetic field due to a long straight current carrying conductor. [1+3]
58. 2068 Old Q.No. 7 a What is a Helmholtz coil? Derive an expression for the uniform magnetic field obtained from it. [1+3]
59. 2068 Q.No. 5 a Deduce an expression for the force between two parallel current carrying conductors. Define one ampere current. [4]
60. 2067 Q.No. 5b Find an expression for the magnetic field on the axis of a solenoid, carrying current, using Ampere's law. [4]

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61. 2067 Old Q.No. 7a Obtain magnetic field strength at a point on the axis of circular current loop by using Biot-and Savart law [4]

62. 2067 Sup Q.No. 6b State and explain Biot-savart law and use it to find magnetic field due to a long straight current carrying conductor. [1+3]

63. 2066 Q.No. 7 a Derive an expression of force per unit length between two parallel conductors separated by a distance 'r' and carrying currents I_1 and I_2 in the same direction. [4]

64. 2066 Supp Q.No. 7a State and explain Biot-savart law. Use it to find the magnetic field at the center of a circular coil of N turns and carrying current I. [1+3]

65. 2065 Q.No. 7 a OR State and explain Biot-Savart law with a case of its application. [2+2]

66. 2064 Q.No. 7 a State and explain Biot-Savart law. Use this law to find the magnetic field intensity at any point due to a long straight current carrying conductor. [1+3]

67. 2063 Q.No. 7 a Find an expression for torque on rectangular coil in a uniform magnetic field. [4]

68. 2063 Q.No. 7 a OR 2058 Q.No. 7 a OR What is a Helmholtz coil? Derive an expression for the magnetic field due to this coil. [4]

69. 2062 Q.No. 7 a State and explain Biot-Savart law and hence use it to find the magnetic field intensity at any point due to a long straight conductor. [4]

70. 2061 Q.No. 7 a Derive the formula for the magnetic field at a point due to a long straight current carrying conductor using Biot-Savart law. [4]

71. 2060 Q.No. 7 a State and explain Ampere's theorem and hence use it to find the magnetic field intensity due to a long current carrying solenoid. [1+3]

72. 2059 Q.No. 7 a Derive the formula for the magnetic field at the centre of a circular coil carrying current. Explain why the magnetic field at the centre of the coil disappears when the circular coil is made infinitely large. [4]

73. 2057 Q.No. 7 a Derive an expression for the magnetic field at a point due to a long straight conductor carrying current. [4]

74. 2056 Q.No. 7 c Explain in brief, the motion of an electron moving normal to a magnetic field. [4]

75. 2056 Q.No. 8 Derive an expression for the magnitude of the magnetic flux density at the center of a narrow circular coil. [4]

76. 2055 Q.No. 9 OR State Biot-Savart law and obtain the expression for the magnetic field at the centre of the circular coil. [4]

Numerical Problems [4 Marks]

77. 2076 GIE Set A Q.No. 9b A closely wound coil has a radius of 6cm and carries a current of 2.5A. How many turns must it have if the magnetic field at a point 6 cm from the centre of the coil on the coil axis is 6.4×10^{-4} T? ($\mu_0 = 4\pi \times 10^{-7}$ Hm^{-1}) [4]
Ans: 70 turns

78. 2076 GIE Set B Q.No. 9c Two long parallel transmission lines, 40.0 cm apart carry 25.0 A and 75.0A currents. Find location were the net magnetic field of these two wires is zero if these currents are in the same direction. [4]
Ans: 0.1 m from 25.0 A wire

79. 2076 Set B Q.No. 9b Two galvanometers, which are otherwise identical, are fitted with different coils. One has a coil of 50 turns and resistance 10Ω while the other has 500 turns and a resistance of 600Ω. What is the ratio of their deflection when each is connected in turns to a cell of e.m.f. 25 V and internal resistance 50Ω? [4]
Ans: 13:1

80. 2076 Set C Q.No. 9b A flat silver strip of width 1.5cm and thickness 1.5mm carries a current of 150A. A magnetic field of 2T is applied perpendicular to the flat face of the strip. The emf developed across the width of the strip is measured to be 17.9μV. Calculate the free electron density in the silver. [4]
Ans: 6.98×10^{27} m^{-3}

81. 2075 GIE Q.No. 9b A Silver wire has 1×10^{30} free electrons per cubic meter, a cross sectional area of 2 mm^2 and carries a current of 5A. Calculate the force acting on each electron if the wire is now placed in a magnetic field of flux density 0.15T which is perpendicular to the wire. [4]
Ans: 3.75×10^{-21} N

82. 2075 Set B Q.No. 9b 2061 Q.No. 7 b A horizontal straight wire 5 cm long weighing 1.2 gm^{-1} is placed perpendicular to a uniform horizontal magnetic field of flux density of 0.6 T. If the resistance per unit length of the wire is 3.8 Ω m^{-1}, calculate the p.d. that has to be applied between the ends of the wire to make it just self-supporting. [4]
Ans: 3.7 ×10^{-3}V

83. 2074 Set A Q.No. 9b A straight horizontal rod of length 20 cm and mass 30 gm is placed in a uniform horizontal magnetic field perpendicular to the rod. If a current of 2A through the rod makes it self supporting in the magnetic field, calculate the magnetic field. [4]
Ans: 0.75 T

84. 2074 Set B Q.No. 9b A coil consisting of 100 circular loops with radius 60 cm carries a current of 5A. Find the magnetic field at a point along the axis of the coil, 80 cm from the centre. ($\mu_0 = 4\pi \times 10^{-7}$Tm/A) [4]
Ans: 1.13×10^{-4} T

85. 2073 Supp Q.No. 9b A straight conductor of length 5cm carries current of 1.5A. The conductor experiences a magnetic force of 4.5×10^{-3}N when it is placed in a magnetic field of 0.9T. What angle the conductor makes with magnetic field? [4]
Ans:3.8°

86. 2073 Set D Q.No. 9b A circular coil has 100 turns and a mean diameter of 20 cm. It carries a current of 5A. Find the strength of the magnetic field at a point on its axis at a distance of 15 cm from the centre of the coil. [4]
Ans: 5.37×10^{-4} T

87. 2072 Set C Q.No. 9b A horizontal wire, of length 5 cm and carrying a current of 2A, is placed in the middle of a long solenoid at right angles to its axis. The solenoid has 1000 turns per meter and carries a steady current I. Calculate I if the force on the wire is equal to 10^{-4} N. ($\mu_0 = 4\pi \times 10^{-7}$ H m^{-1}). [4]
Ans: 0.8 A

88. 2072 Set D Q.No. 9b 2071 Supp. Q.No. 9b 2067 Q.No. 6b The coil of a moving coil galvanometer has 50 turns and its resistance is 10Ω. It is replaced by a coil having 100 turns and resistance 50Ω. Find the factor by which the current and voltage sensitivities change.
Ans: 2, 2/5

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89. **2072 Set E Q.No. 9c** A 60 cm long wire of mass 10 g is suspended horizontally in a transverse magnetic field of flux density 0.4T through two springs at its two ends. Calculate the current required to pass through the wire so that there is zero tension in the springs. [4]
Ans: 0.42 A

90. **2071 Set C Q.No. 9 b** A horizontal straight wire of mass 0.12 gm and length 10cm is placed perpendicular to a uniform horizontal magnetic field of flux density 0.6T. If the resistance per unit length of the wire is $3.8\Omega m^{-1}$, calculate the potential difference that has to be applied between the end of the wire to make it just self supporting. [4]
Ans: 7.6×10^{-3} V

91. **2071 Set D Q.No. 9 a** A copper wire has 10^{29} free electrons per cubic meter, a cross sectional area of $2mm^2$ and carries a current of 5 A. Calculate the force acting on each electron if the wire is now placed in a magnetic field of flux density 0.15 T which is perpendicular to the wire. [4]
Ans: 3.75×10^{-24} N

92. **2070 Supp. Set A Q.No. 9 a** Two long parallel conductors carry respectively currents of 12A and 8A in the same direction. If the wires are 10cm apart, find where a third parallel wire also carrying a current must be placed so that the force experienced by it will be zero. [4]
Ans: 0.06 m

93. **2070 Supp. Set B Q.No. 9 b** An electron of K.E. 10 eV is moving in a circular orbit of radius 11 cm, in a plane at right angles to a uniform magnetic field. Determine the value of the flux density. (mass of an electron = 9.1×10^{-31} kg, e=1.6×10^{-19}c) [4]
Ans: 9.7×10^{-5} T

94. **2070 Set D Q.No. 9 b** A slab of copper, 2 mm thick and 1.50 cm wide, is placed in a uniform magnetic field of flux density 0.40 T, so that maximum flux pass through the slab. When a current of 75 A flows through it, a potential difference of 0.81 μV is developed between the edges of the slab. Find the concentration of the mobile electrons in copper. [4]
Ans: $1.15 \times 10^{29}/m^3$

95. **2069 Supp Set B Q.No. 9 b** A copper wire has 1×10^{29} free electrons per cubic meter and crossectional area $2mm^2$ carries a current of 6 A. Calculate the force acting on each electron if the wire is now placed in uniform magnetic field of flux density 0.1 T perpendicularly. [4]
Ans: 3×10^{-24}N

96. **2069 Supp Set B Q.No. 9 c** **2069 Set A Q.No. 9b** **2067 Sup Q.No. 9b** A slice of indium antimonide is 2.5 mm thick and carries a current of 150 mA. A magnetic field of flux density 0.5 T, correctly applied, produce a maximum Hall voltage of 8.75 mV between the edges of the slice. Calculate the number of free charge carries per unit volume assuming that each have a charge of 1.6×10^{-19} C. [4]
Ans: $2.14 \times 10^{22} m^{-3}$

97. **2069 Set A Old Q.No. 7b** A copper wire 28m long is wound into a flat circular coil 8.0cm in diameter. If the current of 4.50 A flows through the coil, what is the magnetic induction at the centre? [1+2+1]
Ans: 7.8×10^{-3}T

98. **2069 Set B Q.No. 9a** An alpha particle makes a full rotation in a circle of radius 1.0 meter in 2.0 sec. Calculate the value of magnetic field induction at the centre of the circle. ($\mu_0 = 4\pi \times 10^{-7} H m^{-1}$) [4]
Ans: 10^{-25}J

99. **2068 Can. Q.No. 9b** A long wire carrying a current of 10 A is placed perpendicular to magnetic field of flux density 5 Tesla. Calculate the force acting on 2m of the wire. [4]
Ans: 100 N

100. **2068 Q.No. 9 b** A coil consisting of 100 circular loops with radius 0.60m carries a current of 5 A. At what distance from the center, along the axis, the magnetic field magnitude 1/8 as great as it is at the center? [4]
Ans: 1.04m

101. **2065 Q.No. 7 b** A wire carrying current of 10A and 2 m in length is placed in a field of flux density 0.34 Tesla. What is the force on the wire if it is placed at 60° to the field? [3]
Ans: 5.88 N

2. MAGNETIC PROPERTIES OF MATERIALS

FORMULAE

1. $\tan\delta = \frac{B_V}{B_H}$
2. Apparent dip, $\tan\delta' = \frac{\tan\delta}{\cos\theta}$
3. True dip from two apparent dips, $\cot^2\delta = \cot^2\delta_1 + \cot^2\delta_2$
4. $B_V^2 + B_H^2 = B^2$
5. $\mu_r = 1 + \chi$
6. $\mu = \mu_0\mu_r = \frac{B}{H} = \mu_0(1 + \chi)$
7. $I = \frac{M}{V} = \frac{m}{A}$
8. $H = \frac{B_0}{\mu_0}$
9. $\chi_m = \frac{I}{H}$

Short Answer Questions [2 Marks]

1. **2077 Set D Q.No. 1b** What is Curie temperature? [2]
2. **2076 GIE Set B Q.No. 1d** Distinguish between diamagnetic and paramagnetic substances in terms of their relative permeability and susceptibility. [2]
3. **2075 GIE Q.No. 1e** **2074 Set A Q.No. 1d** Why is soft iron preferred for making the core of a transformer? [2]
4. **2075 Set B Q.No. 1e** What is the significance of the area of a hysteresis loop? [2]
5. **2074 Supp Q.No. 1d** Permanent magnets are made of steel. Why? [2]
6. **2074 Set A Q.No. 1c** What is angle of dip? How is it related with components of earth's magnetic field? [2]
7. **2073 Supp Q.No. 1c** **2069 Set A Q.No. 1d** Steel is used in making permanent magnets whereas soft iron is preferred for making the core of transformer. Why? [2]
8. **2073 Set D Q.No. 1a** How do you expect about the directions of horizontal and vertical components of earth's magnetic intensity at pole and at equator? Give justification in terms of angle of dip. [2]

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9. 2072 Supp Q.No. 1d 2071 Set D Q.No. 1 d Why should the permeability of a paramagnetic material be expected to decrease with increasing temperature? [2]
10. 2072 Set C Q.No. 1c What is retentivity and coercivity of a ferromagnetic material? [2]
11. 2072 Set D Q.No. 1d Define angle of dip. What will be its value at a place where the horizontal and vertical components of earth's magnetic field are equal? [2]
12. 2071 Supp. Q.No. 1e What is the role of hysterisis loop in choosing a material for making permanent magnets? [2]
13. 2070 Supp. Set A Q.No. 1 d Distinguish between dia and para-magnetic substances on the basis of susceptibility. [2]
14. 2070 Set D Q.No. 1 c The magnetic susceptibility of a paramagnetic material is quite strongly temperature dependent, but that of diamagnetic material is nearly independent of temperature. Why? [2]
15. 2069 Supp Set B Q.No. 1 e Define an angle of dip. What will be its value at the pole of the earth? [2]
16. 2068 Can. Q.No. 1e 2063 Q.No. 8 a Above curie temperature a ferromagnetic material becomes paramagnetic. Why? [2]
17. 2068 Old Q.No. 8 a XI What are the characteristics of a ferromagnetic substance? [2]
18. 2068 Q.No. 1 c A permanent magnet can be used to pick up a string of nails, tacks or paper clips, even though these are not magnets by themselves. How can this be? [2]
19. 2067 Q.No. 1c Why does a magnet lose its magnetism when heated to high temperature? [2]
20. 2067 Sup Q.No. 1e Permanent magnets are made of steel while the core of transformer is made of soft iron. Why? [2]
21. 2066 Old Q.No. 8 a The angle of dip in Britain is greater than that in Kathmandu. Why? [2]
22. 2064 Q.No. 8 a Why does a bar magnet not retain its magnetism when it is melted? [2]
23. 2059 Q.No. 8 c How does dip vary from place to place on earth's surface? [2]
24. 2058 Q.No. 8 c Define angle of dip and angle of declination at a place. [2]
25. 2057 Q.No. 8 b What are magnetic domains? [2]
26. 2057 Q.No. 8 c What is angle of dip? How does it vary from the equator to the poles? [2]

Long Answer Questions [4 Marks]

27. 2076 GIE Set A Q.No. 5c Define the terms magnetic permeability and susceptibility of a substance. Obtain the relation between them. [4]
28. 2076 GIE Set B Q.No. 5c Define true and apparent dips. Obtain the relation between them. [4]
29. 2076 Set C Q.No. 5c Define angle of dip. If δ is the true dip at a place, δ_1 and δ_2 are the apparent dips observed in two vertical planes at right angles to each other at that place, then prove the relation, $\cot^2\delta = \cot^2\delta_1 + \cot^2\delta_2$. [4]
30. 2074 Set B Q.No. 5c Define permeability and susceptibility of magnetic materials. Derive a relation between them. [4]
31. 2073 Set C Q.No. 5b Relate magnetic permeability and susceptibility features of a magnetic material. Can hysteresis curve be drawn in the case of diamagnetic material? Explain on the basis of above features. [4]
32. 2072 Set E Q.No. 5c What do you mean by true dip and apparent dip? Show that $\cos^2\delta = \cot^2\delta_1 + \cot^2\delta_2$, where symbols have usual meanings. [4]
33. 2070 Supp. Set B Q.No. 5 d Prove that $\cot^2\delta = \cot^2\delta_1 + \cot^2\delta_2$, where symbols have usual meanings. [4]
34. 2070 Set C Q.No. 5 b Define magnetic susceptibility and relative permeability and establish a relation between them. [4]

Numerical Problems [4 Marks]

35. 2075 Set A Q.No. 9c A bar magnet, 10 cm in length, has pole strength of 10 AM. Determine the magnetic field at a point on its axis at a distance of 15 cm from the center of the magnet. ($\mu_0 = 4\pi \times 10^{-7}$ H/m) Ans: 7.5×10^{-5} T [4]
36. 2062 Q.No. 9 b The needle of a dip circle shows an apparent dip of 45° in a particular position and 53° when the circle is rotated through 90°. Find the true dip. [4] Ans: 38.7°

3. ELECTROMAGNETIC INDUCTION

FORMULAE

1. Magnetic Flux: $\phi = \vec{B}.\vec{A} = BA\cos\theta$. (where θ is the angle between $\vec{B}$ and $\vec{A}$)
2. Formulae about induced emf, current, charge and power:

i. Induced emf, $E = -N\frac{d\phi}{dt}$

ii. Induced current, $I = \frac{E}{R} = -\frac{N}{R}\cdot\frac{d\phi}{dt}$

iii. Induced charge, $q = \int Idt = -\frac{E}{R}d\phi$

iv. Induced power, $P = IE = \frac{E^2}{R} = N^2\left(\frac{d\phi}{dt}\right)^2\cdot\frac{1}{R}$

3. Magnitude of induced emf:

i. For a conducting rod moving in a uniform magnetic field, $E = Bv\sin\theta$,

ii. For a conducting rod rotating with angular velocity ω in a uniform magnetic field, $E = BAf$

iii. For a disc of radius r rotating in uniform magnetic field, $E = BAf$.

iv. For a rectangular coil rotating in a uniform magnetic field, $E = BA\omega N\sin\omega t = E_0\sin\omega t$

4. Self induction:

i. Magnetic flux, $\phi = LI$

ii. Induced emf in the coil, $E = -L\frac{dI}{dt}$

iii. For a solenoid, $L = \frac{\mu_0 N^2 A}{l}$

iv. For a plane circular coil, $(L) = \frac{\mu_0 N^2 A}{2r}$

v. The energy stored by a inductor, $U = \frac{1}{2}LI^2$

5. Mutual induction

i. The emf induced by neighbouring coil, $E = -M\frac{dI}{dt}$

ii. The mutual inductance of two long coaxial solenoids each of length l, area of cross-section A wound in air is, $M = \frac{\mu_0 N_1 N_2 \pi r_1^2}{2r_2}$, r_2 is radius of bigger coil or $r_2 > r_1$

6. Transformer:
i. Relation of alternating voltage, alternating current and number of turns in two coils. $\frac{V_s}{V_p} = \frac{N_s}{N_p} = \frac{I_p}{I_s}$
ii. Efficiency, $\eta = \frac{\text{output power}}{\text{intput power}} \times 100\%$

Short Answer Questions [2 Marks]

1. 2076 Set C Q.No. 1e 2070 Set C Q.No. 1 d A copper ring is suspended by a thread in a vertical plane. One end of a magnet is brought horizontally towards the ring. How will the position of the ring be affected? [2]
2. 2075 Set A Q.No. 1e A bar magnet falls through copper ring. Will its acceleration be equal to 'g'? Justify. [2]
3. 2075 Set B Q.No. 1f Birds sitting on a high tension line wire fly off when current is switched on. Why? [2]
4. 2074 Supp Q.No. 1e State and explain Faraday's law of electromagnetic induction. [2]
5. 2074 Set A Q.No. 1e 2072 Set C Q.No. 1d If the number of turns of a solenoid is doubled, keeping the other factors constant, how does the self inductance of the solenoid change? [2]
6. 2074 Set R Q.No. 1d What are eddy currents? How can these be reduced in a transformer? [2]
7. 2073 Set D Q.No. 1d 2069 Supp Set B Q.No. 1 d Lenz law follows the principle of conservation of energy. Explain. [2]
8. 2072 Set C Q.No. 1e A transformer gets heated up while in use. Why? [2]
9. 2072 Set D Q.No. 1e Why does acceleration of a magnet falling through a long solenoid decrease? [2]
10. 2071 Supp. Q.No. 1c A vertical magnetic field is perpendicular to the vertical plane of a loop. When the loop is rotated about a horizontal axis in the plane, the current produced in the loop reverses directions twice per rotation. Explain why there are two reversals for one rotation. [2]
11. 2071 Set C Q.No. 1 d 2067 Q.No. 1d A sheet of copper is placed between the poles of an electromagnet with the magnetic field perpendicular to the sheet. When it is pulled out, a considerable force is required, and the force required increases with speed. Explain. [2]
12. 2071 Set D Q.No. 1 e A long, straight conductor passes through the centre of a metal ring, perpendicular to its plane. If the current in the conductor increases, does current get induced in the ring? Explain. [2]
13. 2070 Supp. Set A Q.No. 1 e Can a transformer be used with dc? Why? Why not? [2]
14. 2070 Supp. Set B Q.No. 1 d Pairs of conductors carrying current into or out of the power supply components of electronic equipments are twisted together. Why? [2]
15. 2070 Supp. Set B Q.No. 1 e Does Lenz law violate principle of conservation of energy? Explain. [2]
16. 2070 Set D Q.No. 1 d A copper ring is held horizontally and a bar magnet is dropped through the ring with its length along the axis of the ring. Will the acceleration of the falling magnet be equal to the acceleration due to gravity? Explain. [2]
17. 2069 Set A Q.No. 1f State and explain the lenz's law. [2]
18. 2069 Set A Old Q.No. 1h A bar magnet falls through a metal ring, will its acceleration be equal to 'g'? [2]
19. 2069 Set B Q.No. 1e Explain Faraday laws of electromagnetic induction. [2]
20. 2068 Can. Q.No. 1d A student asserted that if a permanent magnet is dropped down a vertical copper pipe, it eventually reaches a terminal velocity even if there is no air resistance. Why should this be? [2]
21. 2068 Q.No. 1 d If a permanent magnet is dropped down a vertical copper pipe, it eventually reaches a terminal velocity even if there is no air resistance. Why should this be? [2]
22. 2068 Old Q.No. 1 e What is self inductance? Define coefficient of self inductance. [2]
23. 2066 Q.No. 1e A sheet of copper is placed between the poles of an electromagnet with the magnetic field perpendicular to the sheet. When it is pulled out, a considerable force is required, and the force required increases with speed, why? [2]
24. 2065 Q.No. 1 e State Faraday's laws of electromagnetic induction. [2]
25. 2064 Q.No. 2 e A transformer cannot be used in dc circuits, why? [2]
26. 2063 Q.No. 1 e 2061 Q.No. 1 e Why can't a transformer be used to step up or down the d.c. voltage? [2]
27. 2063 Q.No. 2 e What is eddy current? Write down its uses. [2]
28. 2062 Q.No. 2 e What are different power losses in a transformer? What measures do you take to minimize these losses? [2]
29. 2059 Q.No. 2 e Two closely wound circular coils have the same number of turns, but one has twice the radius of the other. What is the ratio of self inductances of the two coils? [2]
30. 2058 Q.No. 1 e Show that Lenz's law is an example of conservation of energy. [2]
31. 2056 Q.No. 7 e State Lenz's law. [2]
32. 2055 Q.No. 7 c Mention two types of loss in a transformer. [2]
33. 2053 Q.No. 7 g What is lenz's law? [2]

Long Answer Questions [4 Marks]

34. 2076 GIE Set A Q.No. 5d What do you mean by electromagnetic induction? Obtain an expression of emf induced in a moving rod in a magnetic field. [4]
35. 2076 GIE Set B Q.No. 5d What are self and mutual inductances? Obtain an expression of energy stored in an inductor. [4]
36. 2076 Set C Q.No. 5d 2075 GIE Q.No. 5d 2067 Sup Q.No. 5c 2064 Q.No. 7 a OR State and explain Faraday's laws of electromagnetic induction and derive an expression for the emf induced in a rectangular coil rotating in a uniform magnetic field. [4]
37. 2074 Supp Q.No. 5c Describe the structure and working principle of a transformer. Define the efficiency of a transformer. [4]
38. 2074 Set A Q.No. 5d 2073 Supp Q.No. 5c State and explain Faraday's law of electromagnetic induction. Obtain an expression for the emf induced in the rectangular coil rotating in a uniform magnetic field. [4]

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39. 2073 Set D Q.No. 5c Explain how the concept of self and mutual inductances are used in the working principle of a transformer. [4]

40. 2072 Supp Q.No. 5c Describe the phenomena of self and mutual induction. Describe the construction and explain the action of a transformer. [4]

41. 2072 Set C Q.No. 5d What is Lenz's law? Deduce an expression for the emf induced in a straight conductor moving in a uniform magnetic field. [4]

42. 2071 Set C Q.No. 5 d Define self inductance. An inductor having self inductance L is used in a ac power supply. Calculate the energy stored in it. [4]

43. 2070 Supp. Set A Q.No. 5 d What is meant by self inductance? Derive an expression for energy stored in an inductor. [4]

44. 2070 Supp. Set B Q.No. 5 c 2068 Q.No. 5 b Describe the principle and working of a.c. generator. [4]

45. 2069 Set A Old Q.No. 7a What do you mean by electromagnetic induction? Obtain an expression for the emf induced in the conductor moving in the magnetic field. [1+3]

46. 2068 Can. Q.No. 5b State and explain Faraday's laws of electromagnetic induction. Deduce an expression for the induced emf in a coil rotating uniformly in a uniform magnetic field. [4]

47. 2068 Old Can. Q.No. 7a State Faraday's law of electromagnetic induction. Derive an expression for the emf induced in a straight conductor moving at right angle to the direction oif a uniform magnetic field. [1+3]

48. 2068 Old Q.No. 7 a Or A metallic rod is moving in a magnetic field. Determine the emf induced across it. [4]

49. 2067 Q.No. 5c State Faraday's laws of electromagnetic induction. Derive an expression for induced emf in a coil rotating in a magnetic field. [4]

50. 2066 Supp Q.No. 7a OR State Faraday's laws of electromagnetic induction. Deduce an expression for induced emf in a coil rotating in a magnetic field. [1+3]

51. 2062 Q.No. 7 a OR State Lenz's law and explain how this law leads to the conservation of energy principle. [4]

52. 2059 Q.No. 7 a OR State and explain Lenz's law. [4]

53. 2057 Q.No. 7 a OR Deduce an expression for induced emf in a coil rotating in a magnetic field. [4]

54. 2053 Q.No. 10 State the laws of electromagnetic induction. Derive an expression for the emf induced in a conductor moving in a magnetic field. [4]

55. 2052 Q.No. 8 Obtain the expression for the emf induced in the conductor moving in a magnetic field. [4]

Numerical Problems [4 Marks]

56. 2076 Set B Q.No. 9c The magnetic flux passing perpendicular to the plane of coil is given by $\phi = 4t^2 + 5t + 2$ where ϕ is in weber and t is in second. Calculate the magnitude of instantaneous emf induced in the coil when t = 2 sec. [4]
Ans: 21V

57. 2075 Set A Q.No. 9a A straight conductor of length 25 cm is moving perpendicular to its length with a uniform speed of 10 m/s making an angle of 45° with a uniform magnetic field of 10 T. Calculate the emf induced across its length. [4]
Ans: 17.67 V

58. 2075 Set B Q.No. 9c 2067 Old Q.No. 7b A coil of 100 turns each of area 2×10^{-3} m² has a resistance of 12 Ω. It lies in a horizontal plane in a vertical magnetic flux density of 3×10^{-2} Wbm⁻². What charge circulates through the coil if its ends are short-circuited and the coil is rotated through 180° about a diametrical axis? [4]
Ans: 10^{-4} C

59. 2074 Set B Q.No. 9c An aircraft with a wingspan of 40 m files with a speed of 1080 km hr⁻¹ in the eastward direction at a constant altitude in the northern hemisphere. Where the vertical component of earth's magnetic field is 1.75×10^{-5} T. Find the emf that develops between the tips of the wings. [4]
Ans: 0.21 V

60. 2073 Set C Q.No. 9a A straight conductor of length 15 cm is moving with uniform speed of 10 ms⁻¹ making an angle of 30° with uniform magnetic field of 10^{-4} Tesla. Calculate the emf induced across the length. [4]
Ans: 7.5×10^{-4} V

61. 2072 Supp Q.No. 9b A jet plane is flying due west at the speed of 1800 km/hr. What is the voltage difference developed between the ends of the wings 25m long of the earths' magnetic field at that location is 5×10^{-4} T and the angle of dip is 45°? [4]
Ans: 6.25 V

62. 2072 Set D Q.No. 9c A long solenoid of 1000 turns and cross sectional area 2×10^{-3} m² carries a current of 2A and produces a flux density 52×10^{-3} T inside it. Calculate the self inductance of the coil. [4]
Ans: 0.052H

63. 2072 Set E Q.No. 9b The magnetic flux passing perpendicular to the plane of a coil is given by $\phi = 4t^2+5t+2$ where ϕ is in Weber and t is in seconds. Calculate the magnitude of instantaneous emf induced in the coil when t = 3 sec. [4]
Ans: 29 V

64. 2071 Supp. Q.No. 9c A plane circular coil has 200 turns and its radius is 0.10m. It is connected to a battery. After switching on the circuit a current of 2A is set up in the coil. Calculate the energy stored in the coil. ($\mu_0 = 4\pi \times 10^{-7}$ Hm⁻¹) [4]
Ans: 1.6×10^{-4} J

65. 2071 Set D Q.No. 9 c Find the emf induced in a straight conductor of length 25 cm, on the armature of a dynamo and 12 cm from the axis, when the conductor is moving in a uniform radial magnetic field of 0.5 T. The armature is rotating at 1000 revolutions per minute. [4]
Ans: 1.57 V

66. 2070 Set C Q.No. 9 b A metal aircraft with a wing span of 40 m flies with a speed 1000 km hr⁻¹ in a direction due east at constant altitude in a region of the northern hemisphere where the horizontal component of the earth's magnetic field is 1.6×10^{-5}T and the angle of dip is 41°. Find the potential difference developed between the tips of the wing. [4]
Ans: 0.155V

67. 2070 Set D Q.No. 9 c A rectangular coil of 100 turns has dimensions 15 × 10 cm. It is rotated at the rate of 300 revolutions per minute in a uniform magnetic field of flux density 0.6 T. Calculate the maximum emf induced in it. [4]
Ans: 28.3V

68. 2069 Set A Q.No. 9c A long solenoid with 15 turns per cm has a small loop of area 2cm² placed inside, normal to the axis of the solenoid. If the current carried by the solenoid changes steadily from 2A to 4A in 0.1 second, what is the induced voltage in the loop, while the current is changing? [4]
Ans: 7.5×10^{-6}V

69. 2067 Q.No. 6c Two plane coils having number of turns 1000 and 2000, and radii 5 cm and 10 cm respectively are placed co-axially in the same plane. Calculate their mutual inductance. ($\mu_0 = 4\pi \times 10^{-7}$ H/m) [4]
Ans: 0.79H

70. 2066 Q.No. 7 b A long solenoid of 1000 turns and cross-sectional area 2×10^{-3} m² carries a current of 2A and produces a flux density 52×10^{-3} T in the middle of the coil. Assuming this value of flux density at all sections of the solenoid, calculate its self-inductance. Ans: 0.052H [3]

71. 2060 Q.No. 7 b A transformer has 500 turns in the primary coil and 100 turns in the secondary coil. What is the output voltage if the input voltage is 4000 volts? If the transformer is assumed to have an efficiency of 100%, what primary current is required to draw 2000 watts from the secondary? [3]
Ans: 800V and 0.005 A

72. 2058 Q.No. 7 b A jet plane is traveling due west at the speed of 1800km/h. What is the voltage difference developed between the ends of the wings 25m long, if the earth's magnetic field at the location is 5.0×10^{-4} T and the dip angle is 30°? [3]
Ans: 3.5 V

73. 2054 Q.No. 9 When a wheel with metal spokes 1.2m long is rotated in a magnetic field of flux density 5×10^{-5} T normal to the plane of wheel, an emf of 10^{-2}V is induced between the rim and axle. Find the rate of rotation of the wheel. [4]
Ans: 44.2 rev/S

74. 2052 Q.No. 11 A circular metal disc of area 3.0×10^{-3} m² is rotated at 50 rev/s about an axis through its centre perpendicular to its plane. The disc is in a uniform magnetic field of flux density 5.0×10^{-3}T in the direction of the axle. What is the value of induced emf? [4]
Ans: 75×10^{-5} V

75. 2052 Q.No. 11 OR A step down transferer transforms a supply line voltage 220 volts into 100 volts. Primary coil has 500 turns. The efficiency and power transmitted by the transformer are 80% and 80kw. Find (a) the number of turns in the secondary coil (b) power supplied. [4]
Ans: 227, 10^6 W

4. ALTERNATING CURRENTS

FORMULAE

1. Alternating current and voltage:

i. Instantaneous value of alternating current is, $I = I_0 \sin \omega t$

ii. Instantaneous value of alternating voltages, $V = V_0 \sin\omega t$

iii. $I_{rms} = \frac{I_0}{\sqrt{2}} = 0.707\, I_0$, I_0 = peak value of current

iv. $V_{rms} = \frac{V_0}{\sqrt{2}} = 0.707\, V_0$, V_0 = peak value of Voltage

2. Parameters of Various a.c. circuits

S N	Parameter	R circuit	L circuit	C circuit	RL circuit	RC circuit	LCR circuit
1	Alternating voltage and current	$V=V_0\sin\omega t$ $I=I_0\sin\omega t$	$V=V_0\sin\omega t$ $I=I_0\sin\left(\omega t-\frac{\pi}{2}\right)$	$V=V_0\sin\omega t$ $I=I_0\sin\left(\omega t+\frac{\pi}{2}\right)$	$V=V_0\sin\omega t$ $I=I_0\sin(\omega t-\phi)$	$V=V_0\sin\omega t$ $I=I_0\sin(\omega t+\phi)$	$V=V_0\sin\omega t$ $I=I_0\sin(\omega t\pm\phi)$
2	Phase difference of current w.r.t voltage	zero	lags by $\frac{\pi}{2}$	Leads by $\frac{\pi}{2}$	Lags by ϕ, $\tan\phi=\frac{X_L}{R}$	Leads by ϕ, $\tan\phi=\frac{X_C}{R}$	Leads by ϕ, $\tan\phi=\frac{X_L-X_C}{R}$ or, $\frac{X_C-X_L}{R}$
3	Reactance	Zero	$X_L=\omega L$	$X_C=\frac{1}{\omega C}$	$X_L=\omega L$	$X_C=\frac{1}{\omega C}$	X_L-X_C or, X_C-X_L
4	Impedance	$Z=R$	$Z=X_L$	$Z=X_C$	$Z=\sqrt{R^2+X_L^2}$	$Z=\sqrt{R^2+X_C^2}$	$Z=\sqrt{R^2+(X_L-X_C)^2}$
5	Power factor ($\cos\phi$)	1	Zero	Zero	$\frac{R}{\sqrt{R^2+X_L^2}}$	$\frac{R}{\sqrt{R^2+X_C^2}}$	$\frac{R}{\sqrt{R^2+(X_L-X_C)^2}}$
6	Average Power	$V_{rms}I_{rms}$	Zero	Zero	$V_{rms}I_{rms}\cos\phi$	$V_{rms}I_{rms}\cos\phi$	$V_{rms}I_{rms}\cos\phi$

3. Some other formula regarding a.c.

i. Resonant frequency, $f_o=\frac{1}{2\pi\sqrt{LC}}$ for L-C-R series circuit.

ii. Quality factor, $Q=\frac{\omega_0 L}{R}=\frac{1}{\omega_0 CR}$ for L-C-R series circuit.

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 1f What do you mean by "power factor is 1" and "power factor is zero"? [2]
2. 2076 GIE Set B Q.No. 1e Explain how capacitative reactance of a capacitor changes with frequencies. [2]
3. 2076 Set B Q.No. 1f 2070 Set C Q.No. 1 f 220 V A.C. is more danger than 220 V D.C., why? [2]
4. 2076 Set C Q.No. 1f 2069 Set B Q.No. 1f 2068 Old Can. Q.No. 1e 2068 Old Can. Q.No. 1e A choke coil is preferable to a resistor in an ac circuit. Why? [2]
5. 2075 GIE Q.No. 1f The emf of an ac source is given by the expression, E = 300 sin 314t volts. Write the values of peak voltage and frequency of that source. What will be the rms voltage of source? [2]
6. 2075 Set AQ.No. 1f 2073 Supp Q.No. 1f 2071 Set D Q.No. 1f 2068 Can. Q.No. 1f 2062 Q.No. 1e 2057 Q.No. 1e 2056 Q.No. 7d Why is choke coil preferred over a resistance in a.c.? [2]
7. 2074 Supp Q.No. 1f 2072 Set D Q.No. 1f 2071 Set C Q.No. 1f What is wattless current? [2]
8. 2074 Set A Q.No. 1f The emf of an ac source is given by the expression, E=300 sin (314 t) volts. Write the values of peak voltage and frequency of source. [2]
9. 2074 Set B Q.No. 1e Define rms value of ac. How is it related with the peak value of ac? [2]
10. 2073 Set D Q.No. 1e Alternating current passes through a capacitor whereas direct current does not. Explain this fact on the basis of capacitative reactance. [2]
11. 2072 Supp Q.No. 1f How does the resonance frequency of an L.C.R. series circuit change if the plates of the capacitor are brought closer together? [2]
12. 2072 Set E Q.No. 1f What are the advantages of A.C. over D.C.? [2]
13. 2071 Supp. Q.No. 1b For a capacitor in an a.c. circuit, explain why there is a phase difference between current and voltage. [2]

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14. 2070 Supp. Set B Q.No. 1f 2068 Q.No. 1f 2067 Sup Q.No. 1f 2064 Q.No. 1 e Define rms values of alternating current. [2]
15. 2070 Set D Q.No. 1 f 2059 Q.No. 1 e Fluorescent lights often use an inductor, to limit the current through the tubes. Why is it better to use an inductor rather than a resistor for this purpose? [2]
16. 2069 Set A Q.No. 1e At high frequencies, a capacitor becomes a short-circuit and an inductor becomes an open circuit. Explain. [2]
17. 2069 Set A Old Q.No. 2e Define power factor in an a.c. circuit. [2]
18. 2069 Set B Q.No. 1b Sketch the symbols of "a capacitor", "an inductor", "emf of a cell" and "a resistor" [2]
19. 2067 Q.No. 1f 2058 Q.No. 2 e What do you mean by wattless current? [2]
20. 2067 Old Q.No. 2e What are the advantages of a.c. over d.c.? [2]
21. 2066 Q.No. 2 e Fluorescent lamps often use an inductor, called a ballast, to limit current through the tubes. Why is it better to use an inductor rather than a resistor for this purpose? [2]
22. 2066 Supp Q.No. 1e Define rms value of a.c. [2]
23. 2062 Q.No. 1 e Why is a choke coil better than a resistor in an electrical appliances? [2]
24. 2058 Q.No. 2 e What is meant by wattles current? [2]
25. 2056 Q.No. 7 h What do you mean by r.m.s value of an A.C. current? [2]
26. 2055 Q.No. 7 e Why is choke coil preferable to resistor? [2]
27. 2053 Q.No. 7 e Why do we prefer a choke coil to rheostat in an a.c. circuit? [2]
28. 2054 Q.No. 7 g What is meant by impedence of an a.c. circuit? [2]

Long Answer Questions [4 Marks]

29. 2076 Set B Q.No. 5d 2058 Q.No. 7 a An alternating current passes through a circuit containing an inductor and a resistor in series. Derive expressions for the current flowing and phase relation between the current and the voltage. [4]
30. 2075 Set A Q.No. 5d What is a LCR circuit? Derive the condition for resonant frequency for an LCR series circuit with an a.c. supply. [4]
31. 2075 Set B Q.No. 5d Derive an expression for the impedance of an a.c. circuit containing a resistor an inductor and a capacitor. Hence derive resonance frequency. Also, draw the phase diagram. [4]
32. 2074 Set B Q.No. 5d Derive an expression for the impedance of an ac circuit with an inductor L, a capacitor C and a resistor R in series. Draw the phase diagram if the voltage across the inductor is greater than that across the capacitor. [4]
33. 2073 Supp Q.No. 5d Derive expression for the impedance of an ac circuit containing a resistor and an inductor. Also draw the phase diagram. [4]
34. 2073 Set D Q.No. 5b Find expression for current in the case of alternating LCR series circuit and explain the phase relation between voltage and current. [4]
35. 2072 Supp Q.No. 5d Derive an expression for the impedance of a LCR series a.c. circuit. Show graphically how impedance varies with the variation of applied frequency. [4]
36. 2072 Set D Q.No. 5d An alternating current passes through a circuit containing a resistor, a capacitor and an inductor in series. Derive an expression for the phase relation between the current and the voltage. [4]
37. 2072 Set E Q.No. 5d Derive the condition for resonant frequency of LCR alternating current circuit. [4]
38. 2071 Supp. Q.No. 5c Define a.c. power. Derive an expression for it. Also define power factor. [4]
39. 2071 Set D Q.No. 5 d Derive an expression for the impedance of an ac circuit with an inductor L, a capacitor C and a resistor R in series. Draw the phase diagram if the voltage across the capacitor is greater than that across the inductor. [4]
40. 2070 Set D Q.No. 5 d An ac passes through a circuit containing a resistor and an inductor in series. Derive an expression for the current and phase relation between the current and voltage. [4]
41. 2069 Supp Set B Q.No. 5 b Derive expression for the impedance of an ac circuit containing a resistor and an inductor. Also draw the phase diagram. [4]
42. 2069 Set A Q.No. 5d 2052 Q.No. 10 OR Discuss the phase relationship between the voltage and current in the ac circuit containing an inductor and a resistor in series. What is power factor of the circuit? [4]
43. 2069 Set A Old Q.No. 7a OR An expression for the impedence of the circuit when an a.c. be passed through a resistance and a coil connected in series. What do you mean by choke coil? [1+3]
44. 2067 Q.No. 5d 2060 Q.No. 7 a OR Discuss the phase relationship between the current and voltage in A.C. circuit containing capacitor and resistor in series and hence derive an expression for the impedance of the circuit. [4]
45. 2067 Old Q.No. 7a OR 2066 Q.No. 7 a OR Derive an expression for the current flowing through an a.c. circuit containing a resistor and capacitor. Obtain the expression of power factor of this circuit. [3+1]
46. 2065 Q.No. 7 a Derive the condition for resonant frequency of an L-C-R alternating current series circuit. [4]
47. 2061 Q.No. 7 a OR Find an expression for impedance of an a.c. circuit containing a resistance and a capacitor in series. Also discuss the phase relation of current and emf in that circuit. [3+1]
48. 2056 Q.No. 9 An alternating emf is applied across a capacitor. Show that the current in it leads to the applied emf by 90°. [4]
49. 2055 Q.No. 9 Find the impendence of LCR circuit in series [4]

Numerical Problems [4 Marks]

50. 2077 Set D Q.No. 3a A coil of inductance 0.5 H and negligible resistance is in series with a resistance of 40 Ω. A supply voltage of 40 V (rms) is connected across them. If the voltage across the coil is equal to that across resistor calculate the voltage across each component and frequency of the supply. [4]

Ans: 35.35 V, 12.74 Hz

51. **2076 GIE Set A Q.No. 9c** An LCR series circuit, with L = 0.12H, R = 240Ω and C = 7.3 μF, carries current of 0.45 A with a frequency of 400 Hz (i) What are the phase angle and power factor? (ii) What is the impedance of the circuit? [4]
Ans: 45.57°, 0.70, 344Ω

52. **2076 GIE Set B Q.No. 9b** A 100V, 50Hz A.C. source is connected to an LCR circuit containing L = 8.1 mH, C = 12.5 μF and R = 100Ω all are connected in series. Find the p.d. across the resistor. [4]
Ans: 37 V

53. **2076 Set C Q.No. 9c** A circuit consists of a capacitor of 2μF and a resistor of 1000Ω. An alternating emf of 12V and frequency 50Hz is applied. Find the voltage across the capacitor and the phase angle between the applied emf and the current. [4]
Ans: 6.37×10^{-3}A, 10.2V, 57.9°

54. **2075 GIE Q.No. 9c** An ac source of 220 V, 50 Hz is connected to series circuit containing a resistor R and inductor L and a capacitor C. If R = 200 Ω, L = 0.5 H and C = 10 μF, calculate, (i) the current in the circuit, (ii) the phase angle and (iii) the power consumed in the circuit. [4]
Ans: (i) 0.856A (ii) –38.9° (iii) 146.56 Watt

55. **2074 Supp Q.No. 9c** An iron cored coil of inductance 2 H and resistance 50 Ω is connected in series with a resistor of 950 Ω. A 220 V, 50 Hz ac supply is connected across the arrangement. Find the current flowing in the circuit and the voltage across the coil. [4]
Ans: 0.186 A, 116.87V

56. **2074 Set A Q.No. 9c** A coil of inductance 0.1H and negligible resistance is in series with a resistance 40Ω. A supply voltage of 50v (rms) is connected to them. If the voltage across L is equal to that across R, calculate the voltage across the inductor and frequency of the supply. [4]
Ans: 63.7 Hz, 35.35 V

57. **2073 Supp Q.No. 9c** **2053 Q.No. 11** An iron cored coil of inductance 3H and 50Ω resistance is placed in series with a resistor of 550Ω and a 100 v, 50 Hz ac supply is connected across the arrangements. Find the current flowing in the coil and voltage across the coil. [4]
Ans: 0.09 A, 84.8 V

58. **2073 Set C Q.No. 9b** L-C-R alternating current series circuit of L = 1H, C = 1μF and R = 100Ω are connected in series with a source of frequency 50Hz. What is the phase shift between current and voltage? **Ans: 88°** [4]

59. **2072 Set C Q.No. 9c** A coil having inductance and resistance is connected to an oscillator giving a fixed sinusoidal output voltage of 5V rms. With the oscillator set at a frequency of 50 Hz, the rms current in the coil is 1A and at a frequency of 100 Hz, the rms current is 0.625A. Determine the inductance of the coil. [4]
Ans: 0.0114 H

60. **2071 Set C Q.No. 9 c** A circuit consists of a capacitor of 2μF and a resistor of 1000Ω. An alternating emf of 12V (rms) and frequency 50Hz is applied. Find the current flowing, the voltage across capacitor and the phase angle between the applied emf and current. [4]
Ans: 6.38×10^{-3} A, 10.2 V, 57.9°

61. **2070 Supp. Set A Q.No. 9 b** A.C. mains of 200 volts and 50 Hz is joined to a circuit containing an inductance of 100mH and a resistance of 20Ω in series. Calculate the power consumed. [4]
Ans: 576.8 watt

62. **2070 Supp. Set B Q.No. 9 c** An iron cored coil of 2 H and 50 Ω resistance placed in series with a resistor of 450 Ω and 200 v, 50H z a.c. supply is connected across the arrangement, find
i. the current flowing the coil,
ii. its phase angle relative to the voltage supply
iii. the voltage across the coil. [4]
Ans: (i) = 0.25 A (ii) 156.5 V (iii) 54.3°

63. **2070 Set C Q.No. 9 c** A 50 V a.c. supply is connected to a resistor having resistance 50Ω, in series with a solenoid whose inductance is 0.25H. The potential difference between the ends of the resistor is 25 V. Find the resistance of the wire of the solenoid. Take frequency of the ac source is 50 Hz. [4]
Ans: 11.89 Ω

64. **2069 Set B Old Q.No. 9b** Alternating voltage in an ac circuit is represented by $V = 100\sqrt{2}\sin(100\pi t)$ volts. Find its roots mean square value and the frequency. [4]
Ans: 100V, 50 Hz

65. **2068 Can. Q.No. 9c** A 100 V, 50Hz AC source is connected to an LCR circuit containing L= 8.1 mH, C=12.5μ F and R=10 Ω all connected in series. Find the potential difference across the resistor. [4]
Ans: 3.9V

66. **2068 Old Can. Q.No. 7b** An alternating voltage 10v (rms) and 4 KHz frequency is applied to a resistor of resistance 5Ω in series with a capacitor of capacitance 10μF. Calculate the r.m.s. potential differences across the resistor and the capacitor. [3]
Ans: 7.8V, 6.2V

67. **2068 Q.No. 9 c** A circuit consists of an inductor of 200 μ H and resistance of 10Ω in series with a variable capacitor and a 0.10V (r.m.s.), 1.0 MHz supply. Calculate (i) the capacitance to give resonance (ii) the quality factor of the circuit at resonance. [4]
Ans. 1.267×10^{-10}F, 126]

68. **2068 Old Q.No. 7 b** A 50V, 50Hz, a.c. supply is connected to a resistor, of resistance 40Ω, in series with a solenoid whose inductance is 0.20H. The p.d. between the ends of the resistor is found to be 20 V. What is the resistance of the wire of the solenoid? (Assume $\pi^2 = 10$) [3]
Ans. 38Ω

69. **2067 Sup Q.No. 9c** An iron cored coil of inductance 2H and of resistance 50Ω is connected in series with a resistor of 950Ω, and a 220V, 50 Hz ac supply. Find the current flowing in the circuit and the voltage across the coil. [4]
Ans: 0.186A, 116.87 V

70. **2066 Supp Q.No. 7b** A coil of inductance L and negligible resistance is in series with a resistance R. A supply voltage of 40 V (rms) is connected to them. If a voltage across L is equal to that across R, calculate the voltage across R and the frequency of the supply? [3]
Ans: 28.3V, 63.7Hz

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71. 2064 Q.No. 7 b A 50V, 50 Hz, ac supply is connected to a resistor of resistance 40Ω in series with a solenoid having inductance 200 mH with same resistance. The potential difference across the ends of the 40Ω resistor is found to be 20V. Find the resistance of the wire of the solenoid. [4]
Ans: 37.79 Ω

72. 2063 Q.No. 7 b An inductor, a resistor and a capacitor are connected in series across an a.c. circuit. A voltmeter reads 60 v when connected across the inductor, 16V across the resistor and 30 V across the capacitor:
i. What will the voltmeter read when placed across the series circuit?
ii. What is the power factor of the circuit? [4]
Ans: 34V, 0.47

73. 2062 Q.No. 7 b In a series LCR circuit, R = 25Ω, L= 30mH and C = 10μF and these elements are connected to 240 ac (rms) 50 Hz source. Calculate the current in the circuit and voltmeter reading across a capacitor. [4]
Ans: 0.774 A and 246.37 V

74. 2059 Q.No. 7 b The maximum capacitance of a variable capacitor is 33 pF. What should be the self-inductance to be connected to this capacitor for the natural frequency of the LC circuit to be 810 KHz. Corresponding to A.m. broadcast band of Radio Nepal? [4]
Ans: 1.17×10^{-3} H

75. 2057 Q.No. 7 b A circuit consists of a capacitor of 10 μF and a resistor of 1000Ω. An alternating emf of 12V (rms) and frequency 50Hz is applied. Calculate the current flowing and voltage across the capacitor. [4]
Ans: 0.0114 A, 3.63 V

76. 2054 Q.No. 11 A constant A.C. supply is connected to a series circuit consisting of a resistance of 300Ω in series with a capacitance 6.67 MF, the frequency of the supply being $3000/2\pi$ Hz. It is desired to reduce the current in the circuit to half its value. Show how this could be done by placing an additional resistance. [4]
Ans: 306.1 Ω

UNIT-3 MODERN PHYSICS

1. ELECTRONS AND PHOTONS

FORMULAE

1. Motion of electron in uniform electric field:
i. The charge of an electron, $e = 1.6 \times 10^{-19}$ C, negative nature and its mass, $m_e = 9.1 \times 10^{-31}$ kg.
Speed of light, $C = 3 \times 10^8$ m/sec
Planck's constant, $h = 6.62 \times 10^{-34}$ Js
ii. Its specific charge $\left(\frac{e}{m}\right) = 1.76 \times 10^{11}$ C / kg.
iii. Its path in electric field is parabolic in nature, and the equation of path, $y = \left(\frac{eV}{2mdu^2}\right) x^2$.
iv. Acceleration produced is, $a = \frac{F}{m} = \frac{eE}{m}$.

2. Motion of electron in uniform magnetic field:
i. Force experienced by an electron moving in a magnetic field, $F = Bev \sin\theta$
ii. The radius of circular path, $r = \frac{mv}{Be} = \frac{p}{Be} = \frac{\sqrt{2mE_k}}{Be}$
iii. The time period of revolution, $T = \frac{2\pi m}{Be}$
iv. The frequency of revolution, $f = \frac{1}{T} = \frac{Be}{2\pi m}$
v. The angular frequency, $\omega = 2\pi f = \frac{Be}{m}$
vi. The radius of a circle in helical path, $r = \frac{mv \sin\theta}{Be}$
vii. The pitch of helical path,
$= v \cos\theta \times T = \frac{2\pi mv \cos\theta}{Be} = \frac{2\pi r}{\tan\theta}$

3. The speed of electron in cross field, $v = \frac{E}{B}$

4. Millikan's oil drop experiment:
i. Radius of oil drop, $r = \sqrt{\frac{9\eta v_1}{2(\rho - \sigma)g}}$
ii. The charge of electron is determined from,
$q = \frac{6\pi\eta d}{V}\sqrt{\frac{9\eta v_1}{2(\rho - \sigma)g}}(v_1 + v_2)$ and $q = ne$

5. Photons:
i. Energy of a photon, $E = hf = \frac{hc}{\lambda}$
ii. It has zero rest mass, $m_o = m\sqrt{1 - \frac{v^2}{c^2}}$, for $v = c$, $m_o = 0$
iii. From Einstein's mass-energy equivalence,
$E = hf = \frac{hc}{\lambda} = mc^2$
So, $m = \frac{hf}{c^2} = \frac{h}{c\lambda}$
iv. Momentum of photon, $p = mv = mc = \frac{E}{c} = \frac{h}{\lambda}$
v. Work function $(\phi_0) = hf_0 = \frac{hc}{\lambda_0}$
vi. Einstein's photoelectric equation, $hf = \phi_0 + E_k$ and $\left(E_k = \frac{1}{2}mv^2_{max}\right)$
vii. Stopping potential (V_s), $eV_s = hf - \phi_0 = \frac{1}{2}mv^2_{max}$

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 2a Beams of protons and electrons with the same initial K.E. enter normally into an electric field. Which one will deflect more and why? [2]
2. 2076 GIE Set A Q.No. 2c Can photoelectric effect be explained on the basis of wave theory of light? Justify your answer. [2]
3. 2076 GIE Set B Q.No. 2a Why does the electric discharge take place at reduced pressure? Explain. [2]
4. 2076 Set B Q.No. 2a Why discharge does not take place at very low pressure? [2]
5. 2075 GIE Q.No. 2a 2071 Supp. Q.No. 2a Explain why electric discharge through a gas takes place at low pressure. [2]
6. 2075 GIE Q.No. 2b If the wavelength of electromagnetic radiation is doubled, what will happen to the energy of the photons? [2]
7. 2075 Set A Q.No. 2a 2068 Can. Q.No. 2a Gases are insulators at ordinary pressure and start conducting at low pressure. Why? [2]

8. 2075 Set A Q.No. 2c 2070 Supp. Set B Q.No. 2 b What happens to the kinetic energy of photo electrons when intensity of light is doubled? [2]
9. 2075 Set B Q.No. 2a Why is a magnetic field used to deflect electron beam but not an electric field in a T.V. picture tube? [2]
10. 2074 Supp Q.No. 2a Gases become conducting at low pressure. Why? [2]
11. 2074 Set A Q.No. 2b 2071 Set C Q.No. 2 a 2069 Set A Q.No. 2a The value of e/m is constant for cathode rays but not for positive rays, why? [2]
12. 2073 Supp Q.No. 2a 2069 Supp Set B Q.No. 2 a An electron and a proton move with the same speed in a uniform magnetic field of equal magnitude. Compare the radii of their circular paths. [2]
13. 2072 Supp Q.No. 2b Human skin is relatively insensitive to visible light, but ultra violet radiation can cause severe burns. Does this have anything to do with photon energies? Explain. [2]
14. 2072 Set C Q.No. 2a If we go on increasing the wavelength of light incident on a metal surface, what changes take place in the number of electrons and energy of the electrons? [2]
15. 2072 Set E Q.No. 2a Beams of electrons and protons having the same initial K.E. enter normally into an electric field, which beam will be more curved? Justify. [2]
16. 2071 Set D Q.No. 2 a A gas at lower pressure conducts electricity but the same gas at higher pressure does not. Explain. [2]
17. 2070 Supp. Set A Q.No. 2 b Gases at normal pressure are insulators; how do they become conducting at low pressure? [2]
18. 2070 Set C Q.No. 2 a A charged particle is fired into a cubical region of space where there is uniform magnetic field. Outside this region, there is no magnetic field. Is it possible that the particle will remain inside the cubical region? Explain. [2]
19. 2070 Set D Q.No. 2 a A charged particle moves through a region of space with constant velocity. If the external magnetic field is zero in this region, can we conclude that the external field in the region is also zero? Explain. [2]
20. 2069 Set A Q.No. 2e What is the threshold frequency for photoelectric emission? Does it depend on the intensity of light? [2]
21. 2069 Set B Q.No. 2f Write down expressions for acceleration of a moving charge Q in parallel and perpendicular magnetic fields. [2]
22. 2068 Q.No. 2 a What property of the cathode rays indicates that they consist of electrons? [2]
23. 2067 Q.No. 2a What is the importance of Millikan's oil drop experiment? [2]
24. 2067 Sup Q.No. 2a Why does electric discharge take place at low pressure and high potential difference? [2]
25. 2065 Q.No. 2 f Compare the specific charge of an electron with that of a proton. [2]
26. 2060 Q.No. 1 g Cathode rays can not be regarded as electromagnetic waves. Why? [2]
27. 2056 Q.No. 12 c What is meant by stopping potential? [2]
28. 2054 Q.No. 12 d Explain why photoelectric effect can not be observed with all wavelengths of light. [2]
29. 2053 Q.No. 12 e What is threshold frequency? [2]

Long Answer Questions [4 Marks]

30. 2077 Set D Q.No. 2b Describe J.J. Thomson's experiment for measuring the specific charge (e/m) of an electron. [4]
31. 2076 GIE Set A Q.No. 6a Discuss the motion of electrons in an electric field and obtain the expression of vertical deflection when it leaves the electric field. [4]
32. 2076 GIE Set B Q.No. 6a Discuss the motion of electrons in a magnetic field and show that time period is independent of electron velocity. [4]
33. 2076 Set B Q.No. 6a What is quantization of charge? Describe the theory of Millikan's oil drop experiment to determine the number of charges on an oil drop. [4]
34. 2076 Set C Q.No. 6a What are cathode rays? How are they produced? Mention the properties of cathode rays. [4]
35. 2076 Set C Q.No. 6c What is photoelectric effect? Discuss Einstein's photoelectric equation. Write some applications of photoelectric effect. [4]
36. 2075 GIE Q.No. 6b Describe Millikan's experiment to determine the value of Plank's constant. Explain how Einstein's photoelectric equation is verified from this experiment. [4]
37. 2075 Set A Q.No. 6b Discuss J.J Thomson's experiment to determine the specific charge of an electron. [4]
38. 2075 Set B Q.No. 6a 2074 Set B Q.No. 6a 2071 Set D Q.No. 6 a 2069 Set A Q.No. 6a 2068 Can. Q.No. 6a Describe the theory of Milikan's oil drop experiment to determine the charge of an electron. [4]
39. 2074 Supp Q.No. 6b What is photoelectric effect? Explain the effect of increase of (i) frequency (ii) intensity of the incident radiation on photoelectrons emitted by a phototube. [4]
40. 2074 Set A Q.No. 6b 2072 Set D Q.No. 6a Discuss photoelectric effect and derive Einstein's photoelectric equation. What is stopping potential? [4]
41. 2073 Supp Q.No. 6a 2070 Supp. Set B Q.No. 6 a 2054 Q.No. 15 Describe an experiment to determine the specific charge of an electron. [4]
42. 2073 Set C Q.No. 6a Explain photoelectric effect to write Einstein's photoelectric equation. Describe Millikan's laboratory method to determine Planck's constant. [4]
43. 2073 Set D Q.No. 6d Describe the laboratory method to determine the specific charge of an electron by J.J. Thomson's method. [4]
44. 2072 Supp Q.No. 6b Describe an experiment to determine the ratio of the charge to mass (e/m) for an electron. Show how the result is derived from the observations. [4]
45. 2072 Set C Q.No. 6a Describe with necessary theory Thomson's method to determine specific charge of an electron. [4]
46. 2072 Set E Q.No. 6d 2067 Q.No. 6a Explain Millikan's experiment for the verification of Einstein's photoelectric equation. [4]
47. 2071 Supp. Q.No. 6a Verify quantization of charge using Millikan's oil drop experiment. [4]

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48. 2071 Set C Q.No. 6a Discuss the motion of an electron in a uniform magnetic field and show that if a free electron moves at right angle to a magnetic field, the path is a circle and the time period of revolution is independent of the speed of the electron. [4]

49. 2070 Supp. Set A Q.No. 6a Discuss the trajectory of a charged particle when it is moving in a uniform magnetic field and hence discuss how the specific charge of the particle is obtained. [4]

50. 2070 Supp. Set A Q.No. 6 d What is work function of a metal? Does it depend on the intensity of incident light? Discuss Einstein's photoelectric equation. [4]

51. 2069 Supp Set B Q.No. 6 a Describe J.J. Thomson's experiment with necessary theory behind the determination of specific charge of electron. [4]

52. 2069 Supp Set B Q.No. 6 d Explain photoelectric effect and present the necessary theory to determine the value of Planck's constant. [4]

53. 2069 Set A Old Q.No. 8a What is photoelectric effect? Derive Einstien's photoelectric equation. Define various terms used in it. [3]

54. 2069 Set B Q.No. 6a Describe Millikan's oil drop experiment with necessary theory. Estimate the specific charge of an electron from it. [4]

55. 2068 Q.No. 6 a Describe the phenomenon of electrical discharge through gases. [4]

56. 2068 Old Q.No. 9 What are cathode rays? How are they produced? Mention two of their important properties. [4]

57. 2067 Old Q.No. 8a Describe J.J. Thomson's experiment to determine the specific charge of an electron. [4]

58. 2067 Sup Q.No. 6a What is photoelectric effect? Discuss Einstein's Photoelectric equation. Does the work function of a metal depend on intensity of light? [1+2+1]

59. 2066 Supp Q.No. 9 Or Describe with necessary theory to determine the ratio of charges to mass (e/m) of an electron by J.J. Thomson method. [4]

60. 2065 Q.No. 9 a OR Describe an experimental method to determine the specific charge of an electron. [2+2]

61. 2064 Q.No. 9 What is specific charge of an electron? Describe and give necessary theory of J.J. Thomson's method to determine the specific charge of an electron. [1+3]

62. 2063 Q.No. 8 a OR Describe the theory of Millikan's oil drop experiment to determine the number of charge on oil drop. [4]

63. 2063 Q.No. 9 OR Show that electron motion in magnetic field is circular. Prove that frequency and time period are independent with the velocity of electron. [4]

64. 2060 Q.No. 8 a Write down Einstein's photoelectric equation and describe an experiment to verify it. [1+3]

65. 2057 Q.No. 8 a What are cathode rays? State their six properties. [4]

66. 2056 Q.No. 13 Explain the phenomena of discharge of electricity through gases at low pressure. [4]

67. 2055 Q.No. 13 Discuss the physical principles involved in Millikan's experiment for the determination of the charge of an electron. [4]

68. 2052 Q.No. 15 Describe with necessary, theory, Millikan's oil drop experiment to determine the value of the charge associated with an electron.

Numerical Problems [4 Marks]

69. 2076 GIE Set B Q.No. 10a Find the change in stopping potential when the wavelength of a radiation is decreased from 400 nm to 300 nm on the same metallic surface. Planck's constant = 6.62×10^{-34} Js and velocity of light = 3×10^8 m/s. [4]

Ans: 1.034 V

70. 2076 Set B Q.No. 10a 2069 Set B Q.No. 10c An ion for which the charge per unit mass is 4.40×10^7 c/kg has velocity of 3.52×10^5 m/s and moves in a circular orbit in a magnetic field of flux density 0.4T. What will be the radius of this orbit? [4]

Ans: 0.02m

71. 2075 GIE Q.No. 10a 2068 Can. Q.No. 10a 2060 Q.No. 8b OR Two plane metal plates 4 cm long are held horizontally 3 cm apart in a vacuum, one being vertically above the other. The upper plate is at a potential of 300 V and the lower plate is earthed. Electrons having a velocity 10^7 m/s are injected horizontally midway between the plates and in a direction parallel to 4 cm edge. Calculate the vertical deflection of the electron beam as it emerges from the plates. (e/m for the electron = 1.8×10^{11} Ckg^{-1}) [5]

Ans: 1.44×10^{-2} m

72. 2075 Set A Q.No. 10b A clean nickel surface of work function 5.1 eV is exposed to light of wavelength 235 nm. What is the maximum speed of the photoelectrons emitted from its surface? [5]

Ans: 2.91×10^{-20} J, 2.52×10^5 m/sec

73. 2075 Set A Q.No. 10c An electron moving with a speed of 10^7 m/s is passed into a magnetic field of intensity 0.1 T normally. What is the radius of the path of the electron inside the field? If the strength of the magnetic field is doubled, what is the radius of the new path? (e/m = 1.8×10^{11}C/kg) [4]

Ans: 5.6×10^{-4} m, 2.78×10^{-4} m

74. 2075 Set B Q.No. 10a Sodium has a work function of 2 eV. Calculate the maximum energy and speed of the emitted electrons when sodium is illuminated by a radiation of 150 nm. What is the threshold frequency of radiation for which electrons are emitted from sodium surface? [4]

Ans: 1.004×10^{-18} J, 1.483×10^6 m/sec, 4.8×10^{14} Hz

75. 2074 Supp Q.No. 10a Calculate the potential difference to be maintained between two horizontal conducting plates separated by a distance of 10 mm so that a small charged oil drop of mass 1.31×10^{-14} kg will remain in equilibrium. Charge in the oil drop is 6.4×10^{-19} C. [4]

Ans: 2046.87 V

76. 2074 Set A Q.No. 10a An electron moves in a circular path of radius 20 cm in a uniform magnetic field of 2×10^{-3}T. Find the speed of the electron and period of revolution. Mass of electron = 9.1×10^{-31}kg. [4]

Ans: 7.02×10^7 m/sec and 5.6×10^7 rev/sec

77. 2074 Set B Q.No. 10a Radiations of wavelength 5400 Å fall on a metal whose work function is 1.9 eV. Find the energy of the photoelectrons emitted and their stopping potential. Planck's constant = 6.62×10^{-34} Js. [4]

Ans: 0.4 V

78. 2073 Supp Q.No. 10a 2068 Q.No. 10 b 2066 Supp Q.No. 8b 2053 Q.No. 14 Light of frequency 5×10^{14}Hz librates electrons with energy 2.3×10^{-19}J from a certain metallic surface. What is the wavelength of ultraviolet light which librates electrons of energy 8.93×10^{-19}J from the same surface? (Given h = 6.62×10^{-34} JS, C = 3×10^{8} m/s) [4]
Ans: 2×10^{-7} m

79. 2073 Set C Q.No. 10b An electron having 500 eV energy enters at right angle to a uniform magnetic filed of 10^{-4} Tesla. If its specific charge is 1.75×10^{11} Ckg^{-1}, calculate the radius of its circular orbit. [4]
Ans: 0.75 m

80. 2073 Set D Q.No. 10a 400 nm wavelength of light falls on a photo sensitive material of work function 2.3 eV. Compute the maximum energy of photoelectrons. [4]
Ans: 0.803 eV

81. 2072 Supp Q.No. 10b Sodium has a work function of 2 ev. Calculate the maximum energy and speed of the emitted electrons when sodium is illuminated by radiation of wave length 150 nm. (Given mass of electron = 9.1×10^{-31} Kg) [4]
Ans: 1.48×10^{6} m/sec. and 9.96×10^{-19} J

82. 2072 Set C Q.No. 10a The work function for the surface of aluminium is 4.2 eV. How much potential difference will be required to stop the emission of maximum energy electrons emitted by light of wavelength 2000 A? (Plank's constant, h = 6.6×10^{-34} JS) [4]
Ans: 2 V

83. 2072 Set D Q.No. 10a In a Millikan's oil drop experiment, a drop is observed to fall with a terminal speed 1.4 mm/s in the absence of electric field. When a vertical electric field of 4.9×10^{5} v/m is applied, the droplet is observed to continue to move downward at a lower terminal speed 1.21 mm/s. Calculate the charge on the drop. (Density of oil = 750 kg/m^3, viscosity of air = 1.81×10^{-5} kg/ms, density of air = 1.29 kg/m^3) [4]
Ans: 5.16×10^{-19} C

84. 2072 Set E Q.No. 10b A beam of electrons, moving with velocity of 10^{7} m/s, enters midway between two horizontal parallel plates in the direction parallel to the plates which are 5 cm long and 2 cm apart and have a p.d. of V volts between them. Calculate V if the beam is deflected so that it just grazes the edge of the plate. (Assume e/m = 1.76×10^{11} c/kg). [4]
Ans: 90.9 V

85. 2071 Set C Q.No. 10 a Light of wavelength 5×10^{-7} m falls on a sensitive metal plate with photo electric work function 1.90 eV. Find kinetic energy of the photoelectrons emitted and stopping potential. (given h = 6.62×10^{-34} Js) [4]
Ans: E_k = 0.58 eV; Vs = 0.58 V

86. 2071 Set D Q.No. 10a Ultraviolet light of wavelength 3.6×10^{-7} m is made to fall on a smooth surface of potassium. Determine maximum energy of emitted photo electrons and stopping potential. [4]
Ans: 1.5eV, 1.5V

87. 2071 Set D Q.No. 10 c An electron is accelerated through a potential difference of 2000 V and then it enters a uniform magnetic field of 0.02 Tesla in a direction perpendicular to it. Find the radius of the path of the electron in the magnetic field. Mass of an electron is 9.1×10^{-31} kg, charge of an electron is 1.6×10^{-19}C. [4]
Ans: 7.5×10^{-4} m

88. 2070 Supp. Set A Q.No. 10 a Calculate the radius of a water drop which would just remain suspended in an electric field of 300 V/cm and charged with one electron. [4]
Ans: 4.9×10^{-7} m

89. 2070 Supp. Set B Q.No. 10 a Electrons with maximum kinetic energy of 3 eV are ejected from a metal surface by ultra-violet radiation of wavelength 1.5×10^{-7} m. Determine work function, threshold wavelength and the stopping potential for the metal (Planck's constant, h = 6.62×10^{-34} Js) [4]
Ans: 5.275 eV., 2.35×10^{-7} m , 3V

90. 2070 Set C Q.No. 10 a An electron beam after being accelerated from rest through a potential difference of 5 KV in vacuum is allowed to impinge normally on a fixed surface. If the incident current is 50μ A, Determine the force exerted on the surface assuming that it brings the electrons to rest. Take mass of electron is 9.1×10^{-31} Kg. [4]
Ans: 1.2×10^{-8}N

91. 2070 Set C Q.No. 10 b The photoelectric threshold wavelength of a tungsten surface is 272 nm. Calculate the maximum velocity of the electrons ejected from this tungsten surface by ultraviolet radiation of frequency 1.45×10^{15} Hz. (h =6.62×10^{-34} Js, c = 3×10^{8}m/s, m_e = 9.1×10^{-31}kg) [4]
Ans: 7.1×10^{5}m/sec

92. 2070 Set D Q.No. 10 a A beam of electrons, moving with a velocity of 10^{7}m/s, enters midway between two horizontal parallel plates in a directions parallel to the plates. Each plate is 5 cm long. These plates are kept 2 cm apart and a potential difference of 90 V is applied between them. Calculate the velocity of the electron- beam with which it just grazes the edge of the positive plate. (e/m = 1.8×10^{11} c/kg) [4]
Ans: 10^{7}m/sec, 22°

93. 2070 Set D Q.No. 10 b When ultraviolet light with a wavelength of 400 nm falls on a certain metal surface, the maximum kinetic energy of the emitted electrons is 1.10 eV. What is the maximum kinetic energy of the photoelectrons when light of wavelength 300 nm falls on the same surface? [4]
Ans: 2.137 eV

94. 2069 Supp Set B Q.No. 10a 2067 Sup Q.No. 10a In a Millikan apparatus the horizontal plates are 1.5 cm apart. With the electric field switched off an oil drop is observed to fall with the steady velocity 2.5×10^{-2} cms^{-1}. When the field is switched on the upper plate being positive, the drop just remains stationary when the potential difference between the plates is 1500 V. Calculate the radious of the drop and the number of electronic charges neglecting air density. (Given: density of oil =900 kgm^{-3} and viscosity of air = 1.8×10^{-5} Nsm^{-2}) [4]
Ans: 1.5×10^{-6}m, 8

95. 2069 Set A Q.No. 10a An electron is accelerated through a potential difference of 2KV and then it enters a uniform magnetic field of 0.02T, in a direction perpendicular to it. Find the radius of the path of the electron in the magnetic field. (mass of electron = 9.1×10^{-31}kg) [4]
Ans: 7.5×10^{-3}m

96. 2069 Set A Old Q.No. 8bOR In a Thomson experiment, voltage across the plates is 50V and the distance between them is 3 cm. The magnetic field applied to make the beam undeflected is 10^{-4}T. What is the velocity of the electron passing between the plates? [4]
Ans: 1.6×10^{7}m/s

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97. 2068 Can. Q.No. 10c What will be the change in the stopping potential for photoelectrons emitted from a source if the wavelength of incident light is reduced from 400 nm to 360 nm? [4]
Ans: 0.34V

98. 2068 Old Can. Q.No. 8b A beam of electrons, moving with a velocity of 10^6 m/s enters midway between two horizontal parallel plates in a direction parallel to the plates. Each plate is 4cm long. These plates are kept 2cm apart and a potential difference V is applied between them. Calculate V if the beam is deflected so that it just grazes the edge of positive plate. (Given e/m for the electron is 1.8×10^{11}c kg^{-1}.) [4]
Ans: 1.38 V

99. 2068 Old Can. Q.No. 8b OR The maximum energy of photoelectrons emitted from a mental plate is 1.2 ev. If the threshold wavelength is 2.48×10^{-9}m, calculate the wavelength of incident light. (Given Planck's constant is 6.62×10^{-34}JS.) [4]
Ans: 2.47×10^{-9} m

100. 2068 Q.No. 10 a An electron having 450 eV of energy moves at right angles to a uniform magnetic field of flux density 1.50×10^{-3}T. Find the radius of its circular orbit. [Given: specific charge of the electron = $1.76\times10^{+11}$C/kg] [4]
Ans. 0.048m

101. 2068 Old Q.No. 8 b Light of wavelength 6000 Å falls on a photosensitive plate of work function 1.9 eV. Find the speed of the photoelectrons emitted. ($h = 6.62\times10^{-34}$ Js and $m_e = 9.1\times10^{-31}$kg) [4]
Ans. 2.44×10^5 m/sec

102. 2067 Q.No. 10a A beam of electrons is under potential difference of 1.36×10^4V applied across two parallel plates 4 cm apart and a magnetic field 2×10^{-3} T at right angles to each other. If two fields produce no deflection in the electronic beam, calculate (i) The velocity of electrons (ii) the radius of the orbit in which the beam will move, if the electric field is made zero. [Given; mass of electron = 9.1×10^{-31} kg.]. [4]
Ans: 1.7×10^3m/sec, 0.48m

103. 2066 Q.No. 8 b Or In Millikan-type apparatus, the horizontal plates are 1.5 cm apart. With the electric field switched off an oil drop is observed to fall with the steady velocity 2.5×10^{-2} cm/s. When the electric field is switched on the upper plate being positive, the drop just remains stationary when the p.d. between plates is 1500V. (a) Calculate the radius of the drop (b) How many electronic charges does it carry? [4]
Ans: (a) 1.5×10^{-6} m (b) 8

104. 2064 Q.No. 8 b 2063 Q.No. 8 b 2056 Q.No. 15 When a light of frequency 5.4×10^{14} Hz is incident on a metal surface, the maximum energy of the electrons emitted is 1.2×10^{-19} J. If the same surface is illuminated with light of frequency 6.6×10^{14} Hz, the maximum energy of the electrons is 2×10^{-19} J. Find the value of Planck's constant. [4]
Ans: 6.67×10^{-34} Js

105. 2061 Q.No. 8 b A beam of proton is accelerated from rest through a potential difference of 2000V and then enters a uniform magnetic field which is perpendicular to the direction of the proton beam. If the flux density is 0.2T, calculate the radius of the path which the beam describes. (proton mass = 1.7×10^{-27} kg, Electronic charge = $- 1.6 \times 10^{-19}$ C) [4]
Ans: 0.03m

106. 2059 Q.No. 8 b A UV light of 400 nm strikes a cesium surface of work function 1.9 eV. Find the velocity of electrons emitted from the cesium surface $m_e = 9.1 \times 10^{-31}$kg, c = 3×10^8 m/s $h = 6.62 \times 10^{-34}$ J.S. [4]
Ans: 6.5×10^5 m/s

107. 2058 Q.No. 8 b OR Calculate the p.d. in volt necessary to be maintained between two horizontal conducting plates, one 2 mm above the other, so that a small oil drop of mass 1.31×10^{-14} kg with two electrons attached to it remains in equilibrium. ($g = 9.8ms^{-2}$, charge of electron = $- 1.6 \times 10^{-19}$ c). [4]
Ans: 2005.94 V

108. 2057 Q.No. 8 b The photoelectric work function of potassium is 2eV and the surface is illuminated with radiation of wavelength 350 nm. What potential difference have to be applied between a potassium surface and the collecting electrode in order just to prevent collection of electrons? What would be the kinetic energy of the electrons? [4]
Ans: 1.5 V, 2.4×10^{-19} J

109. 2056 Q.No. 16 OR Find the electric field required to keep a water drop of radius 10^{-5} cm just suspended in vacuum when charged with one electron. (electronic charge = -1.6×10^{-19}C, [density of water = 1000 kg/m^3] [4]
Ans: 257

110. 2055 Q.No. 15 OR The maximum kinetic energy of the electrons emitted from a metallic surface is 1.6×10^{-19}J when the frequency of the radiation is 7.5×10^{14} Hz. Calculate the minimum frequency of the radiation for which electrons will be emitted. Assume that $h = 6.6 \times 10^{-34}$ Js. [4]
Ans: 5×10^{14} Hz

111. 2054 Q.No. 14 A beam of proton is accelerated from test through a p.d. of 2000V and then enters a uniform magnetic field which is perpendicular to the direction of the proton beam. If the flux density is 0.4T, calculate the radius of the path which the beam describes. (Proton mass = 1.7×10^{-27} kg, electronic charge = $- 1.6 \times 10^{-19}$c). [4]
Ans: 162.9×10^{-3} m

112. 2053 Q.No. 16 An oil drop of mass 3.25×10^{-15} kg falls vertically with uniform velocity, through the air between vertical parallel plates which are 2cm apart. When a p.d. of 1000V is applied to the plates the drop moves to the positively charged plate being inclined at 45° to the vertical. Calculate the charge on the drop. [4]
Ans: 6.37×10^{-19}C

2. SOLIDS AND SEMICONDUCTOR DEVICES

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 2b What is doping? Write its importance in semiconductor. [2]
2. 2076 GIE Set B Q.No. 2b Explain why the electrical conductivity of a pure semiconductor increases on heating. [2]
3. 2076 Set B Q.No. 2b 2052 Q.No. 12 f What do you mean by hole in a semiconductor? [2]
4. 2076 Set C Q.No. 2b 2068 Old Q.No. 1 f Why is the emitter region of a transistor doped heavily? [2]
5. 2075 GIE Q.No. 2c 2071 Set D Q.No. 2d What is nanotechnology? Explain. [2]
6. 2075 Set A Q.No. 2d A semiconductor has electrons and holes as charge carriers. Do conductors also have the holes as charge carriers? Justify. [2]

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7. 2075 Set B Q.No. 2b In a transistor, emitter-base junction is always forward biased. Why? [2]
8. 2074 Set A Q.No. 2c The output of two-input AND gate is fed to a NOT gate. Give its logic symbol and write down its truth table. Identify the new logic gate formed. [2]
9. 2074 Set B Q.No. 2a Draw a circuit diagram for p-n junction diode in forward bias. Sketch the voltage versus current graph for it. [2]
10. 2073 Supp Q.No. 2b 2070 Set C Q.No. 2 c What is a logic gate? Give logic symbol and truth table for an OR gate. [2]
11. 2073 Set C Q.No. 2b How does the conductivity of semiconductor vary with temperature? Explain. [2]
12. 2073 Set D Q.No. 2a Explain how the conductivity of a semiconductor varies with temperature? [2]
13. 2072 Supp Q.No. 2c Explain the essential characteristics for an element to serve as (i) a donor impurity (ii) an acceptor impurity in a semiconductor. [2]
14. 2072 Set C Q.No. 2b What are logic gates? Give a truth table for a two input NOR gate. [2]
15. 2072 Set D Q.No. 2a The output of two-input AND gate is fed to a NOT gate. Draw the logic circuit of the combination of gates. Write down its truth table. [2]
16. 2072 Set E Q.No. 2b What is meant by a charge carrier hole in a semi conductor? Can it be created in a conductor? [2]
17. 2071 Supp. Q.No. 2b When examining a circuit diagram, how is it possible to tell whether a transistor is PNP or NPN? [2]
18. 2071 Set C Q.No. 2 b Draw a circuit diagram for a p-n junction diode in forward bias. Sketch the voltage-current graph for the same. [2]
19. 2071 Set C Q.No. 2 d What is truth table? Write down the truth table for a two-input NAND gate. [2]
20. 2070 Supp. Set A Q.No. 2 e Based on the band theory of solids, how would you distinguish between conductors and semi conductors? [2]
21. 2070 Supp. Set B Q.No. 2 d 2067 Sup Q.No. 2b An n-type semiconductor has a large number of free electrons at room temperature, yet it is said to be electrical neutral. Why? [2]
22. 2070 Set D Q.No. 2 c 2067 Sup Q.No. 2c What is a logic gate? Give logic symbol and truth table for a two-input AND gate. [2]
23. 2069 Supp Set B Q.No. 2 d What is doping? Discuss its significance in semiconductor studies. [2]
24. 2069 Set A Q.No. 2b A p-type semiconductor has a large number of holes but still it is electrically neutral. Explain. [2]
25. 2069 Set A Old Q.No. 2f Explain how the conductivity of a semiconductor changes with presence of impurity. [2]
26. 2069 Set B Q.No. 2d What is a logic gate? Draw the truth table for an AND gate. [2]
27. 2068 Can. Q.No. 2c How does the suitable impurity increase the conductivity of a semiconductor? [2]
28. 2068 Q.No. 2 b Would there be any advantage to adding n-type or p-type impurities to copper? Why or why not? [2]
29. 2067 Q.No. 2b A student asserts that Si and Ge became good conductors at very high temperatures and good insulators at very low temperature. Do you agree? Explain your reasoning. [2]
30. 2065 Q.No. 1f How is p-type semiconductor formed? Explain. [2]
31. 2063 Q.No. 1f Give the circuit symbol and truth table of NAND gate. [2]
32. 2062 Q.No. 1 f What do you mean by biasing a transistor? [2]
33. 2062 Q.No. 2 g When P and N type materials are interfaced, these exists a depletion layer at the interface. Explain. [2]
34. 2059 Q.No. 1 f What factors determine whether a material is a semiconductor or an insulator? [2]
35. 2058 Q.No. 1 f A p-n diode conducts electricity when forward biased and does not conduct when reserve biased. Explain. [2]
36. 2057 Q.No. 2 f The base region of a transistor is made very thin as compared with emitter and collector regions, why? [2]
37. 2056 Q.No. 12 b How the conductivity of a semiconductor changes with the presence of impurities? [2]
38. 2055 Q.No. 12 a How is it possible to rectify an AC? [2]
39. 2055 Q.No. 12 d When examining a circuit diagram, how is it possible to tell whether a transistor is a n-p-n or p-n-p? [2]
40. 2054 Q.No. 12 e Why may the addition of small quantities of suitable impurities to an intrinsic semiconductor result in a considerable decrease in its resistivity? [2]

Long Answer Questions [4 Marks]

41. 2076 GIE Set A Q.No. 6b What is a rectifier? Describe the working of a half wave rectifier. [4]
42. 2076 GIE Set B Q.No. 6b What is Zener breakdown? Describe the Zener diode as a voltage regulator. [4]
43. 2076 Set B Q.No. 6b What is P-N junction diode? Discuss its applications as full wave rectifier. [4]
44. 2076 Set C Q.No. 6b 2071 Set D Q.No. 6 d Distinguish between intrinsic and extrinsic semiconductors. Explain the formation of potential barrier and depletion region in a PN junction. [4]
45. 2075 GIE Q.No. 6a 2068 Can. Q.No. 6b What is transistor? Discuss the input and output characteristics of a transistor in common emitter configuration. [4]
46. 2075 Set A Q.No. 6c What is the difference between a zener diode and a common diode? Discuss the function of Zener diode as a voltage regulator. [4]
47. 2075 Set B Q.No. 6b What are avalanche effect and Zener effect? How can a Zener diode be used as a voltage regulator? [4]
48. 2074 Supp Q.No. 6a Distinguish between intrinsic and extrinsic semiconductors. Explain the information of potential barrier and depletion region in a p-n junction. [4]
49. 2074 Set A Q.No. 6a What is zener diode? Explain its use as a voltage regulator. [4]
50. 2074 Set B Q.No. 6b What is rectification? With the help of a circuit diagram, explain full wave rectification by using junction diodes. [4]
51. 2073 Supp Q.No. 6b Explain the characteristic of a diode and discuss its application as a half wave rectifier. [4]
52. 2073 Set C Q.No. 6b How are intrinsic and extrinsic semiconductors conceptualized? Explain the biasing characteristics of a junction diode. [4]

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53. 2073 Set D Q.No. 6c What is a rectifier? Describe the working principle of a full wave rectifier. [4]
54. 2072 Supp Q.No. 6c Describe the common emitter configuration in a n-p-n transistor. Draw and explain input, output and transfer characteristics. [4]
55. 2072 Set C Q.No. 6b What is an extrinsic semiconductor? Explain the formation of potential barrier and depletion region in a p-n junction. [4]
56. 2072 Set D Q.No. 6b Explain the use of a p-n junction diode as a rectifier. Draw the circuit diagram of a full wave rectifier using diodes and explain its working. [4]
57. 2072 Set E Q.No. 6a What is rectification? How can you construct a full wave rectifier using two semiconductor diodes? Explain their working. [4]
58. 2071 Supp. Q.No. 6b What is a semiconductor diode? Explain the working of a full wave rectifier. [4]
59. 2071 Set C Q.No. 6 d What is p-n junction? Describe forward biased and reverse biased condition of p-n junction. [4]
60. 2070 Supp. Set A Q.No 6 c 2070 Supp. Set B Q.No. 6 d 2067 Q.No. 6b 2067 Sup Q.No. 6b 2066 Q.No. 8 a What is a rectifier? Explain how two diodes can be used full wave rectifier. [4]
61. 2070 Set C Q.No. 6 a What is Zener breakdown? Describe how a Zener diode can be used as a voltage regulator? [4]
62. 2070 Set D Q.No. 6 a What is a p-n a junction diode? Explain the characteristics of it in the forward and reversed biased condition. [4]
63. 2069 Supp Set B Q.No. 6 c What is rectifier? Describe the working of a full wave rectifiers. [4]
64. 2069 Set A Q.No. 6b Explain with neat diagram, the working mechanism of a full wave rectifier using junction diodes. How the output changes when a filter circuit is used? [4]
65. 2069 Set A Old Q.No. 9 What is n-p-n transistor? Describe briefly a circuit of n-p-n transistor amplifier in its common emitter configuration. [1+3]
66. 2069 Set B Q.No. 6b What is a Zenor diode? Explain how it regulates the constant voltage in the electronic circuit. [4]
67. 2068 Old Can. Q.No. 8a What is a p-n junction diode? With the help of a circuit diagram, explain the working of a junction diode as a full- wave rectifier. [1+3]
68. 2068 Q.No. 6 b What are Logic gates? Describe, with truth tables, three basis gates: OR, AND and NOT. [4]
69. 2067 Old Q.No. 9 OR What do you mean by rectifier? Describe the working of full wave rectifier using semiconductor diodes. [1+3]
70. 2066 Supp Q.No. 8a What are N-type and P-type semiconductors? Discuss how the semiconductor diodes are used as a full-wave rectifier. [2+2]
71. 2065 Q.No. 9 a What do you understand by Zener diode? How can this be used as voltage regulator? [2+2]
72. 2061 Q.No. 9 What is a junction diode? Explain its working as a half wave rectifier. [1+3]
73. 2060 Q.No. 9 OR How is an NPN transistor formed? Discuss the input and output characteristics of the transistor in CE configuration. [1+3]
74. 2059 Q.No. 9 a What are N-type and P-type semiconductor Describe with a neat diagram the working mechanism of full wave rectifier for a junction diode. [1
75. 2056 Q.No. 14 OR Explain the action of a diode valve a full wave rectifier.
76. 2055 Q.No. 13 OR Explain the characteristics of a diode a discuss its application as a full wave rectifier.
77. 2054 Q.No. 15 OR What is a junction diode? Explain wave rectification produced by a filter circuit.
78. 2053 Q.No. 15 OR What is a junction diode? Discuss applications as full wave rectifier.

3. QUANTIZATION OF ENERGY

FORMULAE

1. Bohr's theory:

i. Mathematical form of basic postulates

a. $\frac{mv^2}{r} = \frac{1}{4\pi\epsilon_0}\frac{Ze^2}{r^2}$ b. $mvr = \frac{nh}{2\pi}$

c. $\Delta E = hf = E_i - E_f$

ii. Radius of orbit of hydrogen like atom, $r_n = \frac{\epsilon_0 n^2 h^2}{\pi m Z e^2}$,

$\therefore r_n \propto n^2$

iii. Velocity of electron in an orbit, $v_n = \frac{Ze^2}{2\epsilon_0 nh}$, $v_n \propto \frac{1}{n}$

As, $r_n \propto n^2$, $v_n \propto \frac{1}{\sqrt{r_n}}$

iv. Energy of electron in an orbit of hydrogen like atom,

$E = \frac{me^4 Z^2}{8\epsilon_0^2 n^2 h^2} = -13.6\frac{Z^2}{n^2}$ eV

v. Rydberg constant, $R = \frac{me^4}{8\epsilon_0^2 n^2 ch^3} = 1.097 \times 10^7 m^{-1}$.

vi. The wavelength of radiation that is emitted in electron transition, $\frac{1}{\lambda} = RZ^2\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

2. Dual nature of radiation:

de Broglie wavelength, $\lambda = \frac{h}{p} = \frac{h}{mv} = \frac{h}{\sqrt{2mE_k}} = \frac{h}{\sqrt{3mk_BT}}$

3. Heisenberg's uncertainty principle:

i. Position momentum uncertainty, $\Delta x \times \Delta p \geq \frac{h}{2\pi}$

ii. Energy time uncertainty, $\Delta E \times \Delta t \geq \frac{h}{2\pi}$

iii. Angular momentum and angular displacement uncertainly, $\Delta L \times \Delta\theta \geq \frac{h}{2\pi}$

4. X-Rays:

i. The minimum value of wavelength of X-rays is, $\lambda = \frac{hc}{eV}$

i.e. $\lambda \alpha \frac{1}{V}$

ii. The energy of electron is $\frac{1}{2}mv_{max}^2 = eV$.

iii. Bragg's law of X-rays difference, $2d \sin\theta = n\lambda$, where $n = 1, 2, 3, \ldots$

5. Some constants; electric charge, $e = 1.16 \times 10^{-19}$ C,
Mass of electron, $m_e = 9.1 \times 10^{-31}$ kg,
Speed of light, $c = 3 \times 10^8$ m/s
Planck's constant, $h = 6.62 \times 10^{-34}$ Js

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 2d A proton and an electron have the same de-Broglie wavelength. Which one has greater K.E.? Explain. [2]
2. 2076 GIE Set B Q.No. 2c Justify that production of X-ray is the inverse phenomenon of photoelectric effect. [2]
3. 2076 GIE Set B Q.No. 2f Why cannot we observe matter waves in our daily life? [2]
4. 2076 Set B Q.No. 2c 2054 Q.No. 12 b Which has more energy- a proton in the infrared or photon in the ultraviolet? Given reasons. [2]
5. 2076 Set C Q.No. 2a 2074 Set B Q.No. 2b 2073 Supp Q.No. 2c 2068 Can. Q.No. 2b 2068 Old Can. Q.No. 1f An electron and a proton have the same kinetic energy. Which one of them has the longer wavelength? [2]
6. 2075 Set A Q.No. 2b A photon and an electron have got the same de-Broglie wavelength. Which one has greater total energy? Explain. [2]
7. 2073 Set C Q.No. 2a The accelerating voltage of a proton is increased to twice. How will its de Broglie wavelength change? Explain. [2]
8. 2073 Set C Q.No. 2d Can X-ray diffraction experiment be performed by an ordinary grating? Why? [2]
9. 2073 Set D Q.No. 2f Explain the difference between stimulated and spontaneous emissions of radiation. [2]
10. 2072 Supp Q.No. 2f If a proton and an electron have the same speed, which has the longer de Broglie wavelength? Explain. [2]
11. 2072 Set C Q.No. 2c Even if a hydrogen atom contains an electron, its spectrum consists of a large number of lines. Explain how. [2]
12. 2072 Set D Q.No. 2b What is optical pumping in the production of laser? [2]
13. 2072 Set E Q.No. 2d Production of X-ray is the inverse phenomenon of photoelectric effect. Justify it. [2]
14. 2072 Set E Q.No. 2f "The total energy of an electron of an atom in an orbit is negative". What does this negative energy indicate? [2]
15. 2071 Supp. Q.No. 2c An electron and proton are accelerated through the same potential, which one has higher De-Broglie's wavelength? Justify your answer. [2]
16. 2071 Set C Q.No. 2 c An electron and a proton have same kinetic energy, which of the two has greater de-Broglie wavelength? Justify your answer. [2]
17. 2071 Set D Q.No. 2 b A proton and an electron have same de-Broglie wavelengths, which of the two has greater kinetic energy? Justify your answer. [2]
18. 2071 Set D Q.No. 2c 2060 Q.No. 2f Distinguish between stimulated emission and spontaneous emission. [2]
19. 2070 Supp. Set A Q.No. 2 a If a proton and an electron have the same kinetic energy which has the longer de Broglie wavelength? [2]
20. 2070 Supp. Set A Q.No. 2c Why is the gravitational force not taken into consideration while evaluating the energy of an electron in an atom? [2]
21. 2070 Supp. Set B Q.No. 2 c Can X-rays be produced from gases? Explain. [2]
22. 2070 Set C Q.No. 2 b A proton and an electron have the same speed. Which has longer wavelength? [2]
23. 2070 Set D Q.No. 2 b The wave nature of particles is not observable in daily life. Why? [2]
24. 2069 Supp Set B Q.No. 2 b Draw schematic diagram to show the difference between spontaneous and stimulated emissions of radiation. [2]
25. 2069 Supp Set B Q.No. 2 c Can Bragg's law of x-ray diffraction be verified with yellow light of wavelength 600 nm? Explain. [2]
26. 2069 Set A Q.No. 2c A stone is dropped from the top of a building. How does its de Broglie wavelength change? [2]
27. 2069 Set A Old Q.No. 1e What do you mean by ionization energy and ionization potential? [2]
28. 2069 Set A Old Q.No. 2h What is laser? On what principle it works? [2]
29. 2069 Set B Q.No. 2c Compare the wavelengths of an electron with that of a proton if their kinetic energies are equal. Mass of a proton is nearly equal to 1840 times the mass of an electron. [2]
30. 2068 Can. Q.No. 2d Define population inversion and optical pumping. [2]
31. 2068 Q.No. 2 f When x-rays are produced only about 10% of the initial input energy appears as x-ray energy. Explain what has happened to the other 90% of the energy. [2]
32. 2068 Old Q.No. 1 g What are the differences between X-rays and the ordinary ray of light? [2]
33. 2067 Q.No. 2c What are the differences between matter wave and electromagnetic wave? [2]
34. 2067 Old Q.No. 1f 2066 Supp Q.No. 2f Why is the production of x-rays called inverse of photoelectric effect? [2]
35. 2066 Q.No. 1f The phenomenon of x-rays production is also called an inverse of photoelectric effect. Why? [2]
36. 2066 Q.No. 2 f If matter has a wave nature, why is this not observable in our daily experiences? [2]
37. 2062 Q.No. 2 f What do you mean by matter waves? [2]
38. 2061 Q.No. 1 g Production of x-rays is the reverse phenomenon of photoelectric effect. Justify this statement. [2]
39. 2058 Q.No. 1 g Can aluminum be used as a target in X-ray tube? [2]
40. 2056 Q.No. 12 a Why a glowing gas, such as that in a neon tube, gives only certain wavelengths of light? [2]
41. 2056 Q.No. 12 d Differentiate between stimulated and spontaneous emission of radiations. [2]
42. 2056 Q.No. 12 e What do you mean by uncertainty principle? [2]
43. 2055 Q.No. 12 f Point out the importance of a de Broglie wave. [2]
44. 2054 Q.No. 12 a What do you meant by De Broglie waves? [2]
45. 2053 Q.No. 12 a An electron is in the third excited state. How many different photon-wave lengths are possible? [2]
46. 2052 Q.No. 12 c In the production of X-ray, how will you control the penetrating power of X-rays? [2]

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47. 2052 Q.No. 12 e How Paschen series is originated in Hydrogen spectra? [2]

48. 2052 Q.No. 15 b Differentiate between excitation potential and ionization potential. [2]

Long Answer Questions [4 Marks]

49. 2076 GIE Set A Q.No. 6c What is laser? Describe the working of He-Ne laser. [4]

50. 2076 GIE Set B Q.No. 6c State and explain Bragg's law. [4]

51. 2075 Set A Q.No. 6a Stating the Bohr's postulates, deduce an expression for the total energy of an electron in n^{th} orbit of hydrogen atom. [4]

52. 2075 Set B Q.No. 6c Describe coolidge tube for the production of X-rays. How do you control (i) the intensity (ii) the penetrating power of the emitted X-rays? [4]

53. 2074 Set B Q.No. 6c State Bohr's postulates. Using these postulates obtain an expression for the total energy of an electron in the n_{th} orbit of hydrogen atom. [4]

54. 2073 Supp Q.No. 6c 2063 Q.No. 9 What are Bohr's postulates? Derive an expression for the total energy of electron in n^{th} orbit of H-atom. [4]

55. 2073 Set C Q.No. 6d Explain the working principle of a gas laser. How is population inversion achieved for lasing action? [4]

56. 2073 Set D Q.No. 6a Write down the postulates of Bohr's hydrogen atom. Hence derive expression for energy of the third electron orbit. [4]

57. 2072 Set D Q.No. 6c State Bohr's postulates of hydrogen atom and use them to calculate the radius of n^{th} orbit of the hydrogen atom. [4]

58. 2072 Set E Q.No. 6b Explain the working of He-Ne laser. [4]

59. 2071 Supp. Q.No. 6d Derive Bragg's equation and explain how this equation is used to determine the crystal plane spacing. [4]

60. 2071 Set C Q.No. 6 b What are x-rays? Describe the modern Coolidge tube method to produce x-rays. [4]

61. 2071 Set D Q.No. 6 b State Bohr's postulates of hydrogen atom. Use these postulates to derive an expression for the radius of the n^{th} orbit of the hydrogen atom. [4]

62. 2070 Supp. Set B Q.No. 6 b State Bohr's postulates of atomic structure. Use the postulates to determine the total energy of an electron in n^{th} orbit of hydrogen atom. [4]

63. 2070 Set C Q.No. 6 b State Boh'rs postulates and hence derive expression for the radius of nth orbit of hydrogen atom. [4]

64. 2070 Set D Q.No. 6 b Describe the construction and working of a Helium-Neon laser. [4]

65. 2069 Set A Q.No. 6d Describe the construction and working principle of He-Ne laser. Write some important uses of laser. [4]

66. 2069 Set B Q.No. 6d Describe the construction and working principle of He-Ne laser. Also write its important uses. [4]

67. 2068 Old Can. Q.No. 9 OR Starting from Bohr's postulates, obtain an expression for the energy of the electron in n^{th} orbit of the hydrogen atom. [4]

68. 2068 Q.No. 6 d Describe the modern method of productions of x-rays. Discuss crystal diffraction. [4]

69. 2068 Old Q.No. 8 a On the basis of Bohr's theory of hydrogen atom, derive an expression for the energy of electron in the n^{th} orbit of a hydrogen atom.

70. 2067 Q.No. 6d 2066 Q.No. 9 OR Obtain an expression for the energy of electron in n^{th} orbit of hydrogen atom.

71. 2067 Old Q.No. 8a OR What do you mean by laser? Describe the He-Ne laser. [1+3]

72. 2067 Old Q.No. 9 Explain Bragg's law of diffraction of x-rays.

73. 2067 Sup Q.No. 6c What is laser? Describe the construction and working principle of He-Ne laser. [1+3]

74. 2066 Q.No. 9 Derive Bragg's law.

75. 2065 Q.No. 8 a Write down the postulates of Bohr's model of hydrogen atom and obtain expression for the energy of n^{th} orbit of electron. [1+3]

76. 2062 Q.No. 8 a X-ray diffraction has been very useful in determining the structure of a crystallize substance. Use this concept to determine the distance between two planes.

77. 2062 Q.No. 8 a OR Explain how Bohr modified the Rutherford model of an atom to explain the emission of radiation from atoms: (only quantitative discussion required).

78. 2059 Q.No. 8 a What are Bohr's postulates? Derive the formula for the radius of the third Bohr's orbit.

79. 2058 Q.No. 9 Derive Bragg's law and explain how is this law used to determine the crystal plane spacing.

80. 2057 Q.No. 9 Derive an expression for the energy of an electron in a hydrogen atom.

81. 2055 Q.No. 14 What are the X-rays? Confirm with experiment the wave nature of X-rays.

82. 2053 Q.No. 15 What are Bohr's postulates of hydrogen atom? Derive an expression for the radius of Bohr's orbit.

83. 2052 Q.No. 15 a OR State and explain uncertainty principle.

Numerical Problems [4 Marks]

84. 2076 GIE Set A Q.No. 10a An α-particle of mass 6.64×10^{-27} kg is emitted in radioactive decay of $_{92}U^{238}$ with a energy of 4.2 MeV. What is its de-Broglie wavelength? (Planck's constant = 6.62×10^{-34} Js)

Ans: 7×10^{-15} m

85. 2076 GIE Set A Q.No. 10b Electrons in an x-ray tube are accelerated by a p.d. of 10 KV. If an electron produces one photon on impact with the target, what is the minimum wavelength of resulting x-rays? What is the velocity with which the electron hit the target? Mass of the electron = 9.1×10^{-31} kg.

Ans: 1.24×10^{-10} m, 5.93×10^{7} m/sec

86. 2076 GIE Set B Q.No. 10b An electron is confined within a region of width 1.0×10^{-10}m. (a) Estimate the minimum uncertainty in x - component of electron's momentum (b) If the electron has momentum with magnitude equal to the uncertainty found in part (a) what is its K.E.? Mass of electron = 9.1×10^{-31}kg.

Ans: 1.05×10^{-24} kg m/sec, 3.81

87. 2076 Set B Q.No. 10b 2066 Supp Q.No. 8b Or 2058 Q.No. 8 Obtain the de Broglie wavelength of neutron of kinetic energy 150 eV. (mass of neutron = 1.675×10^{-27} kg. Planck constant = 6.6×10^{-34} Js. 1eV = 1.6×10^{-19} J.)

Ans: 2.33×10^{-10}

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88. **2076 Set C Q.No. 10a** **2069 Set A Q.No. 10b** An x-ray tube, operated at a dc potential difference of 10kv, produces heat at the target at the rate of 720 watt. Assuming 0.5% of the incident electrons is converted into x-radiation, calculate the number of electrons striking per second at the target and velocity of the incident electrons. (given, e/m = 1.8×10^{11} Ckg^{-1}) [4]
Ans: 0.072 A, 6×10^{7} m/sec

89. **2075 GIE Q.No. 10b** Calculate the wavelength of an electron which has been accelerated through a potential difference of 200 V. Take mass of the electron as 9.1×10^{-31} kg and Plank's constant as 6.6×10^{-34} JS. [4]
Ans: 8.6×10^{-11} m

90. **2075 Set B Q.No. 10b** A hydrogen atom is in ground state. What is the quantum number to which it will be excited absorbing a photon of energy 12.75 eV? [4]
Ans: 4

91. **2074 Supp Q.No. 10b** Determine the wavelength of a proton that has been accelerated through a potential differences of 20 kV. Mass of proton = 1.67×10^{-27} kg and Planck constant = 6.62×10^{-34} Js. [4]
Ans: 2.02×10^{-13} m

92. **2074 Supp Q.No. 10c** **2073 Set C Q.No. 10c** The first member of Balmer series of hydrogen atom has a wavelength of 6563 Å. Calculate the wavelength of its second member. [4]
Ans: 4861.48 Å

93. **2074 Set A Q.No. 10b** Calculate de Broglie wavelength of an electron which has been accelerated through a potential difference of 200V. Given-mass of electron =9.1×10^{-31}kg and Planck's constant, h=6.6×10^{-34}Js. [4]
Ans: 8.7×10^{-11} m

94. **2073 Set D Q.No. 10c** Calculate the de Broglie wavelength of electron having kinetic energy of 400 eV. [4]
Ans: 6.13×10^{-11} m

95. **2072 Supp Q.No. 10a** Calculate the wave length of electromagnetic radiation emitted by a hydrogen atom which undergoes a transition between energy levels of -1.36×10^{-19} J and -5.45×10^{-19} J. (Given plank constant = 6.6×10^{-34} Js). [4]
Ans: 4.84×10^{-7} m

96. **2072 Set C Q.No. 10b** **2072 Set D Q.No. 10b** A X-ray tube works at a dc potential difference of 50 kV. Only 0.4% of the energy of the cathode rays is converted into x-rays and heat is generated in the target at the rate of 600 watt. Estimate the current passed into the tube and the velocity of the electrons striking the target. (Mass of electron = 9×10^{-31} kg, charge of electron = 1.6×10^{-19} c) [4]
Ans: 0.012 A, 1.3×10^{8} m/sec

97. **2072 Set E Q.No. 10a** An X-ray spectrometer has a crystal of rock salt for which atomic spacing is 2.82 A set at an angle of 14° to the beam coming from a tube operated at a constantly increasing voltage. An instense first line appears when the voltage across the tube is 9045 V. Calculate the value of Planck constant. [4]
Ans: 6.58×10^{-34} Js

98. **2071 Supp. Q.No. 10a** An x-ray tube works at a dc potential difference of 50KV and the current through the tube is 0.5mA. Find (i) the number of electrons hitting the target per second, (ii) the energy falling on the target per second as the kinetic energy of electrons, (iii) the cut off wavelength of x-ray emitted. (The charge of electron = 1.6×10^{-19}c, velocity of light c = 3×10^{8} m/s, Plank's constant = 6.62×10^{-34}Js). [4]
Ans: (i) 3.125×10^{15} number/sec. (ii) 25 Watt. (iii) 2.48×10^{-11} m

99. **2071 Supp. Q.No. 10c** Determine the energy that must be given to a hydrogen atom so that it can emit second line of Balmer series. (Rydberg's constant R = 1.097×10^{7}m^{-1}) [4]
Ans: 2.55 eV.

100. **2070 Supp. Set A Q.No. 10 c** Find the wavelength of the radiation emitted from a hydrogen atom when an electron jumps from 4th orbit to the second orbit. (given E_0 = 8.85×10^{-12} C^2N^{-1} m^{-2} h = 6.62×10^{-34} Js, m_e = 9.1×10^{-31} kg) (where the symbols have their usual meanings.) [4]
Ans: 4.89×10^{-7} m

101. **2070 Supp. Set B Q.No. 2 a** A cricket ball is moving with a speed of 120 km/hr. What would be its de-Broglie wavelength if its mass is 400gms. [2]
Ans: 4.96×10^{-35} m.

102. **2070 Supp. Set B Q.No. 10 b** X-rays are incident on the zinc sulphide crystal of crystal spacing 3.08×10^{-8}cm such that first order reflection takes place at glancing angle 12°. Calculate the wavelength of X-rays and glancing angle for second order maximum. [4]
Ans: 1.28×10^{-10} m.

103. **2069 Supp Set B Q.No. 10 b** **2067 Sup Q.No. 10b** Find the wavelength of radiation emitted from hydrogen atom when an electron jumps from third orbit to second orbit. (Given: ϵ_0 = 8.854×10^{-12} $N^{-1}m^{-2}$,h = 6.62×10^{-34} Js and mass of electron, m_e = 9.1×10^{-31} kg.) [4]
Ans: 6.6×10^{-7} m

104. **2069 Set A Old Q.No. 8b** **2052 Q.No. 16 OR** X-ray beam of wavelength 2.9AU (Å) is diffracted from the plane of cubic crystal. The first order diffraction is obtained at an angle of 35°. Calculate the spacing between the planes. [4]
Ans: 5×10^{-10} m

105. **2069 Set B Q.No. 10b** X-rays are incident on the zinc sulphide crystal. It's crystal spacing is 3.08×10^{-8} cm and the first order reflection takes place at a glancing angle of 12°. Calculate the wavelength of incident X-rays. [4]
Ans: 1.28×10^{-10}m

106. **2067 Q.No. 10b** An x-ray tube operated at a d.c. potential difference of 40 KV, produces heat at the rate of 720 w assuming 0.5% of the energy of the incident electrons converted into x-radiation. Calculate (i) number of electrons per second striking the target. (ii) the velocity of the incident electrons. [Given *e/m* = 1.8×10^{11}C/kg]. [4]
Ans: 1.13×10^{17}, 1.18×10^{8}m/sec

107. **2065 Q.No. 8 b** X-rays of wavelength 0.36 A^0 are diffracted by a Bragg's crystal spectograph at a glancing angle of (4.8)°. Find the spacing of the atomic planes in the crystal. [4]
Ans: 2.15×10^{-10}m

108. **2062 Q.No. 8 b** If an electron position can be measured to an accuracy of 10^{-9} m. How accurately can its velocity be measured? (m_e = 9.1×10^{-31} kg.) [4]
Ans: 1.16×10^{5} ms^{-1}

109. **2061 Q.No. 8 b OR** Obtain the De Broglie wave length of the electron having the kinetic energy of 3600v.
(mass of electron = 9.1×10^{-31} kg, Electronic charge = 1.6×10^{-19}c, Plank's constant = 6.6×10^{-11} m) [4]
Ans: 2.04×10^{-11} m

110. **2060 Q.No. 8 b** Calculate energy in electron volts of a quantum of x-radiation of wavelength 0.15nm. Take e = 1.6×10^{-19}C, h = 6.5×10^{-34} JS, c = 3×10^{8} ms^{-1}. [4]
Ans: 8125 eV

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111. 2055 Q.No. 15 An electron of energy 20eV comes into collision with a hydrogen atom in its ground state. The atom is excited into a higher state and the electron is scattered with reduced velocity. The atom subsequently returns to its ground state with the emission of photon of wavelength 1.216×10^{-7}m. Determine the velocity of the scattered electron. (mass of electron = 9.1×10^{-31} kg). [4]
Ans: 1.86×10^6 ms^{-1}

112. 2054 Q.No. 16 Calculate the wavelength of the first line of the Balmer series, if the wavelength of the second line of this series is 4.86×10^{-7}m. [4]
Ans: 6.56×10^{-7} m

4. NUCLEAR PHYSICS

FORMULAE

1. The radius (R) of nucleus, $R = R_0 A^{\frac{1}{3}}$, where $R_0 = 1.2 \times 10^{-15}$ m
2. Volume (V) of nucleus, $V = \frac{4}{3}\pi R_0^3 A$
3. Einstein's mass energy relation, $m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$
4. Mass defeat (Δm), $(Zm_p + (A - Z)m_n) - M$.
5. Packing fraction $= \frac{\Delta m}{A}$
6. Binding energy (BE) = $\Delta m \times 931$ MeV, [$\because$ 1 amu = 931 MeV]
7. Binding energy per nucleon $= \frac{B.E.}{A}$
8. Equation for nuclear reaction is, ${}_zX^A + a = {}_zY^{A'} + b + Q$, where Q is energy released or observed.
9. Example of nuclear fission, ${}_{92}U^{235} + {}_0n^1 \rightarrow {}_{92}U^{236} \rightarrow {}_{56}B^{141} + {}_{36}Kr^{82} + 3\,{}_0n^1 + Q$, Q = 200 MeV
10. Example of nuclear fusion, ${}_1H^2 + {}_1H^2 \rightarrow {}_2He^4 + Q$, Q= 24 MeV

Short Answer Questions [2 Marks]

1. 2076 Set C Q.No. 2c Neutron is considered the most effective bombarding particle in a nuclear reaction. Why? [2]
2. 2075 Set A Q.No. 2e A nucleus consists of positively charged protons and electrically neutral netutrons in a small volume. How can this be possible as the like charges repel each other? [2]
3. 2075 Set B Q.No. 2d All nuclei have nearly the same density. Why? [2]
4. 2074 Supp Q.No. 2b 2066 Q.No. 1g The nuclear density is almost constant for all nuclei. Why? [2]
5. 2074 Set A Q.No. 2a 2070 Set C Q.No. 2 d Why is neutron considered the most effective bombarding particle in a nuclear reaction? [2]
6. 2074 Set B Q.No. 2c According to properties of charges, like charges repel each other. Then, how do the protons in a nucleus stay together? [2]
7. 2073 Supp Q.No. 1d 2067 Q.No. 2d Why is the mass of a nucleus slightly less than the mass of constituent nucleons? [2]
8. 2073 Set C Q.No. 2c Define atomic mass unit (amu). Hence convert the mass of a neutron, (1840 me), into amu where me is the mass of 'an electron'. [2]
9. 2073 Set D Q.No. 2b Diameter of Al^{27} nucleus is D_{Al}. How can one express the diameter of Cu^{64} in terms of D_{Al}? Explain. [2]
10. 2072 Supp Q.No. 2d By what factor must the mass number of a nucleus increase to double its volume? Explain. [2]
11. 2072 Set D Q.No. 2c All the nuclei have nearly the same density. Justify. [2]
12. 2071 Supp. Q.No. 2d What is the significance of binding energy per nucleon? [2]
13. 2070 Set D Q.No. 2 d Does a nucleus contain electrons? Explain. [2]
14. 2069 Supp Set B Q.No. 2 e What does the energy balance (Q–value) of a nuclear reaction signify? Explain. [2]
15. 2070 Supp. Set B Q.No. 2 e Find the value of 1 amu in terms of MeV. [2]
16. 2068 Old Can. Q.No. 1g Why are the neutrons used to initiate fission reaction? [2]
17. 2067 Old Q.No. 2f Why does a mountain of uranium not explode as a bomb? [2]
18. 2066 Supp Q.No. 1f Write difference between nuclear fission and fusion. [2]
19. 2065 Q.No. 1 g Explain the significance of Eienstein's mass energy equivalence relation. [2]
20. 2065 Q.No. 2 g Define atomic mass unit and convert it into MeV. [2]
21. 2061 Q.No. 1 f Define mass defect and packing fraction of a nucleus. [2]
22. 2059 Q.No. 2 f Distinguish between isotopes and isobar? [2]
23. 2056 Q.No. 12 f Explain why the mass of a nucleus is always less then the combined masses of its constituent particles. [2]
24. 2055 Q.No. 12 b Explain binding energy in terms of packing fraction. [2]
25. 2055 Q.No. 12 c Point out the difference between nuclear fission and fission. [2]
26. 2053 Q.No. 12 b What is meant by chain reaction? [2]
27. 2052 Q.No. 12 d Distinguish between fission and fusion reaction. [2]

Long Answer Questions [4 Marks]

28. 2075 GIE Q.No. 6c Define binding energy and binding energy per nucleon. How does binding energy per nucleon vary with mass number? What is its significance? [4]
29. 2075 Set A Q.No. 6d Differentiate between nuclear fission and fusion. Explain the production of energy in the Sun. [4]
30. 2074 Supp Q.No. 6c Discuss fission and fusion reaction with one example of each. In which reaction is the energy released greater? [4]
31. 2074 Set A Q.No. 6c Define mass defect and binding energy of a nucleus. Draw a graph showing the variation of binding energy per nucleon and atomic number of the elements. Also, interpret the graph. [4]
32. 2073 Set C Q.No. 6c Write down the representative nuclear fission and fusion reactions. Explain, how the energy release in the case of four protons fused into doubly ionized helium can be estimated? [4]

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33. **2072 Set C Q.No. 6c** Discuss four important properties of nuclei. [4]

34. **2071 Supp. Q.No. 6c** What are meant by mass defect and binding energy per nucleon? Draw a graph showing the relation between binding energy per nucleon and atomic number. Explain its significances. [4]

35. **2071 Set C Q.No. 6 c** Define binding energy. How does binding energy per nucleon vary with mass number? What is its significance? [4]

36. **2070 Set C Q.No. 6 c** Discuss fission and fusion with an example of each. In which reaction is the energy released greater? [4]

37. **2070 Set D Q.No. 6 d** What is nuclear fusion? Discuss the sources of the energy released during fusion. [4]

38. **2069 Set A Q.No. 6c** How does nuclear fusion differ from nuclear fission? How is the energy released estimated in the fusion reaction? [4]

39. **2068 Q.No. 6 c** What is nuclear fission? Compare the energy released from nuclear fission with that of fusion. [4]

40. **2067 Sup Q.No. 6d** Write down the schemes for nuclear fusion and nuclear fission. How can the release energy in any of these reactions estimated? What do you mean by Q-value of a nuclear reaction? [1+2+1]

41. **2063 Q.No. 8 a** What is nuclear fission? How energy is released in nuclear fission reaction? [4]

42. **2062 Q.No. 2 h** What is nuclear fusion? Write a representative equation of fusion reaction? [4]

43. **2061 Q.No. 9 OR** Distinguish between nuclear fusion and fission with examples. [4]

44. **2058 Q.No. 8 a** What do you mean by fission? How energy is released in fission of uranium nucleus? [4]

45. **2057 Q.No. 9 OR** Distinguish between nuclear fusion and fission with examples. [4]

46. **2056 Q.No. 14** What is nuclear fission? Give an example of nuclear reaction. [4]

47. **2052 Q.No. 13** State and explain Einstein's mass energy relation with example. [4]

Numerical Problems [4 Marks]

48. **2076 GIE Set A Q.No. 10c** Find mass defect and B.E. per nucleon of $_{26}Fe^{56}$. [4]
Given mass of proton = 1.007825 amu, mass of neutron = 1.008665 amu, mass of $_{26}Fe^{56}$ = 55.934939 amu. (1 amu = 930 MeV).
Ans: 8.78 MeV/nuclear

49. **2076 GIE Set B Q.No. 10c** Find the power production corresponding to 2g of $_{92}U^{235}$ consumed per day in a nuclear reactor. Energy released per fission of U^{235} is about 200 MeV. Avogadro number = 6.023×10^{23}/mol. [4]
Ans: 1.9×10^6 Watt

50. **2076 Set B Q.No. 10c** **2070 Set D Q.No. 10 c** Calculate the binding energy per nucleon of $_{26}Fe^{56}$. Atomic mass of $_{26}Fe^{56}$ is 55.9349u and that of $_1H^1$ is 1.00783u. Mass of $_0n^1$ = 1.00867u and 1u = 931 MeV. [4]
Ans: 8.78 MeV/ nuclear

51. **2076 Set C Q.No. 10b** Calculate the binding energy per nucleon of calcium nucleus ($_{20}Ca^{40}$). [4]
Given: mass of $_{20}Ca^{40}$ = 39.962589 u
mass of neutron, m_n = 1.008665 u
mass of proton, m_p = 1.007825 u
1u = 931 Me V
Ans: 8.54 MeV/ nuclear

52. **2075 Set A Q.No. 10a** A city requires 10^7 watts of electrical power on the average. If this is to be supplied by a nuclear reactor of efficiency 20%. Using $_{92}U_{235}$ as the fuel source, calculate the amount of fuel required per day (Energy released per fission $_{92}U_{235}$ = 200 MeV). [4]
Ans: 0.0527 kg

53. **2075 Set B Q.No. 10c** **2067 Q.No. 10c** A nucleus of $_{92}U^{238}$ disintegrates according to [4]
$_{92}U^{238} \rightarrow {}_{90}Th^{234} + 2He^4$.
Calculate:
i. the total energy released in the disintegration process.
ii. the k.e. of the α particle, the nucleus at rest before disintegration.
[Mass of $_{92}U^{238} = 3.859 \times 10^{-25}$ kg
Mass of $_{90}Th^{234} = 3.787 \times 10^{-25}$ kg
Mass of $_2He^4 = 6.648 \times 10^{-27}$ kg]
Ans: 4.236 MevV, 4.16 MeV

54. **2074 Set B Q.No. 10b** The mass of $_{17}CL^{35}$ is 34.9800 amu. Calculate its binding energy and binding energy per nucleon. Mass of one proton = 1.007825 amu and mass of one neutron =1.00865 amu. [4]
Ans: 287.66 MeV and 8.2 MeV

55. **2073 Supp Q.No. 10b** **2072 Set D Q.No. 10c** **2070 Supp. Set A Q.No. 10 b** **2068 Can. Q.No. 10b** The energy librated in the fission of single uranium –235 atom is 3.2×10^{-11}J. Calculate the power production corresponding to the fission of 1g of uranium per day. Assume Avogadro constant as 6.02×10^{23} mole^{-1}. [4]
Ans: 9.5×10^5 watt

56. **2073 Set D Q.No. 10b** What will be the amount of energy released in the fusion of three alpha particles into a C^{12} nucleus if mass of He^4 and C^{12} nuclei are respectively 4.00263 amu and 12 amu. [4]
Ans: 7.35 MeV

57. **2072 Supp Q.No. 10c** The mass of the nucleus of the isotope Lithium (Li7) is 7.014351 u. Find its binding energy and binding energy per nucleon. (Given mass of proton = 1.007275 u, mass of neutron = 1.008665 u) [4]
Ans: 39.22 Mev and 5.60 Mev/ Nucleon

58. **2072 Set E Q.No. 10c** $_{28}Ni^{62}$ may be described as the most strongly bound nucleus because it has the highest B.E. per nucleon. Its neutral atomic mass is 61.928349 amu. Find its mass defect, its total binding energy and binding energy per nucleon. Given, mass of neutron = 1.008665 amu; mass of porton = 1.007825 amu; 1 amu = 931.5 MeV.
Ans: MD = 0.585361 amu; TBE = 545.26 MeV; BE = 8.8 Mev Per nucleon

59. **2071 Set C Q.No. 10 c** The energy released by fission of one U^{235} atom is 200 MeV. Calculate the energy released in KWh, when one gram of uranium undergoes fission. [4]
Ans: 4.96×10^5 watt

60. **2071 Set D Q.No. 10 b** Calculate the binding energy per nucleon for a helium nucleus. Given that mass of helium nucleus=4.001509 amu, mass of proton=1.007277 amu and mass of neutron=1.008666 amu. [4]
Ans: 7.07 MeV/nucleo

61. 2070 Supp. Set B Q.No. 10 c The most common isotope of uranium $^{238}_{92}U$, has atomic mass 238.050783u. Calculate the (a) mass defect, (b) binding energy, (c) Binding energy per nucleon (Mass of proton = 1.007825u, mass of neutron = 1.008665u) [4]
Ans: (a) 1.9342u (b) 1800.75 MeV (c) 7.566 MeV/nucleon

62. 2069 Set B Q.No. 10a Estimate the binding energy per nucleon of $_3Li^7$. Mass of $_3Li^7$, a proton and a neutron are respectively 7.01435 amu, 1.00728 amu and 1.00867 amu. [4]
Ans: 5.6 MeV/nucleon

63. 2068 Old Q.No. 8 b OR Assuming that about 200 MeV energy is released per fission of $_{92}U^{235}$ nuclei, what would be the mass of U^{235} consumed per day in the fission reactor of power 1MW approximately? [4]
Ans. 1.05 gm

64. 2064 Q.No. 8 b OR The energy liberated in the fission of a single uranium – 235 atom is 3.2×10^{-11} J. Calculate the power production corresponding to the fission of 1.5 kg. of uranium per day. [4]
Ans: 1.42×10^9 W

65. 2054 Q.No. 16 OR The energy liberated in the fission of a single uranium – 235 atom is 3.2×10^{-11} J. Calculate the power production corresponding to the fission of 1 kg. of uranium per day. [4]
(Avogadro constant = 6.0×10^{23} mole^{-1}) **Ans: 9.4×10^8 W**

66. 2052 Q.No. 14 Calculate the Q-value of the reaction and mention the type of reaction (endothermic or exothermic)
$2He^4 = 4.00377$ amu $\quad 8O^{17} = 17.00450$ amu
$7N^{14} = 14.00783$ amu $\quad 1H^1 = 1.00814$ amu [4]
Ans: 0.96824 Mev

67. 2052 Q.No. 16 Calculate the speed of particle if the mass of it is equal to 5 times its rest mass. [4]
Ans: 2.94×10^8 m/s

5. RADIOACTIVITY

FORMULAE

1. The activity of a radioactive nucleus, $dN/dt = -\lambda N$, where $N = N_0e^{-\lambda t}$, Where N_0 is the number of undecayed nuclei at time $t = 0$.
3. The half-life $T_{1/2}$ and the decay constant λ are related by the equation, $T_{1/2} = 0.693/\lambda$.
4. The relation of mean life and decay constant is $T_m = \frac{1}{\lambda}$

Short Answer Questions [2 Marks]

1. 2077 Set D Q.No. 1c How does a daughter nucleus differ from its parent nucleus when it emits a β particle? [2]
2. 2076 Set B Q.No. 2d All the radioactive series terminate at lead as their final product. Why? [2]
3. 2076 Set C Q.No. 2d How does a daughter nucleus differ from its parent nucleus when it emits an α-particle? [2]
4. 2075 GIE Q.No. 2d How does a daughter nucleus differ from its parent nucleus when it emits
i. an α particle ii. γ-rays [2]
5. 2074 Supp Q.No. 2c What change takes place in the nucleus when
i. an α particle is emitted.
ii. a γ-ray is emitted. [2]
6. 2074 Set A Q.No. 2d How does a daughter nucleus differ from its parent nucleus when it emits (i) an α-particle and (ii) a β- particle? [2]
7. 2074 Set B Q.No. 2d If a radioactive nucleus has a half life of one year, will it be completely decayed at the end of two year? Explain. [2]
8. 2073 Set D Q.No. 2d Characteristic features of X- rays and Υ-rays are similar in many aspects. Write two important features that explain the differences between these rays. [2]
9. 2072 Set C Q.No. 2e A nucleus contains no electrons, yet it ejects them. Explain. [2]
10. 2072 Set D Q.No. 2d How do the mass number and atomic number of a radioactive element change in an α-decay? [2]
11. 2071 Supp. Q.No. 2e There are no electrons inside the nucleus, but they are emitted from an unstable nucleus. Why? [2]
12. 2070 Supp. Set A Q.No. 2 d How are half life and average life of a radioactive substance related? [2]
13. 2069 Set A Q.No. 2d Beta particles penetrate through a matter easily than that of alpha-particle of the same energy. Why? [2]
14. 2069 Set A Old Q.No. 2d 2052 Q.No. 12 a What do you mean by curie? [2]
15. 2069 Set B Q.No. 2b Write down the decay schemes separately for alpha and beta decays from a nucleus $_ZX^A$ [2]
16. 2068 Q.No. 2 d Heavy unstable nuclei usually decay by emitting an α or β particle. Why do they not usually emit a single proton or neutron? [2]
17. 2068 Old Q.No. 1 h Explain the term "decay constant". [2]
18. 2064 Q.No. 2 g How do you get emission of β-particles from the nucleus, although there are no electron within it? [2]
19. 2060 Q.No. 2 g What is the result if an α-particle is emitted from a nucleus? Give an example. [2]
20. 2058 Q.No. 2 f Can a single nucleus at a time emit α-particle, β-particle and gamma ray? [2]
21. 2057 Q.No. 1 f How do β-particles differ from electrons? [2]
22. 2054 Q.No. 12 c 2053 Q.No. 12 d Explain the term artificial radio isotopes. [2]
23. 2053 Q.No. 13 What are beta and gamma rays? State three properties each. [2]
24. 2052 Q.No. 12 b How will you identity α, β and λ radiation by simple experiment? [2]

Long Answer Questions [4 Marks]

25. 2076 GIE Set A Q.No. 6d State radioactive disintegration law and obtain the expression between half life and decay constant. [4]
26. 2076 GIE Set B Q.No. 6d Describe radioactive disintegration law. Obtain the relation between half life and decay constant. [4]
27. 2076 Set B Q.No. 6c List out the laws of radioactive disintegration. Deduce the expression $N = Noe^{-\mu}$ where symbols have their usual meaning. [4]

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28. 2075 Set B Q.No. 6d | 2073 Supp Q.No. 6d | 2072 Set D Q.No. 6d State the laws of radioactive disintegration. Derive the relation between half life and decay constant. [4]

29. 2074 Supp Q.No. 6d State the laws of radioactive disintegration. What is half life period of a radioactive substance? Derive an expression for it. [4]

30. 2073 Set D Q.No. 6b Deduce the law of radioactivity and hence define half life of a radioactive sample. How much is one Curie? [4]

31. 2072 Supp Q.No. 6d State the laws of radioactive disintegration. Derive disintegration equation. Using the equation find a relation between the half life and decay constant. [4]

32. 2072 Set E Q.No. 6c What are different units of radio activity? Describe "carbon dating". [4]

33. 2071 Set D Q.No. 6 c State the laws of radioactive disintegration. What is half life period of a radioactive substance? Derive an expression for it. [4]

34. 2070 Supp. Set A Q.No. 6 b Define decay constant for a radioactive substance and deduce the expression $N=N_0 e^{-\lambda t}$, where the symbols have their usual meanings. How can we estimate the age of some fossils using such equation? [4]

35. 2070 Supp. Set B Q.No. 6 c Discuss radioactive decay law. Deduce an expression for the number of atoms after a time 't' has elapsed and hence write an expression for half life of the radioactive substance. [4]

36. 2070 Set D Q.No. 6 c State the laws of radioactivity and derive the decay equation. [4]

37. 2069 Supp Set B Q.No. 6 b Explain the difference between natural and artificial radioactivity and obtain the decay law of radioactivity. Also find a relation between the decay constant and half life of a radioactive isotope. [4]

38. 2068 Can. Q.No. 6c Write down laws of radioactive disintegration and establish a relation between half life and decay constant. [4]

39. 2068 Old Can. Q.No. 9 | 2066 Supp Q.No. 9 | 2061 Q.No. 8a Define half- life and decay constant of a radioactive substance. Establish a relation between them. [2+2]

40. 2067 Q.No. 6c Derive the decay equation and establish the relationship between decay constant and half life of radio-active element. [4]

41. 2065 Q.No. 8 a OR What do you understand by the activity of a radioactive material? Write its unit. Also derive the law of radioactive disintegration. [1+3]

42. 2064 Q.No. 9 OR State laws of radioactive disintegration and show that the number of atoms of a given radioactive substance decreases exponentially with time. Also, derive a relation between decay constant and half life of a radioactive substance. [2+2]

43. 2060 Q.No. 9 What is radioactivity? Obtain its exponential decay law and hence derive an expression for half life period. [1+2+1]

44. 2054 Q.No. 13 State the law of radioactive disintegration. Derive a relation between half-life and decay constant. [4]

Numerical Problems [4 Marks]

45. 2077 Set D Q.No. 3b A radioactive element has a half life of 2500 years. In how many years will its mass decay by 90% of its initial mass? [4]
Ans: 8297 years

46. 2076 Set C Q.No. 10c | 2075 GIE Q.No. 10c Find the half life of U^{238}, if 1 gm of it emits 1.24×10^4 α-particles per-second Avogadro's number = 6.025×10^{23}. [4]
Ans: 4.5×10^9 years

47. 2074 Set A Q.No. 10c The isotope Ra-226 undergoes α decay with a half life of 1620 years. What is the activity of 1 g of Ra-226? Avogadro number = 6.023×10^{23}/mole. [4]
Ans: 3.6×10^{10} dis/sec

48. 2074 Set B Q.No. 10c Calculate the mass in grams of a radioactive sample Pb-214 having an activity of 3.7×10^4 decays / s and a half life of 26.8 minutes. Avogadro number = 6.02×10^{23} /mole. [4]
Ans: 3.05×10^{-17} kg

49. 2073 Supp Q.No. 10c | 2056 Q.No. 16 A radioactive source has decayed to one tenth of one percent of its initial activity in one hundred days. What is its half life period? [4]
Ans: 10 days

50. 2073 Set C Q.No. 10a Half life of Ra^{226} is 1620 years. Estimate its mass when its activity is 0.5 Curie. [4]
Ans: 0.51×10^{-3} kg

51. 2072 Set C Q.No. 10c After a certain lapse of time, the fraction of radioactive polonium undecayed is found to be 12.5% of the initial quantity. What is the duration of this time lapse if half life of polonium is 139 days. [4]
Ans: 417.2 day

52. 2071 Supp. Q.No. 10b If 15% of the radioactive material decays in 5 days, what would be the percentage of amount of original material left after 25 days? [4]
Ans: 44%

53. 2071 Set C Q.No. 10 b The mass of the radium is 226. It is observed that 3.67×10^{10} α-particles are emitted per second from 1g of radium. Calculate the half life of radium. (Avogadro number = 6.023×10^{23} mole) [4]
Ans: 1586 years

54. 2070 Set C Q.No. 10 c Measurements on certain isotope show that the decay rate decreases from 8318 decays/min. to 3091 decays/min. in 4 days. What is the half life of this isotope? [4]
Ans: 2.8 days

55. 2069 Supp Set B Q.No. 10 c At a certain instant a piece of radioactive material contains 10^{12} atoms. The half life of the material is 40 days. Calculate the number of disintegrations in first one second. [4]
Ans: 2×10^6 dis/sec

56. 2069 Set A Q.No. 10c Find the half life of $_{92}U^{238}$, if one gram of it emits 1.24×10^4 α- particles per second. (Avogadro's number = 6.023×10^{23}) [4]
Ans: 1.4×10^{17} sec

57. 2068 Q.No. 10 c At a certain instant, a piece of radio active material contains 10^{12} atoms. The half-life of the material is 30 days. Calculate the number of disintegrations in the first second. [4]
Ans. 2.7×10^6 s

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58. 2067 Old Q.No. 8b If the half life period of a radioactive substance is 2 days, after how many days will $\frac{1}{64}$ th part of the substance be left behind? [4]
Ans: 12 days

59. 2067 Sup Q No. 10c The initial number of atoms in a radioactive element is 6×10^{20} and its half life is 10 hours. Calculate the number of atoms which have decayed in 30 hours and the amount of energy liberated if the energy liberated per atom decay is 4×10^{-13} J. [4]
Ans: 5.25×10^{20} atoms, 2.1×10^{8} J

60. 2066 Q.No. 8 b A small volume of a solution which contains a radioactive isotope of sodium had an activity of 12000 disintegrations per minute when it was injected into the blood stream of a patient. After 30 hours the activity of $1cm^3$ of the blood was found to be 0.5 disintegration per minute. If the half life of the sodium isotope is 15 hours, estimate the volume of the blood in the patient. [4]
Ans: 6000 cm^3

61. 2063 Q.No. 8 b OR A sample of Ra-226 has half life of 1620 years. What is the mass of the sample which undergoes 20000 disintegrations per second? (Avogadro's no. = 6.02×10^{23} mol^{-1}) [4]
Ans: 5.44×10^{-10} kg.

62. 2062 Q.No. 8 b OR The isotope 14c has a half life 5700 yrs. If the sample contains 1×10^{22} carbon 14 nuclei. What is the activity of the sample? [4]
Ans: 4×10^{10} disintegrations/second

63. 2059 Q.No. 8 b OR The unstable isotope of potassium -- 40 has a half life of 2.4×10^{8} yrs. How many decays occur per second in a sample containing 2×10^{-6} gm of potassium – 40? [4]
Ans: 2.76 dis/S

64. 2057 Q.No. 8 b OR A radioactive source which has the half life of 130 days, contains initially 1×10^{20} radioactive atoms, and the energy released per disintegration is 8×10^{-13} J, calculate the activity of the source after 260 days have elapsed and total energy released during this period. [4]
Ans: 1.54×10^{12} dis/S, 6×10^{7} J

65. 2055 Q.No. 16 If 4g of radio active material of half life period of 10 years disintegrates, find out mean life of the given sample. [4]
Ans: 14.43 years

66. 2053 Q.No. 16 OR At certain instant a piece of radio active material contained 10^{12} atoms. The half life of the material is 15 days. Calculate the rate of decay after 30 days have elapsed.
Ans: 1.15×10^{10} dis/S

6. NUCLEAR ENERGY AND OTHER SOURCES OF ENERGY

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 2e What do you mean by degradation of energy? Explain. [2]
2. 2076 GIE Set B Q.No. 2e How is biomass used as fuel? [2]
3. 2076 Set B Q.No. 2e What do you mean by greenhouse effect? Write its effects. [2]
4. 2076 Set C Q.No. 2e What is acid rain? Write its any two effects. [2]
5. 2075 GIE Q.No. 2e 2072 Set D Q.No. 2f 2071 Set D Q.No. 2f 2070 Set C Q.No. 2 e 2068 Can. Q.No. 2f What is acid rain? Explain. [2]
6. 2075 Set A Q.No. 2f 2068 Q.No. 2 e If energy is conserved, why is there an energy crisis? [2]
7. 2075 Set B Q.No. 2c Define acid rain and write it's adverse effects. [2]
8. 2074 Supp Q.No. 2e What do you mean by degradation of energy? Explain. [2]
9. 2074 Supp Q.No. 2f Explain how acid rain in formed. [2]
10. 2074 Set A Q.No. 2f 2074 Set B Q.No. 2f What is energy crisis? Explain. [2]
11. 2073 Supp Q.No. 2e 2067 Old Q.No. 1h 2065 Q.No. 1h What do you mean by energy crisis? [2]
12. 2072 Supp Q.No. 2e Which type of renewable energy is most useful to our country? Give reasons. [2]
13. 2072 Set C Q.No. 2f What do you mean by global warming? [2]
14. 2071 Set C Q.No. 2 e Write the meaning of conservation of energy and degradation of energy. [2]
15. 2071 Set C Q.No. 2 f 2070 Set D Q.No. 2 e What is global warming? Explain. [2]
16. 2069 Set A Old Q.No. 1g Name some of major air pollutants. [2]
17. 2069 Set B Q.No. 2e What is global warming? Give two examples of its effect. [2]
18. 2068 Old Can. Q.No. 1h State the two main effects on the earth due to ozone depletion? [2]
19. 2068 Old Can. Q.No. 2h What are the main energy sources in Nepal? [2]
20. 2068 Old Q.No. 2 g Explain what are solar flares. [2]
21. 2068 Old Q.No. 2 h Mention the major sources of Noise Pollution. [2]
22. 2067 Q.No. 2f What is global warming? [2]
23. 2066 Supp Q.No. 2h What do you mean by radiation hazard? [2]
24. 2065 Q.No. 2 h 2064 Q.No. 2 h What do you understand by green house effect? [2]
25. 2063 Q.No. 1 h What is radiation hazard? [2]
26. 2063 Q.No. 2 e Which bomb is more explosive, hydrogen bomb or atom bomb? [2]
27. 2063 Q.No. 2 f What is the source of energy of sun? [2]
28. 2062 Q.No. 1 h What is Ozone depletion? [2]
29. 2062 Q.No. 10 OR Discuss energy crisis in a modern society. [2]
30. 2060 Q.No. 2 h What is water pollution? [2]
31. 2059 Q.No. 1 h What is noise pollution? [2]
32. 2059 Q.No. 2 h Why is solar energy more preferable than fossil-fuel energy? Explain. [2]
33. 2058 Q.No. 1 h What is ozone-hole? [2]
34. 2057 Q.No. 1 g What are renewable sources of energy? [2]

Long Answer Questions [4 Marks]

35. 2076 Set B Q.No. 6d What are sources of energy? Discuss global energy consumption pattern and demands. [4]

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36. 2076 Set C Q.No. 6d What are the major energy sources? Discuss the global energy consumption pattern and demands. [4]
37. 2075 GIE Q.No. 6d What are the major energy sources in Nepal? Suggest some measures to reduce energy crisis in the future. [4]
38. 2074 Set A Q.No. 6d Explain renewable and non-renewable source of energy with examples. Give an account of the energy consumption scenario in Nepal. [4]
39. 2074 Set B Q.No. 6d What is green house effect? Discuss its effects, sources and the controlling measures. [4]
40. 2072 Supp Q.No. 6a What are the environmental implications of the following energy sources:
(i) fossil fuels and (ii) nuclear fuels? [4]
41. 2072 Set C Q.No. 6d What are renewable and non renewable sources of energy? Write with examples. Describe the necessity of conservation of natural resources of energy to reduce energy crisis in the future. [4]
42. 2070 Set C Q.No. 6 d What are the major energy sources? Discuss the global energy consumption pattern. [4]
43. 2068 Can. Q.No. 6d What are major energy sources? Give a brief account on the global energy consumption pattern and demands. [4]
44. 2068 Old Can. Q.No. 10 What is air pollution? Discuss the adverse effects of it on the human beings. Write some measures to control it. [4]
45. 2068 Old Q.No. 10 What do you mean by radiation hazard? What safety measures may be taken into account in order to avoid it? [4]
46. 2068 Old Q.No. 10 OR Discuss, in brief, the importance of energy for the development of a country. [4]
47. 2068 Old Can. Q.No. 10 OR Discuss the role of physics in the development of a nation. [4]
48. 2067 Old Q.No. 10 Discuss the importance of physics for the development of nation. [4]
49. 2067 Old Q.No. 10 OR What is ozone hole? Mention the causes and effects of depletion of ozone layer. [1+3 = 4]
50. 2066 Supp Q.No. 10 What is ozone hole? Discuss the impacts of ozone depletion on living beings. [4]
51. 2066 Supp Q.No. 10 Or Write an essay on the role of physics in the development of nation. [4]
52. 2064 Q.No. 10 What is water pollution? Discuss its adverse effects and give some measures to control it. [4]
53. 2064 Q.No. 10 OR Write an essay on the role of physics in the development of a developing country like Nepal. [4]
54. 2063 Q.No. 10 What are the roles of physics in the development of nation? [4]
55. 2063 Q.No. 10 OR Describe the present sources of energy being used in our country. [4]
56. 2062 Q.No. 10 What is an ozone layer? Describe the effects of ozone depletion on the plants and animal life on earth. What steps should we take to avoid ozone depletion in our atmosphere? [4]
57. 2061 Q.No. 10 What are the causes of air pollution? Mention its effects and ways to minimize it. [4]
58. 2061 Q.No. 10 OR Write an essay on major sources of energy in Nepal. [4]
59. 2060 Q.No. 10 Give a brief account on "Energy sources of Nepal". [4]
60. 2060 Q.No. 10 OR What is air pollution? Discuss major sources of air pollution and suggest some ways of controlling it. [1+2+1]
61. 2059 Q.No. 10 What do you mean by ozone-hole? What various agents are responsible for ozone layer depletion in the stratosphere? What measures should we take to stop the depletion of ozone layer? [1+2+1 = 4]
62. 2059 Q.No. 10 OR What is renewable source of energy? Nepal is rich in hydro power next to Brazil. Comment on it. [1+3]
63. 2058 Q.No. 10 What is water pollution? What degree of water pollution do you think exists in Kathmandu valley? [4]
64. 2058 Q.No. 10 OR What do you mean by radiation hazard? What are its safety measures? [4]
65. 2057 Q.No. 10 What is the role of physics in the development of a nation? [4]
66. 2057 Q.No. 10 OR What is ozone hole? Discuss the impacts of ozone depletion on living things. [4]

7. PARTICLE PHYSICS AND COSMOLOGY

Short Answer Questions [2 Marks]

1. 2076 GIE Set A Q.No. 2f Write quark combination of proton and neutron. [2]
2. 2076 GIE Set B Q.No. 2d What do you mean by elementary particles and antiparticles? [2]
3. 2076 Set B Q.No. 2f 2072 Supp Q.No. 2a 2070 Supp. Set B Q.No. 2 f Does the universe have a centre? Explain. [2]
4. 2076 Set C Q.No. 2f 2074 Supp Q.No. 2d 2072 Set C Q.No. 2d Write the quark composition of proton and neutron. [2]
5. 2075 GIE Q.No. 2f 2074 Set A Q.No. 2e 2072 Set D Q.No. 2e 2071 Set D Q.No. 2 e State Hubble's law and write the significance of Hubble's constant. [2]
6. 2075 Set B Q.No. 2e Distinguish between leptons and quarks. [2]
7. 2075 Set B Q.No. 2f Give two evidences to show that the universe is expanding. [2]
8. 2074 Set B Q.No. 2e State Hubble's law. What do you mean by dark matter? [2]
9. 2073 Supp Q.No. 2f What are the similarities and differences between a neutrino and a photon? [2]
10. 2073 Set C Q.No. 2f What class of quark combination one can expect in the combination of one quark and a lepton. Explain with example. [2]
11. 2073 Set C Q.No. 2e 2073 Set D Q.No. 2e State and explain Hubble's law. [2]
12. 2073 Set D Q.No. 2c How many types of quark you know? Name them with their electronic charges. [2]
13. 2072 Set E Q.No. 2c 2066 Q.No. 1h 2064 Q.No. 1 f 2061 Q.No. 2 h 2060 Q.No. 1 h What are cosmic rays? [2]
14. 2072 Set E Q.No. 2e 2070 Set D Q.No. 2 f Show that proton contains three quarks: up, up and down. [2]

15. 2071 Supp. Q.No. 2f What are quarks? Write their names with charge they contained. [2]
16. 2070 Supp. Set A Q.No. 2 f What are the similarities and differences between quarks and leptons? [2]
17. 2070 Set C Q.No. 2 f 2069 Set B Q.No. 2a Explain the significance of Hubble's constant. [2]
18. 2069 Supp Set B Q.No. 2 f Show that the dimension of Planck's constant is the same as that of angular momentum. [2]
19. 2069 Set A Q.No. 2f What are the quark combination of proton and neutron. [2]
20. 2068 Can. Q.No. 2e 2066 Supp Q.No. 2g Write the quark combination of proton and neutron. [2]
21. 2068 Old Can. Q.No. 2g What are quarks? Write quark combination of a proton. [2]
22. 2068 Q.No. 2 c What are the similarities and differences between a neutrino and a photon? [2]
23. 2067 Q.No. 2e Write down the quark combination for proton and antineutron. [2]
24. 2067 Old Q.No. 2d What is red shift? [2]
25. 2067 Old Q.No. 2g 2057 Q.No. 2 g What particles do the $\bar{u}\,\bar{u}\,d$ combination produce? [2]
26. 2067 Old Q.No. 2h What are asteroids? [2]
27. 2067 Sup Q.No. 2d A particle consisting up, up and down quarks is a proton. Justify? [2]
28. 2066 Q.No. 2 g What are mesons? Write the names of two mesons. [2]
29. 2066 Q.No. 2 h 2066 Supp Q.No. 1g 2063 Q.No. 1 g What is a black hole? [2]
30. 2063 Q.No. 2 g Give two examples of the pairs of particles antiparticle system. [2]
31. 2061 Q.No. 1 h What is a black hole? [2]
32. 2061 Q.No. 2 g What is the quark combination of a proton? [2]
33. 2059 Q.No. 1 g What quarks combination will give a neutron? [2]
34. 2059 Q.No. 2 g How do you know that the universe is ever expending? Give reasons. [2]

Long Answer Questions [4 Marks]

35. 2069 Set B Q.No. 6c Name the quarks you know. Also present the quark combinations of baryon and meson groups of particles. [4]
36. 2068 Old Q.No. 9 OR Give an account of simple classification of elementary particles with examples. [4]
37. 2066 Q.No. 10 OR Describe the death of a star. [4]
38. 2062 Q.No. 9 What are fundamental particles? How are they classified? Write the properties of quarks and lepton. [4]
39. 2062 Q.No. 9 OR Explain how Universe expands. Explain the Hubble's law. [4]
40. 2059 Q.No. 9 a OR Name the different types of galaxies you know? Describe milky way galaxy in brief. [4]
41. 2058 Q.No. 9 OR Give a classification of elementary particles with example. [4]

YEARWISE QUESTIONS

2077 (Set D)

Group 'A'

1. Answer, in brief, any three questions. [3×2=6]

a. Draw a Wheatstone bridge circuit and mention the balance condition for it.
b. What is Curie temperature?
c. How does a daughter nucleus differ from its parent nucleus when it emits a β particle?
d. What is quality of sound?
e. Can sound waves be polarized? Explain.

Group 'B'

2. Answer any three questions. [3×4=12]

a. Define thermoelectric effect. How does the emf of a thermocouple vary with the temperature of hot junction?
b. Describe J.J. Thomson's experiment for measuring the specific charge (e/m) of an electron.
c. Prove, with necessary diagrams, that both types of harmonics odd and even can be obtained in an organ pipe open at both ends. What is end correction of a pipe?
d. State and explain Huygen's construction and use it to verify laws of refraction.

Group 'C'

3. Answer any three numerical questions. [3×4=12]

a. A coil of inductance 0.5 H and negligible resistance is in series with a resistance of 40 Ω. A supply voltage of 40 V (rms) is connected across them. If the voltage across the coil is equal to that across resistor, calculate the voltage across each component and frequency of the supply.
b. A radioactive element has a half life of 2500 years. In how many years will its mass decay by 90% of its initial mass?
c. At what temperature, the velocity of sound in air is increased by 60% to that at 27°C?
d. In a Newton's rings experiment, the diameter of 15th ring was found as 0.594 cm and that of 5th ring was 0.332 cm. Calculate the radius of curvature of the plano-convex lens if the wavelength of light used is 5890Å.

Chemistry

NEW SYLLABUS

Teaching Hours: 150T+50P

Full marks: 100 (75T + 25 P)
Pass Marks: 27T + 8P

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I. Introduction

Chemistry is concerned with the physical and chemical characteristics of substances, the nature of matter and the study of chemical reactions. Chemistry, thus, is a powerful process of uncovering and extending our understanding of various chemical phenomena. The power resides in the combination of concepts and experiments involving careful observation and quantitative measurements under controlled conditions. The resulting concepts suggest further experiments and investigations as a result, there will be a modification of the existing concept leading to a creativity of thought. This creativity involves the recognition of a problem; formulation of ideas to solve the problem and ultimately refinement of the original ideas. The present curriculum aims to foster this uniqueness among students by enabling them to study both theoretical and practical aspects of chemistry.

This course is theory-cum-practical. It is intended to consolidate learning in chemistry achieved in the secondary school. Furthermore, it intends to provide a concrete knowledge and appropriate skills for those students, continuing further studies in chemistry and the students not studying the subject beyond this stage. The course seeks to maintain a balance between useful facts, concepts and theories which will facilitate understanding of the properties of substances, reactions and processes. Emphasis is enforced to stimulate, create and sustain students' interest in chemistry.

Chemistry being an experimental science, laboratory is an essential component of its syllabus. The course intends to make students aware of the importance of scientific method for accurate experimental work and develop the abilities to interpret, organize and evaluate data in order to make decisions and solve problems.

II. General Objectives

The general objectives of this course are to:

1. apply appropriate chemical principles, concepts, theories, definitions, laws, models and patterns to interpret, draw conclusion, make generalization, and predictions from chemical facts, observations and experimental data;
2. select appropriate facts to illustrate a given principle, concept, theory, model and pattern;
3. present chemical ideas in a clear and logical form; and
4. select and organize data and perform calculations in which guidance on the method is not supplied.

III. Specific Objectives

After studying the course, the student shall be able to :

1. state and apply fundamental facts and principles of chemistry dealing with the
   i. Methods of preparation: general, laboratory and industrial process of the matters,
   ii. Physical and chemical properties,
   iii. Important applications.
2. perform chemical calculations;
3. identify the mineral resources of Nepal;
4. understand chemical patterns and principles;
5. apply knowledge and understanding of chemistry in familiar and unfamiliar situations;
6. make accurate observations and measurements, being aware of possible sources of error;
7. record the results of experiments accurately and clearly; draw conclusion and make generalization from experiment; and
8. appreciate the scientific, social, economic, environmental and technological contributions and applications of chemistry.

General & Physical Chemistry (Section A)

Unit 1: Chemical Bonding and Shape of Molecules - 3 teaching hours

1. Hybridization and concept of sigma and pi bond
2. Valence shell Electron Pair Repulsion (VSEPR) theory
3. Prediction of molecular geometry (Shape of molecules) on the basis of VSEPR and hybridization. (BeF_2, BF_3, NH_3, H_2O, CH_4, H_2O_2, C_2H_2, C_2H_4, H_2S)

Unit 2: Volumetric Analysis - 8 teaching hours

1. Different ways of expressing the concentration of solutions
   i. Molarity
   ii. Normality
   iii. Molality
   iv. Gram /Litre
   v. Percentage
2. Titration:
   i. Acid-base titration
   ii. Redox titration
3. Primary standard substances, primary standard solution, secondary standard solution, end point, equivalence point, neutral point, indicators
4. Derivation of normality equation
5. Relation between normality and molarity
6. Selection of indicators in acid-base titration and pH curve
7. Solving related numerical problems

Unit 3: Ionic Equilibrium - 12 teaching hou

1. Introduction
2. Ionization of weak electrolyte (Ostwald's dilution law)
3. Degree of ionization and ionization constant
4. Strength of acids and base interm of K_a, K_b and p_{Ka} and p_{Kb} values
5. Acid-base concept
   i. Arrhenius concept of acids and bases.
   ii. Bronsted Lowrry concept of acids and bases
   iii. Lewis concept of acids and bases.
6. Ionization of water, pH and pH-scale
7. Hydrolysis of salts (qualitative concept)
8. Solubility product principle and its application
9. Common ion effects and its application
10. Application of solubility product principle in qualitative analysis
11. Buffer Solution
    (Solving numerical problems related with solubility, solubility product, pH and pOH)

Unit 4: Electrochemistry - 10 teaching hou

1. Introduction
2. Electrolysis; strong and weak electrolyte
3. Arrehenius theory of ionization
4. Faraday's laws of electrolysis
5. Criteria of product formation during electrolysis
6. Electrolytic conduction, equivalent and molar conductivities
7. Variation of conductivity with concentration
8. Electrode potential, standard electrode potential, standard hydrogen electrode and its applications
9. Eletrochemical series and its use to predict the feasibility of redox reactions
10. Electrochemical cell (Galvanic cell)
11. EMF of electrochemical cell in the standard state
    (Solving related numerical problems)

Unit 5: Energetics of Chemical Reactions - 8 teaching hou

1. Introduction, unit of energy
2. Some thermodynamical terms: system, surrounding, boundary, universe different types of system, state function, sta variables and internal energy
3. Exchange of energy between the system and surrounding
4. Different types of thermodynamic process
5. The first law of thermodynamics
6. Sign convention of heat and work
7. Enthalpy, enthalpy change in chemical reactions
8. Hess's law of constant heat summation
9. Heat of neutralization, heat of solution, heat of combustion, heat of vapourization, heat of formation and bond energy
   (Solving related numerical problems)

Unit 6: Chemical Thermodynamics - 6 teaching hou

1. Spontaneous process
2. Second law of thermodynamics
3. Entropy and its physical concept
4. Entropy change in phase transformation
5. Entropy and spontaneity
6. Entropy changes and their calculation
7. Gibb's free energy and prediction for the feasibility of reaction
8. Standard free energy change and equilibrium constant
9. Influence of temperature on spontaneous process
   (Calculation involving in standard free energy change and equilibrium constant)

Unit 7: Chemical Kinetics - 10 Teaching hou

1. Concept of reaction rate
2. Average rate and instantaneous rate of a reaction
3. Factors that influences the rate of reaction
4. Rate law equation, rate constant and its units
5. 1^{st} order, 2^{nd} order, 3^{rd} order and zero order reactions
6. Order and molecularity of a reaction
7. Integrated rate law for a first order reaction
8. Half-life of a reaction (first order)
9. Explaining the increase in reaction rate with temperature or collision theory (qualitative concept only)
10. Concept of activation energy as the energy barrier, activated complex and effect of catalyst on the rate of reaction
    (Solving related numerical problems)

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Unit 8: Aromatic Hydrocarbon - 3 teaching hours

1. Definition, characteristics of aromatic compounds. Huckel's rule, structure of benzene, isomerism and orientation of benzene derivatives
2. Preparation of benzenes from
   i. decarboxylation; ii. phenol; iii. ethyne; iv. chlorobenzene
3. Physical properties of benzene
4. Chemical properties of benzene
   i. Addition reaction : hydrogen, halogen and ozone
   ii. Electrophilic substitution reactions: nitration, sulphonation, halogenation, Friedel Craft's alkylation and acylation
   iii. Combustion of benzene and uses

Unit 9: Haloalkanes and Haloarenes

9.1. Haloalkanes: - 8 teaching hours

1. Introduction, classification and isomerism
2. Preparation of monohaloalkanes from alkanes, alkenes and alcohols
3. Physical properties of monohaloalkanes
4. Chemical properties
   - Substitution reactions
   - Elimination reaction (dehydrohalogenation)
   - Grignard's reactions
   - Reduction reactions
   - Wurtz's reaction
5. Polyhaloalkane;
   - Laboratory preparation of trichloromethane from ethanol and proponone
   - Physical properties of trichloromethane
   - Chemical properties: oxidation, reduction, action on Silver Powder, conc. nitric acid, propanone, aqueous alkali, Carbyl amine reaction, Reimer Tiemann's reaction, iodoform reaction, etc

9.2. Haloarenes:

- Preparation of chlorobenzene from
  i. benzene
  ii. benzene diazonium chloride
- Physical properties
- Chemical properties
  - Low reactivity of haloarene as compared to haloalkane in term of nucleophilic substitution reaction
  - Reduction of chlorobenzene
  - Electrophilic substitutre reactons
  - Action with Na, Mg and chloral etc.
  - Uses

Unit 10: Alcohols and Phenols - 10 teaching hours

10.1. Alcohols:

1. Introduction, classification, nomenclature and isomerism
2. Distinction of primary, secondary and tertiary alcohol by Victor Meyer's Method
3. Preparation of monohydric alcohols from i. haloalkane ii. Grignard's reagents using aldehydes and ketones iii. primary amines iv. Ester
4. Industrial preparation ethanol from: i. Oxo-process ii. Fermentation of sugar iii. hydroboration of ethene
5. Physical properties monohydric alcohols
6. Chemical properties of monohydric alcohols
   - Reaction with HX. PX_3, P_2O_5, $SOCl_2$
   - Action with reactive metals like Na, K, Li
   - Esterification process
   - Dehydration of alcohols.
   - Oxidation of primary, secondary and tertiary alcohol with oxidizing agents.
   - Reduction of alcohols (Catalyic dehydrogenation)
   - Laboratory test of ethanol
   - Absolute alcohol, methylated spirit, rectified spirit; alcoholic beverage.
- Preparation and uses of ethane-1, 2-diol (glycol)
- Preparation and uses of Propane-1, 2, 3- triol (glycerol)

10.2. Phenols:

1. Introduction to phenol
2. Preparation of phenol from
   i. chlorobenzene
   ii. Diazonium salt and
   iii. benzene sulphonic acid
3. Physical properties of phenol
4. Chemical properties
   - Acidic nature of phenol

- Action with PCl_5, PX_3, NH_3, Zn, Na, benzene diazonium chloride and phthalic anhydride
- Acylation reaction, Kolbe's reaction, Reimer Tiemann's reaction
- **Electrophilic substitution:** halogenation, nitration, sulphonation, and Friedel Craft's alkylation
- Laboratory test of phenol
- Uses of phenol

Unit 11: Ethers - 4 teaching hours

11.1 Aliphatic Ethers:

1. Introduction, nomenclature classification, isomerism in ether
2. Preparation of ethers from i. alcohol ii. Williamson's etherification process
3. Laboratory preparation of ethoxyethane from ethanol
4. Physical properties of ether
5. Chemical properties of ethoxyethane
   - action with HI, PCl_5, Conc. HCl, Conc. H_2SO_4, air and Cl_2
   - Uses of ethoxyethane

11.2 Aromatic Ether:

- Preparation of methoxybenzene (anisole)
- Halogenation, nitration and sulphonation reactions

Unit 12: Aldehydes and Ketones - 11 teaching hours

12.1 Aliphatic Aldehydes and Ketones

1. Introduction, structure of carbonyl group, nomenclature and isomerism in carbonyl compound
2. Preparation of aldehydes and ketones from
   i. Dehydrogenation and oxidation of alcohol
   ii. Ozonolysis of alkenes
   iii. Acid chloride
   iv. Gem dihaloalkane
   v. Calalytic distillation of fatty acid
   vi. Distillaiton of calcium salt of fatty acid
   vii. Catalytic hydration of alkynes
3. Physical properties
4. Chemical properties
   i. Addition reaction: addition of H_2, HCN, $NaHSO_3$ and Grignand's reagents
   ii. Action with ammonia derivatives; NH_2OH, NH_2-NH_2, phenyl hydrazine, semicarbazides and 2, 4-DNP
   iii. Reduction of aldelydes
   - Oxidation with Tollen's reagent, Fehling's solution
   iv. Aldol condensation reaction; Clemmenson's reduction Wolf-Kishner reduction, Action with PCl_5, action with $LiAlH_4$
   v. Special reaction of methanal; Cannizzaro's reaction, action with ammonia, action with phenol; formalin and its uses

12.2 Aromatic Aldelydes and Ketones:

- Preparation of benzaldelyde from toluene
- Properties of benzaldelyde
- Important reaction of benzaldelyde different from aliphatic aldelydes:
  - Perkin condensation
  - Benzoin condensation
  - Electrophilic substitution reaction
  - Cannizzaro's reaction
- Preparation of acetophenone by Friedel Craft's acylation

Unit 13: Carboxylic Acids - 10 teaching hours

13.1 Aliphatic Carboxylic Acids:

- Introduction, nomenclature, examples
- Preparation of monocarboxylic acids from
  i. aldehydes ii. nitriles iii. Grignard's reagents
  iv. dicarboxylic acid v. sodium alkoxide. vi. trihaloalkanes
- Physical properties of monocarboxylic acids
- Chemical properties: Action with alkalies, metal oxides, metal carbonates, metal bicarbonates, PCl_3, $LiAlH_4$ and dehydration of carboxylic acid, esterification, halogenation
- Effect of constituents on the acidic strength of carboxylic acid
- Laboratory preparation of methanoic acid
- Abnormal behaviour of methanoic acid
- Uses of carboxylic acid

13.2 Derivatives of Carboxylic Acid:

1 Nomenclature, preparation and properties of
i. Acid halides ii. Acid amides
iii. Acid anhydrides and iv. Esters

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13.3 Aromatic Carboxylic Acids:
- Preparation of benzoic acid
- Physical and chemical properties
- Uses of benzoic acid

Unit 14: Nitrocompounds:

14.1 Aliphatic Nitrocompounds (Nitroalkane): - 4 teaching hours

1. Introduction and nomenclature
2. Preparation from haloalkane and alkane
3. Physical properties
4. Reduction of nitroalkane
5. Uses

14.2 Aromatic Nitrocompounds:

1. Laboratory preparation of nitrobenzene
2. Physical properties
3. Chemical properties
   - Reduction in different media
   - Electrophilic substitution reactions
   - Uses of nitrobenzene

Unit 15: Amino Compounds (Amines and Aniline)

15.1 Aliphatic Amines: - 7 teaching hours

1. Introduction, nomenclature and classification
2. Separation of primary, secondary and tertiary amines by Hoffmann's method
3. Preparation of primary amines from haloalkane, nitriles, nitroalkanes and amides
4. Physical properties
5. Chemical Properties: basicity of amines, comparative study of basic nature of 1°, 2° and 3° amines, Reaction of Primary amines with chloroform, conc. HCl, R-X, RCOX and nitrous acid ($NaNO_2$ / HCl)
6. Test of 1°, 2° and 3° amines. (nitrous acid test)

15.2 Aromatic Amine (Aniline):

1. Laboratory preparation of aniline
2. Physical properties
3. Chemical properties: basicity of aniline, comparision of basic nature of aniline with aliphatic amines; alkylation, acylation, diazotization, carbylamine and coupling reaction
4. Electrophilic substitution: Nitration, sulphonation and halogenation
5. Uses of anitne

Unit 16: Molecules of Life - 8 teaching hours

1. **Carbohydrates:** definition, classification of carbohydrates, various examples of carbohydrate of different class, structure of glucose and fructose, function of carbohydrates, sugar and non-sugar
2. **Protein:** definition, amino acid, essential and non-essential amino acids, peptide linkage, hydrolysis of amino acids, denaturation of protein, Zwitter ions, functions of amino acids
3. **Nucleic acid:** definition, basic components of nucleic acid; doule helix, difference between RNA and DNA; biological function of nucleic acid
4. **Lipid:** definition, fatty acids, fat as ester of fatty acid and difference between fats and oils, function of lipid
5. Enzymes and their functions

Unit 17: Chemistry in Service to Mankind - 10 teaching hours

1. **Polymer:** definition, natural and synthetic polymers, homopolymers and co-polymer, Preparation of some polymers; PVC, polyethene polystyrene, Teflon, Nylon-6,6, Bakelite and their uses
2. **Dyes:** definition, natural and synthetic dyes, names and structure of some common drug, drug addiction
3. **Fertilizer:** definition, chemical and organic fertilizers, nitrogen fertilizer, phosphatic fertilizer; fertilizer as pollution
4. **Pesticides:** insecticides, herbicides, weedicides and fungcides (examples and their uses)

Inorganic Chemistry Section C

Unit 18: Heavy Metals -18 teaching hours

1 General Characteristics of Transition Metals

18.1. Copper:

1. Position in periodic table
2. Occurrence and extraction of copper form copper pyrites
3. Properties and uses
4. Chemistry of (i) blue vitriol (ii) black oxide of copper (iii) red oxide of copper

18.2 Zinc:

1. Position in periodic table
2. Occurrence and extraction of zinc from zinc blende
3. Properties and uses
4. Preparation, properties and uses of zinc white and white vitriol
5. Galvanization

18.3 Mercury:

1. Occurrence and extraction of Hg from Cinnabar
2. Properties of mercury

3. Mercury poisoning and uses of Hg
4. Preparation, properties and uses of (i) Calomel (ii) Corrosive Sublimate

18.4. Iron:

1. Occurrence and extraction of iron
2. Varieties of Iron
3. Properties of Iron
4. Manufacture of Steel by
   i. Bessemer process
   ii. Open Hearth process
5. Heat treatment of steel
6. Stainless steel
7. Rusting of iron and its prevention
8. Uses and biological importance of iron
9. Structure and uses of Green vitriol, Ferric chloride, Mohr's salt

18.5. Silver:

1. Extraction of Silver by cyanide process and its uses
2. Preparation and uses of
   i. Silver chloride
   ii. Silver nitrate

Practical

Full Marks: 2
Pass Marks: 1

Students are required to secure the pass marks in the practical paper separately from the theory paper. The following is the list of experiments. The students are required to perform in the practical classes in Grade XII.

A. Experiments based on recovery and preparation of salt.

1. To recover blue vitriol crystal from the given mixture of copper sulphate and Sodium chloride;
2. To recover $CaCO_3$ from the mixture of $CaCO_3$ and $MgCO_3$ (dolomite)
3. To obtain hydrated calcium sulphate form the given marble chips.

B. Experiments on volumetric analysis (Titration)

4. To prepare primary standard solution of Na_2CO_3 and standardize the given acid solution HCl by the standard solution;
5. To determine the strength of approximate 0.1 N NaOH solution with the help of standard decinormal solution of HCl supplied
6. To determine the strength of bench sulphuric acid (H_2SO_4) with the help of standard NaOH or Na_2CO_3 solution and express the concentration in (i) normality (ii) molarity (iii) g/litre (iv) percentage by volume
7. To standardize the given $KMnO_4$ solution with the help of primary standard oxalic solution. (Redox titration) ;
8. To determine the enthalpy of neutralization of a strong acid and strong base;
9. To complete salt analysis by dry and wet ways. (at least 3 salts);
10. To detect foreign elements present in a given organic compounds. (N, S and X);
11. To identify the functional group present in the organic compounds. (OH, -COOH, - CHO, > CO, - NH_2);
12. To test the presence of
    a. Saturated or unsaturated fats,
    b. Carbohydrate,
    c. Proteins,
    d. Phenol.

Note: The experiment no.9 requires 4 practical periods. The experiment no. 10 requires 3 practical periods, the experiment no. 11 requires 3 periods and remaining experiments require 1 period of each. (2 theory periods will be equivalent to 1 practical period.)

Evaluation Scheme

The chemistry theory paper (XII) will consist of three types of questions:

a. Very short-answer questions (weightage of 2 marks of each);
b. Short-answer questions (weightage of 5 marks of each);
c. Long- answer questions (weightage of 10 mark of each.)

According to nature of questions, groups are divided into group 'A', group 'B' and group 'C'.

1. Group 'A' will consist of twenty two (22) very short questions, out of which, examinees are required to answer only fifteen (15) questions.
2. Group 'B' will consist of seven (7) short questions, out of which examinees are required to answer five (5) questions
3. Group 'C' will consist of four (4) questions, out of which examinee are required to answer 2 questions

The weightage of content distribution for the three types of questions form different sections of the curriculum will be as follows:

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Units	Teaching hours	V.S.Q.	S.Q.	L.Q.
1	3	1		
2	8	1		
3	12	1		
4	10	1		
5	8	1		
6	6	1		
7	10	1		
8	3	1		
9	8	1		
10	10	1		
11	4	1		
12	11	1		
13	10	1		
14	4	1		
15	7	1		
16	8	1		
17	10	2		
18	18	2		
Total: 18	150	22	7	4

MODEL QUESTION - 2056 (OLD COURSE)

Group 'A'

Attempt any FIFTEEN questions. **[15 × 2 = 30]**

1. Predict the structure of water molecule using VSEPR model.
2. Why is it difficult to undergo nucleophilic substitution in haloarene?
3. Give an example of Reimer Tiemann reaction.
4. Why is the b.p. of ethanol higher than its isomer dimethyl ether?
5. What happens when benzaldehyde is heated with aq. NaOH.
6. Suggest the structure of (A) in the reaction given below:

$$A \xrightarrow[zn/H_2O]{O_3} \text{Methanal + Propanone}$$

7. Give a chemical test to distinguish between methanoic acid and ethanoic acid.
8. Write an example of diazotization reaction.
9. Give two differences between DNA and RNA.
10. List two functions of proteins.
11. Match the following:

A. Aspirin	A. Antibiotic
B. Dettol	B. Antipyretic
C. Paracetamal	C. Antiseptic
D. Chloromycetin	D. Analgesic

12. Name any two insecticides.
13. x gram of $CaCO_3$ reacts completely with 20 mL of 1 molar HCl. Calculate the value of x.

Ans: x = 1 g

14. State Faraday's Law of Electrolysis.
15. Calculate the standard EMF of a cell from the half cell. Ag^{+}/Ag and Ni^{+2}/Ni having standard reduction potential +0.80 V and – 0.25V respectively.

Ans: Emf = 1.05 V

16. Define and give one example of Lewis base.
17. What is the criteria for spontaneity of a reaction?
18. Draw energy profile diagram for catalyzed and uncatalyzed reaction.
19. Write two ways for prevention of corrosion.
20. Give two uses of Zinc.

Group 'B'

Attempt any FIVE questions. **[5×5= 25]**

21. How is Diethyl ether prepared in the laboratory?
22. A primary haloalkane (X) on dehydrohalogenation yields a compound (Y), which when reacted with HCN gives (Z). The compound Z on hydrolysis gives propanoic acid. Identify X, Y and Z.
23. What happens when:
    a. The gas produced by heating chloroform with silver powder is passed into ammoniacal silver nitrate solution.
    b. The product obtained by heating chlorobenzene with aq. NaOH is allowed to react with CO_2 at about 130°C under pressure.
24. For the reaction $2A + B \longrightarrow C$, the following data were obtained.

Expt. No.	Initial conc^n of [A]° mol/L	Conc^n of [B]° mol/L	Initial rate of reaction Mol, L^{-1} s^{-1}
1	0.1	0.2	3×10^2
2	0.3	0.4	3.6×10^3
3	0.3	0.8	1.44×10^4

    a. Find the order of reaction with respect of A, B and over all.
    b. What are the units of rate constant of the reaction?

Ans: (a) 3rd order (b) Mol^{-2} L^{+2} S^{-1}

25. 0.05 g of impure $CaCO_3$ is dissolved into 20 mL of $\frac{N}{5}$ [f = 1.05] HCl solution and excess of HCl solution needs 30 mL of $\frac{N}{10}$ [f=1.15] NaOH solution for complete neutralization. Find the percentage purify of $CaCO_3$.

Ans: 75.01%

26. Define Gibb's free energy and derive an expression to show the relation between ΔG, ΔH and ΔS.
27. How is mercury extracted in pure form from its sulphide ore?

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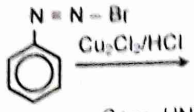
Group 'C'

Attempt any TWO questions. **[2×10 = 20]**

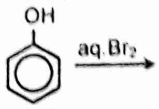
28. How is nitrobenzene prepared in laboratory? Give its reduction in different media.

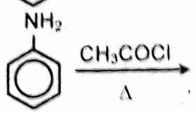
29. a. Write the major product of following reactions:

i. $CH_3COOH \xrightarrow[\Delta]{P_2O_5}$

ii. 

iii. $CHCl_3 \xrightarrow{\text{Conc. } HNO_3}$

iv. 

v. 

b. How would you convert?
i. 1 – propanol into 2 – propanol
ii. Nitrobenzene into phenol

30. a. Define specific conductance and molar conductance. How do they vary with dilution?
b. Find the pH of 0.01M acetic acid solution. (Given, Ka = 1.85×10^{-5})

Ans: 3.

31. Write short note on any TWO:
a. Characteristics of Transition elements.
b. Hoffmann's method of separation of mixture of amines
c. Manufacture of steel by Open-Hearth process.
d. Application of common ion effect in qualitative analysis

CHAPTER BASED QUESTIONS

GENERAL & PHYSICAL CHEMISTRY (SECTION A)

UNIT 1: CHEMICAL BONDING AND SHAPE OF MOLECULES

FORMULAE

VSEPR Theory

No. of e⁻ pair in valance shell	Shape	Bond angle	Example
2	Linear	180°	BeF_2, $BeCl_2$
3	Trigonal	120°	BF_3, BCl_3
4	Tetrahedral	109° 28' (109.5°)	CH_4, CCl_4, NH_4^+
5	Trigonal bipyramidal	90°, 120°	PCl_5
6	Octahedral	90°	SF_6
7	Pentagonal bipyramidal	72°, 90°	IF_7

Variation of bond angle with change in E.N. of central atom

Group 15	Bond angle	E.N.
NH_3	107° 48'	Decrease ↓
PH_3	93° 36'	
AsH_3	91° 48'	
SbH_3	91° 18'	

Group 16	Bond angle	E.N.
H_2O	104° 28'	Decrease ↓
H_2S	92°	
H_2Se	91°	
H_2Te	90°	

Group 17	Bond angle	E.N.
PF_3	97°	↓ Increase
PCl_3	100°	
PBr_3	101.5°	
PI_3	102°	

Hybridization

Hybridization	Geometry	Bond angle	Examples
sp	Linear	180°	C_2H_2, CO_2, BeF_2, $BeCl_2$
sp^2	Trigonal planar	120°	C_2H_4, C_6H_6, BF_3
sp^3	Tetrahedral	109° 28' (109.5°)	CH_4, CH_3X
sp^3d	Trigonal bipyramidal	90°, 120°	PX_5
sp^3d^2	Octahedral	90°	SF_6
sp^3d^3	Pentagonal bipyramidal	72°, 90°	IF_7

Very Short Answer Questions [2 marks]

1. **2077 Set P Q.No. 4** What is the mode of hybridization of B in BF_3. Predict the geometry of such molecule. [1+1]
2. **2077 Set V Q.No. 1** Write an example of a molecule having trigonal pyramidal geometry. What is the mode of hybridization on central atom of the molecule? [1+1]
3. **2077 Set W Q.No. 1** Why has ammonia got trigonal pyramidal geometry though nitrogen shows sp^3 hybridization? [2]
4. **2076 GIE Set A Q.No. 1** C in CH_4 gets sp^3 hybridization. Give reason. [2]
5. **2076 GIE Set B Q.No. 1** Predict the mode of hybridization in BF_3 and write any two features of such hybridization. [1+1]
6. **2076 Set B Q.No. 1** How would you confirm that B in BF_3 gets sp^2 hybridization?
7. **2076 Set C Q.No. 1** C in C_2H_2 gets sp hybridization, why?
8. **2075 GIE Q.No. 1** State any two proper conditions for hybridization. What is the mode of hybridization of C in C_2H_2? [1+1]
9. **2075 Set A Q.No. 1** Predict the mode of hybridization of B in BF_3. Mention any two features of this hybridization [1+1]

10. 2075 Set B Q.No. 1 Predict the mode of hybridization. [1+1]
    i. carbon in ethyne
    ii. oxygen in water
11. 2074 Supp. Q.No. 1 Write two important features of hybrid orbitals [2]
12. 2074 Set A Q.No. 1 Which kinds of hybridization results into tetrahedral geometry? Give an example of such hybridization. [1+1]
13. 2074 Set B Q.No. 1 Which kinds of hybridization results into linear geometry. Give an example of such hybridization. [1+1]
14. 2073 Supp Q.No. 1 What kinds of hybridization results into trigonal planar geometry. Give an example of it. [1+1]
15. 2073 Set C Q.No. 1 How would you predict the geometry of ammonia molecule on the basis of VSEPR theory? [2]
16. 2073 Set D Q.No. 1 Ammonia molecule has got trigonal pyramidal geometry even though nitrogen of ammonia gets sp^3 hybridization. Give reason. [2]
17. 2072 Supp. Q.No. 1 Predict the mode of hybridization in the central atom of the molecules having (i) trigonal plannar (ii) tetra-hedral structure with an example of each. [1+1]
18. 2072 Set C Q.No. 1 Define hybridization and write any two features of tetrahedral hybridization. [1+1]
19. 2072 Set D Q.No. 1 What are the features of tetrahedral hybridization? Write an example of it. [1+1]
20. 2072 Set E Q.No. 1 State the mode of hybridization in B of BF_3 and C of C_2H_6. [1+1]
21. 2071 Supp. Q.No. 1 What is the mode of hybridization in carbon of acetylene? Write any two correct features of this hybridization. [1+1]
22. 2071 Set C Q.No. 1 Predict the geometry of molecules having:
    a. sp^3 hybridization
    b. sp hybridization with an example of each. [1+1]
23. 2071 Set D Q.No. 1 Write any two features of sp^3 hybrid orbital with an example. [1+1]
24. 2070 Supp. Q.No. 1 Which kinds of hybridization results into tetrahedral geometry? Mention any one character of such hybridization. [1+1]
25. 2070 Set C Q.No. 1 What is meant by hybrid orbital? Write an example of it. [1+1]
26. 2070 Set D Q.No. 1 Why do NH_3 and BF_3 have dissimilar geometries? [2]
27. 2069 Supp. Set B Q.No. 1 State the mode of hybridization of C_2H_6 and mention any two features of this hybridization. [2]
28. 2069 Set A Q.No. 1 Nitrogen of ammonia gets sp^3 hybridization but ammonia molecule has trigonal pyramid geometry. Give reason. [2]
29. 2069 Set B Q.No. 1 What is the mode of hybridization of B in BF_3? Write any two important features of this hybridization. [1+1]
30. 2068 Q.No. 1 Write any two important characters of tetrahedral hybridization. [1+1]
31. 2067 Q.No. 1 Mention one example of each: [1+1]
    i. Tetrahedral Hybridization
    ii. Trigonal Hybridization
32. 2066 Q. No. 1 What is the mode of hybridization of the central atom whose molecular geometry is tetrahedral? And, give an example of its. [2]
33. 2065 Q.No. 1 Predict the mode of hybridization in
    i. C of C_2H_4 ii. B of BF_3 [2]
34. 2063 Q.No. 1 Define hybridization. Draw the orbital picture of a hydrocarbon showing tetrahedral structure. [2]
35. 2061 Q.No. 1 The bond angle at the central atom in NF_3 is 103°, whereas in BF_3 is 120°. What factor accounts for the difference in bond angles? [2]
36. 2060 Q.No. 1 How would you interpret that all four C – H bonds of methane are identical? [2]
37. 2059 Q.No. 1 Draw the molecular orbital picture of ethane. [2]
38. 2058 Q.No. 1 Draw the orbital picture of ethyne indicating sigma and pi bonds. [2]
39. 2057 Q.No. 1 How do you predict the molecular geometry of NH_3 based on VSEPR model? [2]
40. 2056 Q.No. 1 Draw the shapes of sp and sp^2 hybrid orbitals. [2]
41. 2053 Q.No. 2 Identify the hybridization of the indicated atom in each of the following molecules. [2]
    a. Be in BeF_2 b. B in BF_3 c. N in NH_3
42. 2052 Q.No. 1 Predict the structure of methane based on hybridization. [2]
43. 2064 Q.No. 1 Why is H-O-H bond angle in water molecule comparatively higher than H-S-H bond angle in H_2S molecule? [2]
44. 2062 Q.No. 1 How do you predict the molecular geometry of NH_3 based on VSEPR model? [2]

Short Answer Questions [5 marks]

45. 2056 Q.No. 24 Using VSEPR theory, explain the shapes of BeF_2 and BF_3. [5]
46. 2055 Q.No. 23 Explain the state of hybridization in ethyne molecule. [5]
47. 2054 Q.No. 24 What do you understand by sp^2 hybridization? Using any example explain the molecular geometry involved. [5]

Write short notes on

48. 2061 Q.No. 31(iv) 2055 Q.No. 31(a) VSEPR model [5]

UNIT 2: VOLUMETRIC ANALYSIS

Very Short Answer Questions [2 marks]

FORMULAE

1. Principel of Volumetric Analysis
   No. of gram equivalent of Acid = No. of gram equivalent of Base

$$\text{No. of gram equivalent} = \frac{\text{Weigth of substance}}{\text{Equivalent weight of substance}} = \frac{W}{E}$$

2. Concetration

i. $g/L = \frac{\text{Weigth of Solution (g)}}{\text{Volume of solution (L)}}$

ii. $\%\ \frac{w}{v} = \frac{\text{Weigth of Solution (g)}}{\text{Volume of solution (mL)}} \times 100$

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iii. $\% \frac{w}{w} = \frac{\text{Weigth of Solution (g)}}{\text{Wegith of solution (g)}} \times 100$

iv. Normality (N) $= \frac{\text{Weigth of Solution (g)}}{\text{Gram equivalent weigth of solution}} \times \frac{1}{\text{Volume of solution (mL)}} \times 1000$

$W = \frac{NEV}{1000}$

v. Molarity (M) $= \frac{\text{Weigth of Solution (g)}}{\text{Gram molecular weigth of solution}} \times \frac{1}{\text{Volume of solution (mL)}} \times 1000$

$W = \frac{MMwV}{1000}$

vi. Molality (m) $= \frac{\text{Weigth of Solution (g)}}{\text{Molecular weigth of solution}} \times \frac{1}{\text{Weight of solution (g)}} \times 1000$

vii. ppm $= \frac{\text{Weigth of Solute (g)}}{\text{Volume of solution (mL)}} \times 10^6$

3. Relation between different concentration

i. G/L = Normality × Equivalent weight of solute

ii. G/L = Molarity × Molecular weight of solute

iii. Normality (N) = Molarity (M) × basicify (For acid)
= Molarity (M) × basicify (For base)

iv. Normality (N) = Molarity $\times \frac{\text{Molecular weight}}{\text{Equivalent weight}}$ (for salt)

v. Equivalent weight of acid $= \frac{\text{Molecular weight of acid}}{\text{Basicity}}$

vi. Equivalent weight of base $= \frac{\text{Molecular weight of acid}}{\text{Acidity}}$

vii. Equivalent weight of salt $= \frac{\text{Molecular weight of acid}}{\text{Total + ve charge present in basic radical}}$

viii. Normality (N) $= \frac{\% \frac{w}{w} \times \text{specific gravity} \times 10}{\text{Equivalent weight}}$

viii. Molarity (M) $= \frac{\% \frac{w}{w} \times \text{specific gravity} \times 10}{\text{Molecular weight}}$

4. Standard Solution

i. Normal solution = 1N Molar solution = 1M

ii. Decinormal solution $= \frac{N}{10}$ Decimolar $= \frac{M}{10}$

iii. Seminormal solution $= \frac{N}{2}$ Semimolar $= \frac{M}{2}$

iv. Centinormal solution $= \frac{N}{100}$ Centimolar $= \frac{M}{100}$

5. % purity $= \frac{\text{Calculated weight}}{\text{Given weight}} \times 100$

6. Normality equation: $V_1N_1 = V_2N_2$

7. Molarity equation: $V_1M_1 = V_2M_2$

8. Normality of resultant mixture (N) $= \frac{V_1N_1 + V_2N_2 + \ldots}{V_1 + V_2 + \ldots}$

9. Normality of resultant acid solution (N_mV_m)
$= V_1N_1 + V_2N_2 + V_3N_3 + \ldots$

10. Molarity of resultant mixture (M) $= \frac{V_1M_1 + V_2M_2 + \ldots}{V_1 + V_2 + \ldots}$

1. **2077 Set V Q.No. 3** What volume of water should be added to 50 mL of semi normal NaOH solution to make it exactly deci-normal. [2]
Ans: 200 mL

2. **2076 GIE Set A Q.No. 2** Distinguish between titrant and titrand. [2]

3. **2076 GIE Set B Q.No. 2** Oxalic acid is taken as prima... standard substance, why?

4. **2076 Set B Q.No. 2** Distinguish between decinormal a... decimolar solution.

5. **2076 Set C Q.No. 2** Distinguish between titration error a... normality factor.

6. **2075 GIE Q.No. 2** Differentiate between end point a... equivalence point of a reaction. [1+...]

7. **2075 Set A Q.No. 2** Differentiate between normality a... molarity.

8. **2075 Set B Q.No. 2** Distinguish between Primary standa... solution and secondary standard solution. [1+...]

9. **2074 Supp. Q.No. 2** Define the terms: [1+...]
i. Primary standard solution ii. Acidimetry

10. **2074 Set A Q.No. 2** Define the terms; [1+...]
i. Normality factor
ii. Secondary standard solution

11. **2074 Set B Q.No. 2** How is end point differed fro... equivalence point? [2]

12. **2073 Supp Q.No. 2** What is the importance of calculatin... normality factor of solutions during titration? [2]

13. **2073 Set C Q.No. 2** Define the terms: [1+...]
i. Normality factor
ii. Secondary standard solution

14. **2073 Set D Q.No. 2** Why is crystal oxalic acid regarded as ... good substance for the preparation of primary standar... solution?

15. **2072 Supp. Q.No. 2** How would you convert 500 cc of 2 N H_2SO_4 into
i. gram/liter ii. Normality [1+...]
Ans: (i) 196 g/L (ii) 4 N

16. **2072 Set C Q.No. 2** Distinguish between end point an... equivalence point of reaction. [1+...]

17. **2072 Set D Q.No. 2** Which one has higher concentration and... why? [1+...]
a. 80 g/litre NaOH solution and 3 M NaOH solution.
b. 5.3 g/litre Na_2CO_3 and $\frac{N}{10}$ Na_2CO_3 solution.
Ans: (a) 3 M NaOH > 80 g/litre NaOH
(b) 5.3 g/litre $Na_2CO_3 = \frac{N}{10}$ Na_2CO_3

18. **2072 Set E Q.No. 2** A sample of Na_2CO_3 weighing 0.53 g i... added to 101 m^2 of 0.1N H_2SO_4 solution. Will the resulting solution be acidic, basic or neutral? [2]
Ans: Acidic

19. **2070 Supp. Q.No. 2** Define the term [1+...]
i. Semi normal solution
ii. Alkalimetry

20. **2070 Set C Q.No. 2** Define secondary standard solution wi... a suitable example. [1+...]

21. **2067 Q.No. 17** Write an example of redox titration. Why is ... called so? [1+...]

22. **2066 Q. No. 17** What is the normality of 20 cc of ... phosphoric acid (H_3PO_4)?
Ans: 6...

23. 2065 Q.No. 17 What is normality? How is it related with molarity? [2]
24. 2054 Q.No. 3 What do you mean by equivalent weight of an element? [2]
25. 2053 Q.No. 3 What are the requisites for a substance to be a primary standard? [2]
26. 2052 Q.No. 3 Define decinormal solution. [2]

Short Answer Questions [5 marks]

27. 2077 Set W Q.No. 9 Define molality of solution. Calculate molality of one liter of 93% H_2SO_4 solution (weight by volume). The density of the solution is 1.84 g mL^{-1}. [1+4]
Ans: 10.41 mol/Kg

28. 2076 GIE Set A Q.No. 23 "All standard solutions are not primary standard solutions." Comment the statement. How many ml of a 0.1 MHCl are required to react completely with 1gm mixture of Na_2CO_3 and $NaHCO_3$ containing equimolar amount of the two. [1+4]
Ans: 202.6 m^2

29. 2076 GIE Set B Q.No. 23 Define normality factor. 0.18 g of a divalent metal was completely dissolved in 250 cc of acid solution containing 4.9 g H_2SO_4 per liter. 50 cc of the residual acid solution required 20 cc of N/10 alkali for complete neutralization. Calculate the atomic weight of metal. [1+4]
Ans: 36 amu

30. 2076 Set B Q.No. 23 Are all standard solutions, primary standard solutions or not? Give reason. 1 g of a divalent metal was dissolved in 25 mL of 2N H_2SO_4 (f = 1.01). The excess acid required 15.1mL of 1N NaOH (f = 0.8) for complete neutralization. Find the atomic weight of the metal. [1+4]
Ans: Atomic weight = 52.05 amu

31. 2076 Set C Q.No. 23 It is better to express concentration in molality rather than molarity, Why? x g of a metal (equivalent weight = 12) was completely dissolved in 100 cc of $\frac{N}{2}$ HCl solution. The volume was then made upto 500cc. It is found that 25 cc of the diluted acid solution required 17.5 cc of $\frac{N}{10}$ NaOH for complete neutralization. Find the value of X. [1+4]
Ans: 0.18 g

32. 2075 GIE Q.No. 23 Define deci-normal solution. 12 g of commercial zinc is made to react with excess dil. H_2SO_4. The total volume of H_2 gas was found to be 4.2 litres at 570 mmHg pressure and 279 K temperature. Determine the percentage purity of the zinc. [1+4]
Ans: 74.48%

33. 2075 Set A Q.No. 23 Define end point. 12 g of commercial zinc is made to react with excess dilute H_2SO_4. The total volume of H_2 gas liberated was found to be 4.2 litres at 570 mmHg pressure and 279 K. Determine the percentage purity of the zinc. (Atomic mass of Zn = 65) [1+4]
Ans: 74.48%

34. 2075 Set B Q.No. 25 What is meant by normality factor? How many mL of conc. HNO_3 of specific gravity 1.41 containing 69% by mass are required to prepare 500 mL of 0.5 N HNO_3? [1+4]
Ans: 16.19 mL

35. 2074 Supp. Q.No. 24 Define the terms:
i. Titration error ii. Unknown solution
What volume of 10 M HCl and 3M HCl should be mixed to obtain one litre of 6 M HCl solution? [1+1+3]
Ans: 0.4 L of 10 M HCl and 0.57 L of 3 M HCl

36. 2074 Set A Q.No. 24 Define titration error. 0.012 g of a divalent metal is completely dissolved in 40 cc of $\frac{N}{10}$ HCl. The excess of acid required 15 cc of $\frac{N}{5}$ NaOH for neutralization. Find the atomic weight of the metal. [1+4]
Ans: 24 a.m.u.

37. 2074 Set B Q.No. 24 Define the terms;
i. Titration error ii. Standard solution
Calculate the volume of 1M NaOH required to neutralize 200 cc of 2M HCl. What mass of sodium chloride are produced from the neutralization reaction? [1+1+1+2]
Ans: 23.5 g NaCl

38. 2073 Supp Q.No. 24 What is meant by acidity of base? 500 cc of 2 N. Na_2CO_3 are mixed with 400 cc of 3N H_2SO_4 and volume was diluted to one litre. Will the resulting solution acidic, basic or neutral? Also, calculate the molarity of the dilute solution. [1+2+2]
Ans: 0.1 M, Acidic

39. 2073 Set C Q.No. 24 What is meant by acidity of base? 500 cc of 2N Na_2CO_3 are mixed with 400 cc of 3N H_2SO_4 and volume was diluted to one litre. Will the resulting solution acidic, basic or neutral? Also calculate the molarity of the dilute solution. [1+2+2]
Ans: 0.1 M, Acidic

40. 2073 Set D Q.No. 24 Define redox titration.
10 g of NaOH was added to 200 cc of $\frac{N}{2}$ (f = 1.5) H_2SO_4. The volume was diluted to two litres. Predict whether the dilute solution is acidic, basic or neutral and also calculate the resulting molarity of the dilute solution. [1+2+2]
Ans: Basic, 0.05 M

41. 2072 Supp. Q.No. 25 What is meant by acidimetry? A solution of conc. HCl contain 38% HCl by mass:
i. What is the molarity of this solution if the density of the solution is 1.19 g/cc?
ii. What volume of the conc. HCl is required to neutralize one liter of 0.1 M NaOH solution? [1+2+2]
Ans: 12.38 N, 8.077mL

42. 2072 Set D Q.No. 25 What is meant by normality factor? How many mL of conc. HNO_3 of specific gravity 1.41 containing 69% by mass are required to prepare 500 mL of 0.5N HNO_3? [1+4]
Ans: 16.19 mL

43. 2072 Set E Q.No. 26 Define normality and molarity. Write their relationship. A commercial sample of sulphuric acid has specific gravity 1.8. 10 mL of this acid was diluted upto 1 litre with water. 10 mL of diluted acid required 30 mL of $\frac{N}{10}$ NaOH for complete neutralization. Calculate the percentage purity of H_2SO_4 in the commercial sample. [2+3]
Ans: 81.66%

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44. 2071 Supp. Q.No. 25 What is meant by normality factor? What volume of 95% sulphuric acid (density = 1.85g/cc) and what mass of water must be taken to prepare 100 cc of 15% solution of sulphuric acid (density = 1.1g/cc)? [1+4]
Ans: Volume = 9.36 cc, Mass = 90.64 g

45. 2071 Set C Q.No. 25 Differentiate between primary standard and secondary standard solution. What volume of 12 M NaOH and 2 M NaOH should be mixed to get 2 litres of 9 M NaOH solution? [2+3]
Ans: 1.4 litre of 12 M NaOH, 0.6 litre of 2 M NaOH

46. 2070 Set C Q.No. 23 0.8 g of a divalent metal was dissolved in 100 cc of 1.28 N HCl and the solution was diluted to 200 cc. Then 50 cc of this solution required 54.6 cc of 0.22 N NaOH for neutralization. Find the atomic weight of the metal. [5]
Ans: 20 amu

47. 2066 Q. No. 25 What are Primary and Secondary standard solutions? Calculate the resulting normality of a solution prepared by mixing 20 mL of 0.8 M NaOH with 25 mL of 0.4 M H_2SO_4 solutions. [2+3]
Ans: 0.088N

48. 2069 Set A Q.No. 26 Define the terms: [1×5]
i. End point ii. Equivalence point
iii. Indicators iv. Basicity of acid
v. Acidimetry

Long Answer Questions [10 marks]

49. 2064 Q.No. 30(i) Define the terms:
a. gram equivalent weight
b. equivalent point of reaction
c. end point of titration [5]

50. 2064 Q.No. 30(ii) Define indicator. Explain how are indicators selected in acid base titration? [5]

51. 2062 Q.No. 30(b) Define indicator. How is a suitable indicator selected for a particular titration? [5]

Write Short Notes on

52. 2069 Set B Q.No. 33d /2069 Supp. Set B Q.No. 33 c
Selection of indictors in acid base titration. [5]

Numerical Problems

53. 2072 Set C Q.No. 25 What is meant by redox titration? 4 g of a divalent metal was dissolved in 100 cc of 2M H_2SO_4 (f = 1.01).The excess acid required 30 cc of 1 N NaOH for complete neutralization. Find the atomic mass of the metal. [1+1]
Ans: 21.62 amu

54. 2071 Supp. Q.No. 2 Calculate the normality and molarity of 5% of NaOH solution. [1+1]
Ans: 1.25 M or N NaOH

55. 2071 Set C Q.No. 2 What mass of 90% pure $CaCO_3$ is required to neutralize 2 litre deci-normal solution of HCl?[1+1]
Ans: 11.11 g

56. 2071 Set D Q.No. 25 Define acidimetry. A solution of conc. hydrochloric acid contain 38% HCl by mass [1+4]
a. What is the molarity of this solution if the density of the solution is 1.19g/cc?
b. What volume of the conc. HCl is required to neutralize 1 litre of 0.1 M NaOH solution?
Ans: (a) 12.38 N (b) 8.077 mL

57. 2071 Set D Q.No. 2 How many moles of H_2SO_4 are required to neutralize 4 litres of 2N NaOH solution? [1+1]
Ans: 4 mol

58. 2070 Supp. Q.No. 25 Define acidity of a base giving ... example. 0.8 g of a divalent metal was dissolved in 100 cc ... 1.28 N HCl and the solution was diluted to 200 cc. 50 cc ... this dilute solution required 54.6 cc of 0.22 N NaOH ... neutralization: Calculate the atomic mass of the metal. [1+...]
Ans: 20 ...

59. 2070 Set D Q.No. 26 Define normality, 0.8 g of divalent ... was dissolved in 100 mL of 1.28 N HCl and the solution ... diluted to 200 mL. Then, 50 mL of the solution required 5... mL of 0.22 N NaOH for neutralization. Find the atomic weig... metal. [1+...]
Ans: 20 ...

60. 2070 Set D Q.No. 2 What volume of water should be add... to 500 mL of 2 N (f = 0.98) Na_2CO_3 to make it exactly $\frac{N}{10}$ ...?
Ans: 9300 ...

61. 2069 Set A Q.No. 2 x cc of 5 N HCl was diluted to one litre ... normal solution. Calculate the value of x.
Ans: 200 ...

62. 2069 Set B Q.No. 2 What mass of Na_2CO_3 is required ... make 50 cc of its seminormal solution?
Ans: 1.325 ...

63. 2069 Supp. Set B Q.No. 2 What volume of 5% NaOH ... required to neutralize 2 litres of decinormal H_2SO_4? [2]
Ans: 0.16 ...

64. 2068 Q.No. 17 Convert the followings: [1+...]
i 2.5 M H_3PO_4 into Normality.
ii. 4.9 M H_2SO_4 into gram/litre.
Ans. 7.5 N, 480.2 g...

65. 2068 Q.No. 30 Define the terms: [5+...]
i. Primary standard solution. ii. Normality factor.
iii. Acidity of a base iv. Alkalimetry.
What is meant by redox titration? Write an example of it. 4 g of NaOH was added to 20 cc of 2 N H_2SO_4 solution ... the volume was diluted to one litre. Predict whether the dilu... solution is acidic, basic or neutral and also calculate the resulting normality of the dilute solution in term of g/litre.
Ans: 0.06 N, 2.4 g/...

66. 2067 Q.No. 25 Define:
i. Acidity of base ii. End point
What volumes of $\frac{N}{2}$ and $\frac{N}{10}$ HCl must be mixed to give ... liters of $\frac{N}{5}$ HCl. [2+3=5]
Ans: 0.5 L of $\frac{N}{2}$ HCl and 1.5 L of $\frac{N}{10}$ HC...

67. 2065 Q.No. 25 Define decinormal solution. 3 g of a trivalen... metal was completely dissolved with 750 mL of 1N HCl. The residual solution further required 1000 mL of $\frac{N}{2}$ NaOH for the complete neutralization. Find the atomic mass of the metal [1...
Ans: 36 ...

68. 2064 Q.No. 30(iii) 0.715 g of $Na_2CO_3 . x H_2O$ requir... 20 mL of seminormal hydrochloric acid solution for comple... reaction. Find the value of x.
Ans: x = ...

69. 2063 Q.No. 18 0.315 g of a dibasic acid required 50 m... decinormal sodium hydroxide solution for comple... neutralisation. Find the molecular mass of the acid.
Ans: Molecular mass = 126 ...

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70. **2063 Q.No. 26** Define normality and molarity of a solution. Find their relationship for a given solution. 1 g of NaOH is added to 2 litres of x M H_2SO_4 solution, so that the pH of the resulting solution is 7. Find the value of x. [1+1+1+2]
Ans: $x = 6.25 \times 10^{-3}$ M

71. **2062 Q.No. 13** Define normal solution. What is the normality of 500 mL solution of sodium hydroxide containing 30 g NaOH? [2]
Ans: 1.5 N

72. **2061 Q.No. 30**
a. Provide a short definition of each of the following terms:
i. equivalent weight ii. standard solution
iii. neutralization point iv. primary standard
v. indicator.
b. 7.35 g of a dibasic acid was dissolved in water and diluted to 250 mL. 25 mL of this solution was neutralized by 15 mL of 1 N NaOH solution. What is equivalent weight and molecular weight of the acid? [5+5]
Ans: Equivalent weight = 49, Molecular weight = 98 amu

73. **2060 Q.No. 13** 5 g of a diacidic base is completely neutralized by 50 mL 2 N HCl. Find the molecular weight of the base. [2]
Ans: Molecular weight = 100 amu

74. **2059 Q.No. 13** What volume of decinormal solution of HCl is required to neutralize 25 mL NaOH solution containing 8g NaOH in one litre solution? [2]
Ans: 50 mL

75. **2059 Q.No. 26** x g of a metal (equivalent weight = 12) was completely dissolved in 100 cc of $\frac{N}{2}$ HCl. The volume was then made up to 500 cc. 25 cc of this diluted acid required 17.5 cc $\frac{N}{10}$ NaOH for complete neutralization. Find the value of x. [5]
Ans: x = 0.18g

76. **2058 Q.No. 13** x g of Ca_2CO_3 reacts completely with 20 mL of 1M HCl. Calculate the value of x. [2]
Ans: x = 1 g

77. **2057 Q.No. 13** What volume of water must be added to 40 mL of 0.25 (N) acid solution in order to make it exactly decinormal? **Ans: 60mL** [2]

78. **2057 Q.No. 30**
a. Define molar solution, end point and indicator. Calculate the molarity of 5% H_2SO_4 solution.
b. 7.5 g of a dibasic acid dissolved in water and the solution made up to 250 cc. 25 cc of this acid requires 16.3 cc (1 N) NaOH for complete neutralisation. Calculate the molecular weight of the acid. [5+5]
Ans: (a) Molarity = 0.5 M (b) Molecular weight = 92.02 amu

79. **2056 Q.No. 21** 100 mL of 0.1 M HCl is mixed with 50 mL of 0.1M KOH. Calculate the concentration of acid in terms of gm/litre in the resulting solution. [5]
Ans: Gram/Litre = 1.2045 g/L

80. **2055 Q.No. 1** Find the equivalent weight of H_3PO_4 in the reaction $Ca(OH)_2 + H_3PO_4 \longrightarrow CaHPO_4 + 2H_2O$. [2]
Ans: 49

81. **2055 Q.No. 21** 20 mL of a sulphuric acid solution neutralizes 0.265 g of Na_2CO_3. Calculate the normality of the acid solution. [5]
Ans: Normality = 0.25 N

82. **2054 Q.No. 27** x g of magnesium (equivalent weight = 12) reacts with 20 mL of N (f = 0.95) acid. Calculate the weight of x. [5]
Ans: Weight of x = 0.228 g

83. **2053 Q.No. 19** 25 cc of an alkali solution is mixed with 8 cc of 0.75 N acid solution for complete neutralization, it further requires 15 cc of 0.8 N acid solution. Find the strength of the given alkali solution. [2]
Ans: 0.72N

84. **2052 Q.No. 19** If 20 mL of 0.5 N NaOH is mixed with 30 mL of 0.3 N HCl, is the resulting solution acidic or basic? Calculate the normality with respect to the acidic or basic final solution. [2]
Ans: Normality = 0.02N, Basic

UNIT 3: IONIC EQUILIBRIUM

FORMULAE

1. pH and pOH
$pH = -\log [H^+]$
$pH = -\log [OH^+]$
$pH + pOH = 14$
2. Ostwald's Dilution Law
$K_a = \frac{\alpha^2 C}{1-\alpha}$ where, C = Conc^n in molarity
$\alpha = \frac{\text{No. of moles ionized}}{\text{Total no. of moles taken}}$ = Degree of ionization
$K_a = \alpha^2 C (1 - \alpha \approx 1)$
$\alpha = \sqrt{\frac{Ka}{C}}$
3. Solubility product
$K_{sp} = [A]^x [B]^y$
Solubility in mol L^{-1} = $\frac{\text{Solubility of salt in g/L}}{\text{Molecular weight of salt}}$
Solubility of g/L = Solubility in mol L × Molecular weight

Very Short Answer Questions [2 marks]

1. **2077 Set P Q.No. 3** What is the pH of 10^{-9}M HCl? [2]
Ans: pH = 3

2. **2077 Set W Q.No. 5** Calculate the pH of 1×10^{-3}M KOH. [2]
Ans: pH = 11

3. **2076 GIE Set A Q.No. 3** Find the pH of 1×10^{-6} N of H_2SO_4. [2]
Ans: 6

4. **2076 GIE Set B Q.No. 3** Is the solution acidic, basic or neutral in which concentration of hydroxy ion is 3.33×10^{-10} molL^{-1}? [2]
Ans: 4.52, Acidic in nature

5. **2076 Set B Q.No. 3** Find the pH of 1×10^{-5} N H_2SO_4. [2]
Ans: pH = 5

6. **2076 Set C Q.No. 3** **2064 Q.No. 15(i)** Write the conjugate acid and base of NH_3. [1+1]

7. **2075 GIE Q.No. 3** Is the solution acidic basic or neutral in which concentration of hydroxyl ion is 3.33×10^{-10} mol L^{-1}? [2]
Ans: Acidic

8. **2075 Set A Q.No. 3** Is the solution acidic, basic or neutral in which the hydrogen ion concentration in 3×10^{-5} molL^{-1}? [2]
Ans: Acidic

9. **2075 Set B Q.No. 3** Calculate the pH of the solution by disolving 1 g of NaOH in 1 litre of its solution. [2]
Ans: 12.4

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10. 2074 Supp. Q.No. 3 Is an aqueous solution containing hydroxyl ions concentration 3.33×10^{-10} mol L^{-1} acidic, basic or neutral? [2]
Ans: Acidic

11. 2074 Set A Q.No. 3 Is an aqueous solution containing hydrogen ion concentration 3×10^{-5} mol L^{-1} acidic, basic or neutral? [2]
Ans: Acidic

12. 2074 Set B Q.No. 3 Is an aqueous solution containing hydroxyl ion concentration 3.33×10^{-1} mol L^{-1} acidic, basic or neutral? [2]
Ans: Basic

13. 2073 Supp Q.No. 3 Define [1+1]
i. ionic product of water ii. pH of solution

14. 2073 Set C Q.No. 3 State Ostwald's dilution law and mention its limitation. [1+1]

15. 2073 Set D Q.No. 3 Define: [1+1]
i. Degree of ionization ii. Ostwald's dilution law

16. 2072 Supp. Q.No. 3 What are the limitation of Lewis acid and base? [1+1]

17. 2072 Set C Q.No. 3 Calculate the pH of 0.1 N H_2SO_4. [2]
Ans: pH = 1

18. 2072 Set D Q.No. 3 Define Lewis concept of base and point out its limitation. [1+1]

19. 2072 Set E Q.No. 3 Define Bronsted concept of acid and base with an example of each. [2]

20. 2071 Supp. Q.No. 3 Give an example of each of the following [0.5×4]
i. Lewis acid ii. Lewis base
iii. Acidic salt iv. Bronsted-Lowry acid

21. 2071 Set C Q.No. 3 Define the term: [1+1]
a. Degree of ionization b. Bronsted Lowry acid

22. 2071 Set D Q.No. 3 What happens when HCl gas is passed through a saturated solution of NaCl and why? [2]

23. 2070 Supp. Q.No. 3 State Ostwald's dilution law. What is its limitation? [1+1]

24. 2070 Set D Q.No. 3 Define Lewis acid and Lewis base giving one example of each. [1+1]

25. 2069 Set B Q.No. 3 Write suitable examples to show water acts as Bronsted-Lowry acid and base. [2]

26. 2069 Supp. Set B Q.No. 3 Define pH of a solution and write the relation between pH and pOH. [1+1]

27. 2067 Q.No. 14 Whether the aqueous solution of $CaCl_2$ is acidic basic or neutral. Given reason. [2]

28. 2065 Q.No. 14 49 g of H_2SO_4 is present in 1000 mL of its solution. What is the pH of the solution? [2]
Ans: pH = 0

29. 2064 Q.No. 15(ii) Predict whether the aqueous solution of $CuSO_4$ acidic, basic or neutral. [1]

30. 2062 Q.No. 15 Water is a Lewis base as well as a Bronsted acid. Explain. [2]

31. 2062 Q.No. 18 Explain the fact that the aqueous solution of sodium carbonate is basic, while the aqueous solution of sodium chloride is neutral. [2]

32. 2061 Q.No. 15 Define Lewis acid and Lewis base. Give ... example of each.

33. 2060 Q.No. 14 Calculate the pH of an aqueous solution ... containing 10^{-7} moles of NaOH per litre.
Ans: pH = 7

34. 2059 Q.No. 15 Why is aqueous solution of $FeCl_3$ acidic?

35. 2058 Q.No. 16 Define Lewis acid and base giving ... example from each.

36. 2058 Q.No. 26 Two litres of 1M HCl is mixed with one litre ... 1M NaOH solution. Calculate the strength of the salt formed and the pH of the resulting solution.
Ans: Strength = 0.33M, pH = 0

37. 2057 Q.No. 15 What happens when dry HCl gas is passed through saturated solution of sodium chloride?

38. 2057 Q.No. 16 Why is aq. Na_2CO_3 basic?

39. 2055 Q.No. 4 Explain why sodium chloride precipitates from a saturated salt solution when hydrogen chloride gas is passed into the solution?

40. 2055 Q.No. 2 10^{-2} mole of KOH is dissolved in 10 litres of water. What will be the pH of the solution?
Ans: pH = 12

41. 2054 Q.No. 2 What will be the H^+ ion concentration of a solution having pH 5.5?
Ans: 3.16×10^{-6} mol L^{-1}

42. 2054 Q.No. 5 What do you understand by equilibrium state in a reversible reaction?

43. 2054 Q.No. 8 What will happen when HCl gas is passed over a saturated solution of NaCl, also explain the principle involved?

Short Answer Questions [5 marks]

44. 2077 Set V Q.No. 9 Point out the limitation of Ostwald's dilution law. The solubility product of $BaSO_4$ is 1×10^{-11}. Will precipitate occur or not if equal volume of 2×10^{-3} M $BaCl_2$ solution and 2×10^{-4} M Na_2SO_4 solution are mixed? [1+4]
Ans: Precipitate will occur

45. 2075 GIE Q.No. 25 What is meant by Lewis acid and base? Point out it's limitations. [3+2]

46. 2075 Set A Q.No. 25 All Bronsted bases are also Lewis bases but all Bronsted acids are not Lewis acids. Explain. 80 mL of 0.01 M $AgNO_3$ are mixed with 20 mL of 0.001 M NaCl solution. Will any AgCl precipitate or not? [Ksp for AgCl = 1.5×10^{-10}] [1+4]
Ans: ppt will occur

47. 2070 Supp. Q.No. 24 200 mL of an aqueous solution of HCl (pH = 2) is mixed with 300 mL of an aqueous solution of NaOH (pH = 12). What will be the pH of resulting mixture solution? [5]
Ans: 11.3

48. 2069 Set B Q.No. 28 Define degree of ionization. Calculate the pH of 1.0 M solution of acetic acid. To what volume one litre of this solution be diluted so that the pH of the solution that is formed will be twice of original value [Ka = 1.8×10^{-5}] [1+2+2]
Ans: pH = 2.37; V = 233.08 L

49. 2065 Q.No. 30 a Define the following terms and give one example of each:
i. Bronsted Lowry acid and base.
ii. Lewis acid and base. [2.5+2.5]

50. 2062 Q.No. 30(a) Write a concise account of solubility product principle. [5]

51. 2062 Q.No. 26 Explain Bronsted and Lewis concepts of acid and base with suitable examples. [5]

Long Answer Questions [10 marks]

52. 2076 Set C Q.No. 32 State Ostwald's dilution law. What is the limitation of this law? Define the terms

i. Ionic product of water ii. Common ion effect
iii. Degree of ionization iv. pH value

What will be the resultant pH when 200 mL of aqueous solution of HCl (pH = 2) is mixed with 300 mL of an aqueous solution of NaOH (pH = 12)? [1+1+1+1+1+1+4]
Ans: Resultant pH = 11.30

53. 2075 Set B Q.No. 30 How is a strong electrolyte differed from a weak electrolyte? Derive the mathematical equation for Ostwald's dilution law. Point out its limitation. Calculate pH of the solution obtained by mixing 150 mL of 0.2N HCl and 150 mL of 0.1 N NaOH solution. [2+3+1+4]
Ans: 1.30

54. 2073 Supp Q.No. 32 State solubility product principle and common ion effect. What are its main applications? If the volume of 25 cm^3 of 0.05 M $Ba(NO_3)_2$ are mixed with 25 cm^3 of 0.02 M NaF. Will any BaF_2 precipitate? (Ksp of BaF_2 = 1.7×10^{-6} at 298K) [2+4+4]
Ans: 1.7×10^{-8}

55. 2073 Set C Q.No. 32 What is the common-ion effect? Explain its main applications. The solubility product constant (K_{sp}) of $Ca(OH)_2$ at 25°C is 4.42×10^{-5}. A 500 mL of saturated solution of $Ca(OH)_2$ is mixed with an equal volume of 0.4 M NaOH. What mass of $Ca(OH)_2$ is precipitated out? [2+4+4]
Ans: 0.75813 g/L

56. 2073 Set D Q.No. 32 State solubility product constant. What is the proper condition of precipitation of salt from its solution? Explain application of the solubility product principle and common ion effect. What is the minimum volume of water required to dissolve 1 g of calcium sulphate at 298 K? (given, solubility product (Ksp) for $CaSO_4 = 9.1 \times 10^{-6}$] [1+1+4+4]
Ans: 2.45×10^3mL

57. 2072 Supp. Q.No. 32 State Ostwald's dilution law. What is the limitation of this law? Define the terms (i) ionic product of water (ii) common ion effect (iii) degree of ionization (iv) pH value. What will be the resultant pH when 200 mL of an aqueous solution of HCL (pH = 2) is mixed with 300 mL of an aqueous solution of NaOH (pH = 12)? [1+1+1+1+1+1+4]
Ans: 11.30

58. 2072 Set D Q.No. 30 What is meant by the terms:

i. common ion effect
ii. solubility product constant (K_{sp})

Explain the common ion effect and solubility product principle in qualitative salt analysis. What will be the resulting pH of a solution prepared by mixing 200 mL of aquous solution of HCl (pH = 2) with 300 mL of an aquous solution of NaOH (pH = 12)? [2+4+2+2]
Ans: pH = 11.30

Write short notes on (5 Marks)

59. 2076 GIE Set A Q.No. 33iii 2074 Set A Q.No. 33d 2074 Set B Q.No. 33c 2070 Set C Q.No. 33 c Application of solubility product principle and common in effect in qualitative salt analysis. [5]

60. 2076 GIE Set B Q.No. 33i 2074 Supp. Q.No. 33(ii) 2066 Q. No. 31 iv Solubility product principle and its application. [5]

61. 2076 Set B Q.No. 33iv 2076 Set C Q.No. 33iii 2060 Q.No. 31(i) Lewis concept of acid and base. [5]

62. 2072 Set C Q.No. 33c Application of solubility principle and common-ion effect in salt analysis. [5]

63. 2069 Set A Q.No. 33 c 2059 Q.No. 31(b) 2058 Q.No. 31(a) Solubility product principle [5]

64. 2061 Q.No. 31(iii) pH and pH scale. [5]

65. 2057 Q.No. 31(a) Common ion effect [5]

66. 2056 Q.No. 31(a) Law of mass action [5]

Numerical Problems

67. 2072 Set E Q.No. 27 Define the terms: [1+1+3]
i. Degree of ionization. ii. Ostwald's dilution law.
Calculate the pH of a saturated solution of $Mg(OH)_2$, Ksp for $Mg(OH)_2$ is 8.9×10^{-12}.
Ans: pH=10.35

68. 2071 Supp. Q.No. 32 Write short note on solubility product and its application in analytical chemistry. The solubility product (Ksp) of $Ca(OH_2)$ at 25°C is 4.42×10^{-5}. A 500 mL of a saturated solution of $Ca(OH_2)$ is mixed with an equal volume of 0.4 M NaOH. How much $Ca(OH)_2$ is precipited?[5+5]
Ans: 0.75813 g/ litre

69. 2071 Set C Q.No. 30 2071 Set D Q.No. 32 State the following terms:

a. Ostwald's Dilution Law b. Degree of dissociation
c. Ionic product of water d. Common ion effect
e. pH value of a solution

Why is Ostwald's dilution law not applicable to strong electrolyte? What mass of KOH should be dissolved in one litre of solution to prepare a solution having pH is 12 at 25°C? (Atomic weight of K = 39) [1+1+1+1+1+1+4]
Ans: 0.56 g

70. 2070 Set C Q.No. 3 Calculate the pH of 1g/litre NaOH solution. [2]
Ans: 12.4

71. 2070 Set D Q.No. 27 What is meant by degree of ionization? 0.41 kg of NaOH is placed in 100 mL of 0.1N H_2SO_4. Find the pH of the resulting solution. [1+4]
Ans: 11.4

72. 2069 Set A Q.No. 3 What is pH of solution of NaOH whose concentration is 0.4g/ liter? [2]
Ans: pH = 12

73. 2069 Supp. Set B Q.No. 27 What are the limitations of Lewis concept of acid and base? A 500 mL of a saturated solution of $Ca(OH)_2$ is mixed with equal volume of 0.4 M NaOH. What mass of $Ca(OH)_2$ is precipitated. K_{sp} of $Ca(OH)_2$ is 4.42×10^{-5}. [2+3]
Ans: 0.75813 g/ L

74. 2068 Q.No. 13 Calculate the strength in gm/litre of NaOH whose pH values is 11. [2]
Ans. 4×10^{-3} g L^{-1}

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75. **2068 Q.No. 26** Define solubility product principle. 0.00143 g of AgCl dissolve in one litre of water at 25°C to form a saturated solution. What is the solubility product of the salt? (Ag = 108, Cl = 35.5) [2+3]
Ans: 9.92×10^{-11}

76. **2067 Q.No. 29** Define the terms [6+4]
i. Common ion effect ii. pH of a solution
iii. Lewis base iv. Degree of ionization
v. Ionic product of water vi. Ostwald's dilution law
A sample of AgCl is treated with 5 mL of 2M Na_2CO_3 solution to produce Ag_2CO_3. The remaining solution contained 0.003 g of Cl^- per litre. Calculate solubility product of AgCl. (Ksp of $Ag_2CO_3 = 8.2\times10^{-12}$).
Ans: 1.71×10^{-10}

77. **2066 Q. No. 14** The pH of a solution of KOH is 10. Calculate the hydroxyl ion concentration. [2]
Ans: 10^{-4}M

78. **2065 Q.No. 30 b** What is ionic product of water? The pH of 0.1 M HCN solution is 5.2. What is value of ionization constant (Ka) for the acid? [1+4]
Ans: 3.969×10^{-10}

79. **2064 Q.No. 16** Define pH. Calculate the pH of 0.1M H_2SO_4. [2]
Ans: pH = 0.699

80. **2064 Q.No. 26** What is meant by solubility product of sparingly soluble electrolyte? The solubility of AgCl in water at 298 K is 1.43×10^{-3} g L^{-1}, calculate its solubility in 0.5M KCl solution. [2+3]
Ans: 1.984×10^{-10} mol L^{-1}

81. **2063 Q.No. 13** Calculate the hydroxide ion concentration of a solution having pH 10.5.
Ans: 3.16×10^{-4} mol/litre

82. **2063 Q.No. 25** What are ionization constant and degree of ionization of a weak electroyte? How do they vary with temperature? Calculate the pH of 0.1M acetic acid solution having K_a 1.8×10^{-5}. [2+1+2]
Ans: pH = 2.87

83. **2061 Q.No. 13** The solubility of CaF_2 in water at 18°C is 2.05 $\times 10^{-4}$ mole per litre. Calculate its solubility product. [5]
Ans: 3.446×10^{-11} mol/L

84. **2060 Q.No. 15** The solubility product constant of $BaSO_4$ in water at 25°C is 1×10^{-10} $mole^2L^{-2}$. Calculate the solubility of $BaSO_4$ in g/L. [Ba = 137] [2]
Ans: Solubility of $BaSO_4 = 2.33 \times 10^{-3}$ g/L

85. **2060 Q.No. 26** Define ionic product of water. Why does Kw of water increases with temperature? 10 cc $\frac{N}{2}$ HCl, 30 cc $\frac{N}{10}$ HNO_3 and 60 cc $\frac{N}{5}$ H_2SO_4 are mixed together. Find the pH of the mixture. [1+1+3]
Ans: pH of the mixture = 0.698

86. **2059 Q.No. 16** Calculate the pH value of 0.04 N HNO_3 solution, assuming HNO_3 to be completely ionized. [2]
Ans: pH = 1.39

87. **2059 Q.No. 30** Explain Bronsted Lowry concept of acids and bases. Calculate the degree of ionization of HCN having concentration 0.01 M (K_a of HCN = 4.8×10^{-10}). Also calculate H^+ ion concentration and pH. [3+4+3]
Ans: $H^+ = 2.2 \times 10^{-6}$, pH = 5.65

88. **2058 Q.No. 15** Calculate the hydrogen ion concentration of solution whose pH is 9.5.
Ans: 3.16×10^{-10}

89. **2057 Q.No. 25** Define solubility product. The solubility of CaF_2 in water at 18°C is 2.05×10^{-4} mol/litre. Calculate its solubility product. [1+4]
Ans: 3.446×10^{-11} mol^2 L^{-2}

90. **2056 Q.No. 5** The pH of HCl solution is 3. Calculate the strength of HCl in terms of molarity.
Ans: pH = 0.01

91. **2056 Q.No. 22** The solubility product of CuS is 8.0×10^{-45} at a certain temperature. Find its solubility at this temperature.
Ans: 8.94×10^{-23} mol L^{-1}

92. **2055 Q.No. 22** The solubility product of chalk is 9.3×10^{-9}. Calculate its solubility in gram per litre.
Ans: Solubility = 3.49×10^{-2} gm

93. **2054 Q.No. 22** The solubility of CaF_2 in water at 18°C is 2.05 $\times 10^{-4}$ mole per litre, Calculate its solubility product.
Ans: 3.446×10^{-11} mol/litre

UNIT 4: ELECTROCHEMISTRY

FORMULAE

1. Faraday's First Law
   $m = ZIt$
   $Q = It$
   $1F = 6.022 \times 10^{23} \times 1.6 \times 10^{-19}\ C = 96500C$
2. Faraday's Second Law
   $\frac{m_1}{m_2} = \frac{E_1}{E_2} = \ldots$
   Relation between equivalent weight and electro chemical equivalent
   $Z = \frac{E}{F} = \frac{E}{96500}$
3. Electrolytic conductance
   $R \propto \frac{l}{A}$
   $R = \rho \frac{l}{A}$
   $Ohm = \rho \frac{cm}{cm^2}$
   $\therefore \rho = Ohm\ cm$
   $\kappa = \frac{1}{\rho}$ where, κ = Specfic conductivity
   $\kappa = Ohm^{-1}\ cm^{-1}$
   $= Simenes\ cm^{-1}$
   $= Scm^{-1}$
4. Equivalent conductivity (λ) = $\kappa \times V$
   $\lambda = \kappa \times \frac{1000}{N} = \kappa V$
   $= Ohm^{-1}\ cm^{-1}\ cm^3\ eqv^{-1}$
   $= Ohm^{-1}\ cm^2\ eqv^{-1}$
   $= Scm^2\ eqv^{-1}$
5. Molar conductivity (μ) $= \kappa \times V$
   $= \kappa \times \frac{1000}{M}$
   $= Ohm^{-1}\ cm^2\ mol^{-1}$
   $= Scm^2\ mol^{-1}$
6. Cell constant = $\frac{l}{A} = cm^{-1}$
7. Relation between μ and λ
   $\mu = Z \times \lambda$
8. Galvanic cell: $E°\ cell = E°_R - E°_L$

Very Short Answer Questions [2 marks]

1. **2077 Set 'A' Q.No. 4** What products would you expect at cathode and anode when aqueous NaCl is electrolysed using platinum electrode? [2]

2. **2076 GIE Set A Q.No. 4** How many grams of Chromium are produced by 4.8×10^4 coulombs according to the following reactions.
$CrO_3 + 6H^+ + 6e \rightarrow Cr(s) + 3H_2O$ [2]
Ans: 4.31 g

3. **2076 GIE Set B Q.No. 4** Define one Faraday. How many coloumbs of electricity are required to produce 2.7 gm of aluminium from molten Al_2O_3? [1+1]
Ans: 28950 C

4. **2076 Set B Q.No. 4** How many coulombs are required to produce [1+1]
   i. 27 g of silver from $AgNO_3$?
   ii. 50 g of Aluminum from Al_2O_3?
   (Atomic weight of Ag = 108, Atomic weight of Al = 27)
   Ans: (i) 24125 C (ii) 536111 C

5. **2076 Set C Q.No. 4** How many coulombs are required to produce [1+1]
   i. 80 g of calcium from molten $CaCl_2$?
   ii. 50 g of Aluminum from molten Al_2O_3?
   Ans: (i) 386000 C (ii) 536111 C

6. **2075 GIE Q.No. 4** Can $CuSO_4$ solution be stored in a Zinc Vessel? [2]
$E^0 Cu^{2+}/Cu = 0.34$ V $E^0 Zn^{2+}/Zn = -0.76$ V

7. **2075 Set A Q.No. 4** Why does silver nitrate solution become bluish when copper rod is dipped into it? [2]
[Given $E^\circ Cu^{2+}/Cu = 0.34$V and $E^\circ Ag^+/Ag = 0.80$ V]

8. **2075 Set B Q.No. 4** A solution contains 1 g of NaCl in 200 cm^3 and its specific conductance is found to be 2.55×10^{-2} $ohm^{-1} cm^{-1}$. Calculate its molar conductance. [2]
Ans: 300 S cm^2 mol^{-1}

9. **2074 Supp. Q.No. 5** How many coulombs are required to produce 50 g of Al when electrode reaction is
$Al^{+++} + 3e^- \longrightarrow Al$ (Atomic mass of Al = 27)? [2]
Ans: 535575 coulomb

10. **2074 Set A Q.No. 5** How many coulombs are required to deposit 126 gram of Cu from $CuSO_4$ solution? (Atomic mass of Cu = 63.5) [2]
Ans: 382140 coulomb charges

11. **2074 Set B Q.No. 5** How many coloumbs of electricity are required to deposit 33 g of Ca from molten $CaCl_2$? [2]
Ans: 159225 coulomb charges

12. **2073 Supp Q.No. 4** Two metallic element X and Y have the following standard electrode potential.
X = +0.40V
Y = –0.80V
What would you expect to occur if X is added to an aqueous solution of salt of Y? Give reason. [2]

13. **2073 Set C Q.No. 4** Predict whether the following reaction will occur spontaneously or not, Why? [1+1]
$Pb^{2+} + 2Ag \longrightarrow 2Ag^+ + Pb$
given, $E^0_{Ag^+}/Ag = 0.80$ V; $E^0_{Pb^{+2}}/Pb = -0.13$ V
Ans: Non Spontaneous

14. **2073 Set D Q.No. 4** Predict whether the following reaction will occur spontaneously or not, Why? [1+1]
$Pb^{2+} + 2Ag \longrightarrow 2Ag^+ + Pb$
given, $E^0_{Ag^+}/Ag = 0.80$ V; $E^0_{Pb^{2+}}/Pb = -0.13$ V
Ans: Non-spontaneous

15. **2072 Supp. Q.No. 4** What is meant by single electrode potential? How is it measured? [1+1]

16. **2072 Set C Q.No. 4** Calculate the number of coulombs required to deposit 40 g of aluminium from molten Al_2O_3. [2]
Ans: 428460 Coulomb charge

17. **2072 Set D Q.No. 4** Why does $AgNO_3$ solution become bluish when copper rod is dipped in it? (The standard reduction potential of Cu and Ag are +0.3V and +0.8V respectively). [1+1]

18. **2072 Set E Q.No. 4** What is meant by standard hydrogen electrode? Write an important use of it. [1+1]

19. **2071 Supp. Q.No. 4** How many coulombs of electric charge are required to deposit? [1+1]
   i. 4.6 g of sodium
   ii. 3 mole of aluminium
   (Atomic mass of Al = 27 and Na = 23.)
   Ans: (i) 19300 C (ii) 868500 C

20. **2071 Set C Q.No. 4** What is meant by single electrode potential? Name any two factors that affect the magnitude of single electrode potential. [1+1]

21. **2071 Set D Q.No. 4** How would you justify that value of one Faraday is 96500 coulumbs? [2]

22. **2070 Supp. Q.No. 4** **2070 Set C Q.No. 4** Mention important application of standard hydrogen electrode giving example. [2]

23. **2069 Set A Q.No. 4** What do you mean by electrolytic conduction? [2]

24. **2069 Supp. Set B Q.No. 4** Standard hydrogen electrode acts as both an anode or cathode. Give reason. [2]

25. **2068 Q.No. 14** Define the term: [1+1]
   i. electrochemical equivalent
   ii. equivalent conductance

26. **2067 Q.No. 13** Can a solution of 1M $CuSO_4$ be stored in a vessel made up of Nickel? If not why? [2]
Given: $E^\circ Ni^{++}/Ni = -0.25$ V; $E^\circ Cu^{2+}/Cu = +34$ V

27. **2066 Q. No. 13** Will the reaction occur:
$Zn^{++} + 2Fe^{++} \longrightarrow Zn + 2Fe^{+++}$
Given standard reduction potentials are:
$E^\circ_{Zn^{++}/Zn} = -0.76$V, $E^\circ_{Fe^{3+}/Fe} = +0.80$ V. Given reason. [2]
Ans: – 1.56 V

28. **2065 Q.No. 13** Can a solution of 1M $CuSO_4$ be stored in a vessel made of nickel metal? If not, why? [2]
Given: $E^\circ_{Ni^{++}/Ni} = -0.25$ V; $E^\circ Cu^{++}/Cu = 0.34$ V
Ans: No

29. **2064 Q.No. 13** How is single electrode potential originated? [2]

30. **2063 Q.No. 15** What is meant by: [2]
   i. One ampere current is passing through a solution.
   ii. The standard reduction potential of Cu^{++}/Cu is 0.34V.

31. **2060 Q.No. 18** Define the terms: [2]
   i. Cell constant ii. Molar conductivity.

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32. 2058 Q.No. 14 Construct a galvanic cell in which the cell reaction is:
$Fe(S) + H_2SO_4(aq) \longrightarrow FeSO_4(aq) + H_2(g)$ [2]

33. 2057 Q.No. 14 Define standard electrode potential. [2]

34. 2056 Q.No. 8 How does specific conductance decreases and equivalent conductance increases with dilution? [2]

35. 2055 Q.No. 3 State Faraday's Second Law. [2]

36. 2054 Q.No. 4 Define the term electrochemical equivalent. [2]

37. 2053 Q.No. 4 2052 Q.No. 4 What is E.C.E. (Electro-chemical Equivalent)? [2]

Short Answer Questions [5 marks]

38. 2077 Set P Q.No. 9 Define the terms
i. Equivalent conductance
ii. Standard electrode potential.
The cost of electricity required to deposit 1 g of Mg is Rs. 6. How much would it cost to deposit 10 g of Al? (At. wt of Al = 27) [2+3]
Ans: 55 Rupees

39. 2076 GIE Set A Q.No. 24 What is meant by standard electrode potential? The standard electrode potential for Mg^{+2}/Mg and Cu^{+2}/Cu are –2.37 V and +0.34V respectively. [1+4]
i. Draw a standard cell rotation.
ii. Identify the anode and the cathode as the current drawn from it.
iii. Write the cell reactions taking place at the electrodes.
iv. Calculate the standard cell potential.
Ans: +2.71 V

40. 2076 GIE Set B Q.No. 24 Define electrochemical cell. The standard electrode potential of Cu^{+2}/Cu and Zn^{+2}/Zn electrodes are +0.34V and –0.76V respectively.
i. Write the cell notation indicating anode and cathode.
ii. Write the cell reaction. [1+1+1+1+1]
iii. Calculate the emf of the cell
iv. Predict the feasibility of the reaction with reason.
Ans: (iii) +1.10 V (iv) Fisible

41. 2076 Set B Q.No. 24 2076 Set C Q.No. 24 Mention the important applications of standard hydrogen electrode. The standard electrode potential for Fe^{+3}/Fe^{+2} and I_2/I^- are + 0.77 V and +0.54 V respectively.
i. Draw the standard cell notation.
ii. Identify the anode and cathode as the current drawn from it.
iii. Write the cell reaction taking place at the electrodes.
iv. Calculate standard cell potential. [1+1+1+1+1]
Ans: (iv) E^oCell: +0.23 V

42. 2075 GIE Q.No. 24 State and explain Faraday's 1st law of electrolysis. An electrolytic cell contains a solution of $CuSO_4$ and anode of impose copper. How many Kg of copper will be deposited at cathode by 150 ampere passing for 12 hours? [2+3]
Ans: 2.13192 Kg

43. 2075 Set A Q.No. 24 What is meant by (i) molar conductivity and (ii) Electro-chemical equivalent? How long a current of 3 ampere has to be passed through a solution of $AgNO_3$ to coat a metal of surface area 80 cm^2 with 0.005 mm thick layer (Density of Ag = 10.5 g/cm^2) [2+3]
Ans: 125 sec.

44. 2075 Set B Q.No. 23 What is meant by standard hydrogen electrode? Write its important application. The standard electrode potentials are given as
E^o Zn/Zn^{+2} = –0.76V
E^o Fe^{+3}/Fe^{+2} = + 0.77V
i. Construct a cell notation for a galvanic cell indicating anode and cathode.
ii. Calculate the e.m.f. at 1M solution of ions.
iii. Will the reaction $Zn^{2+} + 2Fe^{2+} \longrightarrow Zn + 2Fe^{3+}$ Occur? [2+
Ans: +1.53V

45. 2074 Supp. Q.No. 23 What is meant by hydrogen electrode? Mention it's an important use. The standard electrode potentials are given as:
E^oMg^{++}/Mg = – 2.37 V, E^oCu^{++}/Cu = + 0.34V
i. Construct a cell notation for an electrochemical cell.
ii. Write the reactions taking place at anode and cathode.
iii. Calculate the emf of the cell. [2+3]
Ans: +2.71V

46. 2074 Set A Q.No. 23 What is meant by primary reference electrode? Mention its one important use.
The standard electrode potential of copper and silver are [E^oCu^{++}/Cu = +0.34 V and E^o Ag^+/Ag = +0.80V]
i. Construct cell notation for an electrochemical cell.
ii. Calculate the emf at 1M solution of its ions.
iii. Will the reaction occur?
$Cu + 2\,Ag^+ \longrightarrow Cu^{++} + 2\,Ag$? Give reason. [2+3]
Ans: 0.46 V

47. 2074 Set B Q.No. 23 Name a primary reference electrode and mention its one important use. For a cell;
$Mg(s)/Mg^{++}(1M)//Cu^{++}(1M)/Cu(s)$
E^o Mg^{++}/Mg = -2.37 V and E^oCu^{++}/Cu = +0.34 V [2+3]
i. Indicate cathode and anode.
ii. Write the reaction taking place at electrode.
iii. Calculate the emf at 1M solution of its ions.
Ans: +2.71 V

48. 2073 Supp Q.No. 23 How do molar and equivalent conductivity vary with concentration for weak electrolyte? A solution contains 2 g of anhydrous $BaCl_2$ in 400cm^3. Its conductivity is found to be 5.8 × 10^{-3} cm^{-1}. Calculate the molar conductivity of $BaCl_2$. (Atomic weight of Ba=137) [3+2]
Ans: 241.66 S cm^2 mol^{-1}

49. 2073 Set C Q.No. 23 How does molar conductivity vary with concentration for weak electrolyte? Give reason for its variations. A solution contains 2 g of anhydrous $BaCl_2$ in 400 cm^3, its conductivity is found to be 5.8 × 10^{-3} S cm^{-1}. Calculate the molar conductivity of $BaCl_2$ (Atomic weight of Ba = 137) [3+2]
Ans: 241.66 S cm^2 mol^{-1}

50. 2073 Set D Q.No. 23 State Faraday's laws of electrolysis. Establish relationship between electro-chemical equivalent and chemical equivalent. 0.197 g of copper is deposited by a current of 0.2 A in 50 minutes. Calculate its electrochemical equivalent. [2+1+2]
Ans: 3.2×10^{-4} g

51. 2072 Set D Q.No. 23 Define the term: [2+1.5+1.5]
i. Electrochemical equivalent.
ii. Standard electrode potential.
How many coulombs are required to produce:
i. 80 g of aluminium from molten Al_2O_3?
ii. 24 g of magnesium from $MgCl_2$? **Ans: 856920C, 19300C**

52. **2071 Supp. Q.No. 23** **2071 Set D Q.No. 23** What is meant by electrochemical cell? Design a Galvanic cell in which the reaction $Zn(s) + 2Ag^+(aq) \longrightarrow Zn^{2+}(aq) + 2Ag(s)$, takes place. Further predict. [1+2+1+1+1]
   i. Which of the electrode is negatively charged?
   ii. The carriers of the current in the cell.
   iii. Individual reaction at each electrode.

53. **2070 Set D Q.No. 28** Represent graphically the variation of equivalent conductivity of strong electrolyte and weak electrolyte with concentration. Why do equivalent conductivity of strong electrolyte and weak electrolyte vary differently with dilution? [2+3]

54. **2069 Set B Q.No. 27** Give any two differences between electrochemical and electrolytic cell. You are given zinc rod, copper rod, zinc sulphate and copper sulphate solutions and standard electrode potential of zinc and copper are –0.76V and 0.34V respectively.
   a. Represent an electrochemical cell indicating anode and cathode
   b. Write net cell reactions
   c. What will be the emf of the cell? [2+1+1+1]
   Ans: 1.10 V

55. **2068 Q.No. 24** What is meant by standard electrode potential? The standard electrode potential for the following electrode are; [1+2+1+1]
   $Zn^{++} + 2e^- \longrightarrow Zn$, $E^o = -0.76V$
   $Fe^{+++} + e^- \longrightarrow Fe^{++}$, $E^o = 0.77V$
   i. Represent a suitable galvanic cell and point out which one will be cathode?
   ii. With 1 M solutions of the ions what will be emf?
   iii. Will the reaction $Zn^{++} + 2Fe^{++} \longrightarrow Zn + 2Fe^{+++}$ occur? Give reason.
   Ans. (ii) 1.53 Volt

56. **2064 Q.No. 31(i)** Write short notes on Variation of electrolytic conductances with concentration. [5]

57. **2063 Q.No. 24** State and explain Faraday's second law of electrolysis. Show that the electric charge carried by transfer of 1 mole of electron is one Faraday. [5]

58. **2061 Q.No. 26** Distinguish between (a) electrolytic and voltaic cells b) oxidation and oxidizing agent. [5]
   Four metals, labelled A, B, C and D react with each other and with acids in the following way: B displaces only C from solution. Only A and D displace hydrogen from 1M HCl. None of the metals will displace D from solution. Arrange the four metals in an activity series with hydrogen.
   Ans: D > A > H > B > C

59. **2060 Q.No. 27** How is single electrode potential originated? Predict which one of the following reactions occur spontaneously? [5]
   i. $2Fe^{+2} + Sn^{+4} \longrightarrow 2Fe^{+3} + Sn^{+2}$
   ii. $2Fe^{+3} + Sn^{+2} \longrightarrow 2Fe^{+2} + Sn^{+4}$
   Given standard reduction potentials of Fe^{3+}/Fe^{2+} and Sn^{4+}/Sn^{2+} are + 0.77V and + 0.15V respectively.

Write Short Notes on (5 marks)

60. **2062 Q.No. 31(d)** Faraday's laws of electrolysis. [5]

Numerical Problems

61. **2072 Supp. Q.No. 23** **2071 Set C Q.No. 23** Define weak electrolytic cell giving an example of it. Chromium metal can be plated out from an acidic solution containing CrO_3 according to the following equation. [1+2+2]
   $CrO_3(aq) + 6H^+ + 6e^- \longrightarrow Cr(s) + H_2O$
   Calculate:
   i. How many gram of Cr will be plated out by 2400 coulomb?
   ii. How long will it take to plate out 1.5 g of Cr by using 12.5 amphere current? (Atomic mass of Cr = 52)
   Ans: (i) 0.21 g (ii) 22.26 min

62. **2072 Set C Q.No. 23** Define the terms: [2+3]
   i. Standard electrode potential
   ii. Electrochemical series
   The standard electrode potentials are given as:
   $E^\circ_{Zn/Zn^{+2}} = -0.76$ V $\quad E^\circ_{Fe^{+3}/Fe^{+2}} = +0.77$ V
   i. Construct a cell notation for a galvanic cell indicating anode and cathode.
   ii. Calculate the e.m.f. at 1 M solution of ions.
   iii. Will the reaction $Zn^{2+} + 2Fe^{2+} \longrightarrow Zn + 2Fe^{3+}$ occur?
   Ans: (ii) + 1.53 V, (iii) No

63. **2072 Set E Q.No. 28** State Faraday's laws of electrolysis? Silver is electrodeposited on a metal plate of surface area 800 cm^2 by passing 0.2 ampere of current for 3 hours. Calculate the thickness of Ag deposited. (Given specific gravity of Ag = 10.47 and atomic mass = 108) [2+3]
   Ans: 2.875×10^{-4} cm

64. **2070 Supp. Q.No. 23** **2070 Set C Q.No. 24** State Faraday's 2nd law of electrolysis. Equal amount current was passed through an aqueous solution of tri-valent metallic salt and dil. H_2SO_4. The volume of H_2 liberated was 96.5 mL at 27°C and 765 mm Hg pressure. The weight of the metal deposited was 0.74g. Calculate the atomic weight of the metal. [1+4]
   Ans: 283.61 amu

65. **2070 Set D Q.No. 4** How many number of coulombs are required to deposit 81 g of Aluminium when the electrode reaction is: $Al^{+++} + 3e^- \longrightarrow Al$? [2]
   Ans: 868,500 coulombs

66. **2069 Set A Q.No. 25** Distinguish between electrochemical equivalent and chemical equivalent. A metallic spoon is coated with silver by passing a current of 5 ampere through $AgNO_3$ solution for 5 hrs. What is the thickness of silver plating if the area of the spoon is 12 cm^2 (density of silver is 10.5 g cm^{-3})? [1+4]
   Ans: 0.8 cm

67. **2069 Set B Q.No. 4** Convert the following:
   i. Charge of 4.0×10^{12} electrons into coulombs.
   ii. Chemical equivalent of Magnesium into Electro chemical equivalent. [1+1]
   Ans: (i) 6.4×10^{-7} coulombs (ii) 1.24×10^{-4}

68. **2069 Supp. Set B Q.No. 26** State Faraday's first law of electrolysis and write the mathematical relation between electrochemical equivalent and chemical equivalent. 1.52 g of a trivalent metal Ⓜ was deposited at cathode by passing a current of 2.5 ampere through its salt solution (metal sulphate) for 30 minutes. What is the atomic mass of Ⓜ? [1+4]
   Ans: 97.78 amu

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69. 2067 Q.No. 24 Define one Faraday's electricity. How many grams of silver could be plated out on a serving tray by passing electricity through a solution of Ag (I) salt for 8 hours at a current of 9 ampere? What is the area of the tray, if thickness of the silver platting is 0.002 cm? Density of silver is 10g/cm³. (Atomic mass of Ag = 107.8). [1+4]
Ans: Weight of Ag = 289.55 g; Area of tray = 14477.59 cm²

70. 2066 Q. No. 24 Define:
i. Electrochemical cell
ii. Equivalent Conductance
A current of 2.5 amphere passes through the solution of a metal sulphate for 30 minutes and deposits 1.52 g of metal at cathode. Find the equivalent weight of the metal. [1+1+3]
Ans: 32.6 g

71. 2065 Q.No. 24 State Faraday's 1st Law of electrolysis. What current strength is required to deposit whole copper from 1 litre of 1M $CuSO_4$ solution by passing electricity through it in 10 minute? [1.5+3.5]
Ans: 321.66 ampere

72. 2064 Q.No. 14 Calculate the equivalent conductance of 0.1N KCl solution having specific resistance 83.3 Ohm cm^{-1}. [2]
Ans: 120 ohm^{-1} cm^2 eq^{-1}

73. 2062 Q.No. 14 Calculate the equivalent conductivity of 0.12 N solution of an electrolyte, whose conductivity is 0.024 S cm^{-1}. [2]
Ans: 200m^{-1} cm^2 eqv^{-1} (200 Scm^2 eqv^{-1})

74. 2059 Q.No. 14 Find out the molar conductivity of 0.01 M acetic acid having specific conductivity 1.46×10^{-4} ohm^{-1} cm^{-1} mol^{-1}. [2]
Ans: 14.6 ohm^{-1} cm^2 mol^{-1}

75. 2058 Q.No. 30 State and explain Faraday's laws of electrolysis. How long a current of 3 ampere has to be passed through a solution of $AgNO_3$ to coat a metal surface of 80 cm^2 with 0.005 mm thick layer? (density of Ag = 10.5 g/cc). [10]
Ans: 125.37 sec

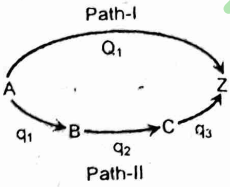
76. 2057 Q.No. 26 You are given standard reduction potential of Cu^{+2}/Cu and Fe^{+2}/Fe as + 0.34V and – 0.44V respectively.
a. Construct a galvanic cell indicating anode and cathode
b. Write the cell reaction and calculate the standard emf of the cell. [5]
Ans: Standard EMF of the cell = 0.78V

77. 2056 Q.No. 4 How many coulombs of electricity are required to discharge 0.1 mole of Na^+? [1 Faraday = 96500 coulomb.][2]
Ans: 9650 Coulomb

UNIT 5: ENERGETICS OF CHEMICAL REACTIONS

FORMULAE

1. Internal Energy: $\Delta E = E_P - E_R$
2. First Law of Thermodynamics
   $q = \Delta E + w$ $w = P\Delta V$
   $\Delta V = V_{final} - V_{initial}$ $q = \Delta E + P\Delta V$
2. Enthalpy (H) = E + PV
   $\Delta H = \Delta E + P\Delta V$
   PV = nRT (Ideal gas equation)
   At constant T and P
   $P\Delta V = \Delta nRT$
   So, $\Delta H = \Delta E + \Delta nRT$
   $\Delta H = H_P - H_R$
3. Hess's law of constant heat summation
   $Q_2 = q_1 + q_2 + q_3$
   $Q_1 = Q_2$



4. Bond energy
   $\Delta H = \Sigma(\text{Bond energy})_{reactant} - \Sigma(\text{Bond energy})_{product}$
   1J = 10^7 erg
   1 L atm = 101.3J
   1 calorine = 4.184 J
   1.987 cal = 0.0821 L atm

Very Short Answer Questions [2 marks]

1. 2077 Set P Q.No. 2 State Hess's law of constant heat summation. [2]
2. 2077 Set V Q.No. 2 Calculate the enthalpy of formation in the following reactions:
   i. $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$, $\Delta H = -136$ Kcal
   ii. $H_2(g) + I_2(g) \longrightarrow 2HI(g)$, $\Delta H = -24.8$ Kcal. [1+1]
   Ans: (i) – 68 Kcal (ii) – 12.4 Kcal
3. 2076 GIE Set A Q.No. 5 Point out limitations of first law of thermodynamics. [2]
4. 2076 GIE Set B Q.No. 5 State first law of thermodynamics. Write the limitations of this law. [1+1]
5. 2076 Set B Q.No. 5 Define state function. Write any two examples of it. [1+1]
6. 2076 Set C Q.No. 5 State the first law of thermodynamics. [2]
7. 2075 GIE Q.No. 5 2074 Set A Q.No. 4 2074 Set B Q.No. 6 2069 Supp. Set B Q.No. 6 State the first law of thermodynamics and point out its limitation. [1+1]
8. 2075 Set A Q.No. 5 Define the term 'internal energy'. why is the internal energy of a system a state function? [1+1]
9. 2075 Set B Q.No. 5 Define enthalpy of formation giving an example of it. [2]
10. 2074 Supp. Q.No. 4 Distinguish between extensive and intensive properties with an example of each. [2]
11. 2073 Supp Q.No. 5 Define enthalpy of combustion. Enthalpy of combustion of carbon to CO_2 is –393 kJ/mol. Calculate heat released upon formation of 33 g of CO_2 form carbon and oxygen. [1+1]
    Ans: -294.75 kJ
12. 2073 Set C Q.No. 5 Define standard enthalpy of formation. If heat change for the following reaction is 1648 kJ, what is the standard enthalpy of formation of Fe_2O_3?
    $4Fe(s) + 3O_2(g) \longrightarrow 2Fe_2O_3(s)$ [2]
    Ans: –824.
13. 2073 Set D Q.No. 5 What is meant by enthalpy of reaction? If standard enthalpy of formation of ammonia is 46 kJ mol^{-1}, what is the enthalpy change of the following reaction? $N_2(g)$ + $3H_2(g) \longrightarrow 2NH_3(g)$ [1+1]
    Ans: –92 kJ mol^{-1}

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14. **2072 Supp. Q.No. 5** Calculate the standard enthalpy of formation of water in the following reaction: [1+1]
$2H_2(g) + O_2(g) \longrightarrow 2H_2O\ (l),\ \Delta H = -136$ Kcal
Ans: –68 K Cal/ Mole

15. **2072 Set C Q.No. 5** Distinguish between enthalpy of combustion and enthalpy of formation. [1+1]

16. **2072 Set D Q.No. 5** What is meant by state function? Give its example. [1+1]

17. **2072 Set E Q.No. 5** Distinguish between intensive and extensive property with examples: [1+1]

18. **2072 Set E Q.No. 6** The enthalpy of reaction for $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$ is –92.4 kJ. Calculate the enthalpy of formation of ammonia. [2]
Ans: –46.2 kJ

19. **2071 Supp. Q.No. 5** Distinguish between extensive and intensive properties giving one example of each. [1+1]

20. **2071 Set C Q.No. 5** Calculate the standard enthalpy of formation of water in the following reaction:
$2H_2(g) + O_2(g) \longrightarrow 2H_2O\ (l),\ \Delta H = -136$ Kcal [2]
Ans: –68 k Cal/ mole

21. **2071 Set D Q.No. 5** Define state function and give any two correct examples of it. [1+1]

22. **2070 Supp. Q.No. 5** State the first law of thermodynamics and write its mathematical relation. [1+1]

23. **2070 Set C Q.No. 6** Define the terms: [1+1]
i. Extensive properties ii. Internal energy

24. **2070 Set D Q.No. 5** State first law of thermodynamics. [2]

25. **2069 Set A Q.No. 6** **2069 Set B Q.No. 5** Calculate the enthalpy of formation of NH_3 from the following equation.
$N_2(g)+3H_2(g) \rightleftharpoons 2NH_3(g),\ \Delta H = -186kJ.$ [2]
Ans: ΔH_f = – 93 kJ

26. **2069 Supp. Set B Q.No. 5** Under what conditions, [1+1]
i. reaction occur spontaneously
ii. free energy change become zero.

27. **2067 Q.No. 16** State the first law of thermodynamics. [2]

28. **2065 Q.No. 16** State Hess's Law of constant heat summation.[2]

29. **2062 Q.No. 16(i)** Define the terms: Enthalpy of a reaction. [2]

30. **2059 Q.No. 17** How is free energy change of a reaction related to enthalpy change and entropy change? [2]

31. **2058 Q.No. 17** Draw energy profile diagrams for exothermic and endothermic reactions. [2]

32. **2055 Q.No. 6** Define exothermic and endothermic reaction.[2]

33. **2055 Q.No. 7** State Hess's law of constant heat summation.[2]

34. **2054 Q.No. 7** State whether the following properties are extensive properties or intensive properties
a. Entropy b. Temperature. [2]

Short Answer Questions [5 marks]

35. **2076 GIE Set A Q.No. 25** State and explain Hess's law of constant heat of summation. Write its major applications. [2+3]

36. **2076 Set B Q.No. 25** Define bond dissociation energy. The bond dissociation energy of H_2 (g) and Cl_2 (g) are 435 KJ/mol and 243 KJ/mol respectively. The enthalpy of formation of HCl (g) = –92 KJ/mol. Calculate the bond dissociation energy of HCl (g). [1+4]
Ans: +431 KJ/mol

37. **2076 Set C Q.No. 25** State enthalpy of combustion. If heat of formation of CO_2, H_2O and $C_6H_{12}O_6$ are – 395 KJ mol^{-1}, –269.4 KJ mol^{-1} and –1169 KJ mol^{-1} respectively. Calculate the heat of combustion of glucose. [1+4]
Ans: –2815 kJ

38. **2075 Set B Q.No. 24** State Hess's law of constant heat summation. Heat of combustion of benzene (C_6H_6) is –3280 kJ. Heat of formation of CO_2 and water are – 395 kJ and – 286 kJ respectively. Calculate the heat of formation of benzene. [1+4]
Ans: +52 kJ

39. **2074 Supp. Q.No. 25** State enthalpy of combustion. If heat of formation of CO_2, H_2O and $C_6H_{12}C_6$ are –395 KJ mol^{-1}, –269.4 KJ mol^{-1} and –1169 KJ mol^{-1} respectively. Calculate the heat of combustion of glucose. [1+4]
Ans: –2815 kJ

40. **2074 Set A Q.No. 25** What is meant by enthalpy of combustion? If heat of formation of CO_2, H_2O and $C_6H_{12}O_6$ are –395 kJ mol^{-1}, –269 kJ mol^{-1} and –1169 kJ mol^{-1} respectively. Calculate the heat of combustion of glucose ($C_6H_{12}O_6$) [1+4]
Ans: –2815 kJ

41. **2074 Set B Q.No. 25** Define bond enthalpy. The bond enthalpies of gases H_2, Cl_2 and HCl are 104 Kcal mol^{-1}, 58 Kcal mol^{-1} and 103 Kcal mol^{-1} respectively. Calculate enthalpy of formation of HCl (g). [1+4]
Ans: –22 Kcal

42. **2072 Set E Q.No. 32a** State first law of thermodynamics. What are its advantages and limitations? The enthalpies of formation of CO_2(g), H_2O(l) and CH_4 (g) are –393.5, –286.2 and –74.8 kJ mol^{-1} respectively. Calculate the enthalpy of combustion of methane. [1+1+1+2]
Ans: 891.1 kJ/mol

43. **2072 Set D Q.No. 24** Define heat of formation. Heat of combustion of methane, carbon and hydrogen are –210 KCal, –94KCal and –68 KCal respectively. Calculate the heat of formation of methane. [1+4]
Ans: –20 K Cal

44. **2068 Q.No. 25** Mention the important applications of Hess's Law of constant heat summation. The standard heat of formation of SO_2 (g) and SO_3(g) are –296.6 kJ and –396 kJ respectively. Calculate ΔH for the reaction:
$SO_2(g) + \frac{1}{2}O_2(g) \longrightarrow SO_3(g)$ [2+3]
Ans ΔH = –99.4 kJ

45. **2052 Q.No. 25** State and explain first law of: Thermodynamics, and, hence deduce H = E + PV, where all the symbols have their usual meanings. [5]

Long Answer Questions [10 marks]

46. **2063 Q.No. 30(a)** Define enthalpy of a reaction. State and explain Hess's Law of constant heat summation. [5]

Write Short Notes on [5marks]

47. **2075 GIE Q.No. 33i** **2075 Set A Q.No. 33i** **2073 Supp Q.No. 33iv** **2073 Set C Q.No. 33iii** **2073 Set D Q.No. 33iii** **2072 Supp. Q.No. 33i** **2071 Supp. Q.No. 33a** **2070 Set D Q.No. 33d** Hess's law of constant heat summation. [5]

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Numerical Problems

48. **2076 GIE Set B Q.No. 30**

a. Define enthalpy of a reaction. State and explain Hess's law of constant heat summation.

b. The standard enthalpy of formation of H_2O (l), CO_2 (g) and C_6H_6(l) are –286, –393.5 and +49.02 $KJmol^{-1}$ respectively. Calculate the standard enthalpy of combustion of C_6H_6 (l) at the given temperature. [2+4+4]

Ans: –3268.02 kg

49. **2072 Set C Q.No. 24** Write any two applications of Hess's law. Heat of formation of ethyl alcohol, water and carbondioxide are –64.1 K Cal, –68.5 K Cal and –95 K Cal. Calculate the heat of combustion of ethyl alcohol. [1+4]

Ans: –331.4 KCal

50. **2070 Set C Q.No. 25** State Hess' law of constant heat summation. Calculate the enthalpy of formation of benzene, if enthalpy of combustion of benzene and carbon are –3280 kJ/mol and –395 kJ/ mol respectively. The enthalpy of formation of water is -285 kJ/mol. [1+4]

Ans: 55 kJ mol^{-1}

51. **2069 Set A Q.No. 24** Define enthalpy of combustion. Enthalpy of formation of benzene is 55kJ, enthalpy of formation of water and carbondioxide are –395 kJ and –285 kJ respectively. Calculate the enthalpy of combustion of benzene. [1+4]

Ans: ΔH = –2950 kJ

52. **2069 Supp. Set B Q.No. 28** What is meant by enthalpy of combustion? Enthalpy of formation of benzene is 55 kJ, enthalpy of formation of water and carbondioxides are –395 kJ and – 285 kJ respectively. Calculate the enthalpy of combustion of benzene. [2+3]

Ans: –2950 kJ mol^{-1}

53. **2066 Q. No. 26** Define Hess's Law of constant heat summation. Calculate the heat of combustion of glucose from the following data: [1+4]

$C(s) + O_2(g) \longrightarrow CO_2(g)$, $\Delta H = -395$ kJ

$H_2(g) + \frac{1}{2} O_2(g) \longrightarrow H_2O(l)$, $\Delta H = -269$ kJ

$6C(s) + 6H_2(g) + 3O_2(g) \longrightarrow C_6H_{12}O_6(s)$, $\Delta H = -1169$ kJ

Ans: –2815 kJ

54. **2063 Q.No. 30(b)** The standard enthalpy of formation of H_2O (*l*), CO_2 (g) and C_6H_6 (*l*) are –286, –393.5 and + 49.02 kJ mol^{-1} respectively at 298 K. Calculate the standard enthalpy of combustion of C_6H_6 (*l*) at the given temperature. [5]

Ans: – 3268.02 kJ

55. **2062 Q.No. 24** What is meant by enthalpy of formation? Calculate the enthalpy of formation of ethane at 298K, if the enthalpies of combustion of C, H and C_2H_6 are – 94.14, –68.47 and –373.3 K cal. respectively. [5]

Ans: – 20.39 kcal

56. **2056 Q.No. 28**

i. Distinguish between: [5+5]
   a. Internal energy and enthalpy
   b. Exothermic and endothermic reaction.

ii. Calculate the heat of formation of naphthalene from the following data:

$C(s) + O_2(g) \longrightarrow CO_2(g)$ $\Delta H = -94.405$ K cal.

$H_2(g) + \frac{1}{2} O_2(g) \longrightarrow H_2O(l)$ $\Delta H = -68.3$ K cal

$C_{10}H_8(s) + 12O_2(g) \longrightarrow 10CO_2(g) + 4H_2O(l)$ $\Delta H = -1231.6$ K cal (Naphthalene)

Ans: Heat of formation of naphthalene = 14.35 k cal

57. **2054 Q.No. 23** Calculate the standard heat of formation of CH_4 (g) from the following informations.

$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(1)$ $\Delta H = -890.3$ kJ

$C(\text{graphite}) + O_2(g) \longrightarrow CO_2(g)$ $\Delta H = -393.5$ kJ

$2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$ $\Delta H = -571.7$ kJ [5]

Ans: Standard heat of formation of CH_4 is –74.9 kJ/mol

58. **2053 Q.No. 25(b)** Estimate the enthalpy change for the reaction [5]

$H_{2(g)} + Cl_{2(g)} \longrightarrow 2HCl$

Given: bond energy of H–H = 435 J/mol
bond energy of Cl–Cl = 243 kJ/mol
bond energy of H–Cl = 430 kJ/mol

Ans: –182 kJ/mol

UNIT 6: CHEMICAL THERMODYNAMICS

FORMULAE

1. Entropy (S)

$\Delta S = S_{final} - S_{initial}$

$= S_{product} - S_{reactant}$

$\Delta S = \frac{q_{rev}}{T} = \frac{\Delta H}{T}$ (at constant T)

Entropy of fusion: $\Delta S_{fus} = \frac{\Delta H_{fus}}{T_m}$

Entropy of vapourization: $\Delta S_{vap} = \frac{\Delta H_{vap}}{T_b}$

Entropy of sublimation: $\Delta S_{sub} = \frac{\Delta H_{sub}}{T_b}$

2. Gibb's free energy (G)

$G = H - T\Delta S$

$\Delta G = \Delta H - T\Delta S$

$\Delta G = \Sigma \Delta G_{product} - \Sigma \Delta G_{reactant}$

At standard condtion (25°C)

$\Delta G° = \Sigma \Delta G°_{product} - \Sigma \Delta G°_{reactant}$

3. Gibb's Helmholtz equation

$\Delta G = \Delta H - T\Delta S$

if	ΔG = –ve	spontaneous
	ΔG = +ve	non spontaneous
	ΔG = 0	at equilibrium

Standard free energy change and equilibrium constant

$\Delta G° = -RT \ln K$

$\Delta G° = -2.303\ RT \log K$

Very Short Answer Questions [2 marks]

1. **2077 Set W Q.No. 3** What is meant by molar entropy? Write its unit. [1+1]

2. **2076 GIE Set A Q.No. 6** Calculate entropy change (ΔS) and free energy change (ΔG) for the conversion of ice into water at equilibrium condition when enthalpy change (ΔH) is 10 KJ/mol. [2]

Ans: 0.01 J/mol

3. **2076 GIE Set B Q.No. 6** Predict spontaneity and non-spontaneity in terms of ΔG when ΔH and ΔS are positive. [1+1]

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4. 2076 Set B Q.No. 6 2076 Set C Q.No. 6 Calculate entropy change (ΔS) and free energy change (ΔG) for the conversion of ice into water at equilibrium condition when enthalpy change (ΔH) is 9 KJ/mol. [2]
Ans: ΔS = 32.96 J/mol, ΔG = 1.92 J/mol

5. 2075 GIE Q.No. 6 2075 Set A Q.No. 6 Predict spontaneity and non spontaneity in term of ΔG, when ΔH and ΔS are positive [1+1]

6. 2075 Set B Q.No. 6 Give reason; [1+1]
   i. Gases have the highest absolute entropy among the three state of matter.
   ii. Decrease of enthalpy is the sole criterion for feasibility of a process.

7. 2074 Supp. Q.No. 6 2074 Set B Q.No. 6 How would you apply the relation $-\Delta G = T\Delta S_{total}$ to predict whether the process is spontaneous or non-spontaneous? [2]

8. 2074 Set A Q.No. 6 Apply the relation $-\Delta G = T\Delta S_{total}$ to predict whether the process is spontaneous or non-spontaneous? [2]

9. 2073 Supp Q.No. 6 2073 Set C Q.No. 6 2073 Set D Q.No. 6 Under what conditions the reaction expected to occur,
   i. spontaneous.
   ii. non-spontaneous
   if ΔH and Δ S are positive for the reaction? [1+1]

10. 2072 Supp. Q.No. 6 Mention the proper conditions of a chemical reaction to become spontaneous if its ΔH and ΔS are positive. [2]

11. 2072 Set C Q.No. 6 2071 Set C Q.No. 6 How would you predict the spontaneity of a system in term of free-energy change? [2]

12. 2071 Supp. Q.No. 6 Predict the criteria of spontaneity in light of free-energy change. [2]

13. 2071 Set D Q.No. 6 Predict the criteria of spontaneity in light of entropy change. [2]

14. 2070 Supp. Q.No. 6 Distinguish spontaneous and non spontaneous process giving an example of each. [1+1]

15. 2070 Set C Q.No. 5 What is meant by spontaneous process? Write an example for it. [2]

16. 2070 Set D Q.No. 6 How would you predict the spontaneity using the relation?
$T\Delta S_{total} = -\Delta G_{sys.}$ [2]

17. 2069 Set A Q.No. 5 Define Gibb's free-energy change. Write the mathematical relation to predict the spontaneity. [2]

18. 2069 Set B Q.No. 6 Give the physical meaning of entropy. Write its unit. [1+1]

19. 2068 Q.No. 15 Name the two criteria which must be met for a process to be spontaneous regardless of the temperature. [1+1]

20. 2066 Q. No. 16 Comment the statement "The decrease of enthalpy is not the sole criterian for the feasibility of the process." [2]

21. 2063 Q.No. 14 Define thermodynamic efficiency of heat engine. How is second law of thermodynamics stated in the light of this term? [2]

22. 2062 Q No. 16 (ii) Define the terms: Standard free energy of a reaction. [1]

23. 2061 Q.No. 14 In order for a reaction to occur spontaneously, what is the criterion? [2]

24. 2060 Q.No. 17 What is entropy? State the effect of increased temperature on the entropy of a substance. [2]

25. 2057 Q.No. 17 What is the physical concept of entropy? [2]

Short Answer Questions [5 marks]

26. 2069 Set B Q.No. 26 Define Gibb's free energy. How is spontaneity of a reaction predicted in light of free energy change, enthalpy change and entropy change? [1+4]

27. 2067 Q.No. 26 What is meant by free-energy change? Write the relation between entropy and enthalpy change. How does this relation help in predicting the spontaneity of a reaction? [1+2+2=5]

28. 2065 Q.No. 26 What is free energy change? How it is related with enthalpy change and entropy change? How would you predict whether a reaction is spontaneous, non spontaneous and equilibrium in term of free energy change? [1+2+2]

29. 2064 Q.No. 24 Define Gibb's free energy. How is the feasibility of exothermic and endothermic reactions predicted in the light of free energy change and entropy change? [1+4]

30. 2061 Q.No. 27 State and explain second law of thermodynamics. How does free energy change depend on the equilibrium constant? [5]

31. 2060 Q.No. 25 Define free energy. Derive an expression to relate Gibbs free energy change with work. [5]

32. 2059 Q.No. 24 State second law of thermodynamics. How would you explain the law in the light of entropy change? [5]

33. 2058 Q.No. 25 Discuss the criteria of spontaneity, non spontaneity and equilibrium of exothermic and endothermic reactions on the basis of free energy and entropy change. [5]

34. 2057 Q.No. 24 State and explain second law of thermodynamics. [5]

Long Answer Questions [10 marks]

35. 2070 Set D Q.No. 32 a How is the free energy change of a reaction related with the enthalpy change and entropy change? Discuss the criteria of spontaneity and non-spontaneity of a reaction on the basis of its energy change. [2+3]

Numerical Problems

36. 2072 Set D Q.No. 6 Calculate ΔS and ΔG for conversion of ice into water when they are equilibrium at 0°C(ΔH = 4kJ/mole)[1+1]
Ans; ΔS = 14.65 J mol^{-1} k^{-1}; ΔG = 0.55 J mol^{-1}

37. 2064 Q.No. 17 The latent heat of fusion of ice is 336 Jg^{-1}. Calculate the molar entropy of fusion of ice at its normal melting point. [2]
Ans: 22.15 $Jmol^{-1}$ K^{-1}

Write Short notes on [5 marks]

38. 2077 Set P Q.No. 12ii Gibb's free energy change and prediction for spontaneity of reaction. [5]

39. 2072 Set E Q.No. 33(iv) Prediction for the feasibility of reaction in terms of ΔG and ΔS. [5]

40. 2071 Set C Q.No. 33 a /2071 Set D Q.No. 33 a Second Law of thermodynamics [5]

41. 2070 Supp. Q.No. 33 a Spontaneity in light of entropy change, enthalpy change and free-energy change. [5]

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UNIT 7: CHEMICAL KINETICS

FORMULAE

1. Rate of reaction $= \frac{\text{Decrease in conc}^n \text{ of reactant}}{\text{Time interval}}$
$= \frac{\text{Increase in conc}^n \text{ of product}}{\text{Time interval}}$
2. $aA + bB \longrightarrow cC + dD$
Equivalent rate $= -\frac{d[A]}{a\,dt} = -\frac{d[B]}{b\,dt} = \frac{d[C]}{c\,dt} = \frac{d[D]}{d\,dt}$
3. Order of reaction
$aA + bB \longrightarrow$ product
Rate $\propto [A]^a [B]^b$ (Theoretical)
Rate $\propto [A]^m [B]^n$ (Experimental)
4. Rate law
$aA + bB \longrightarrow$ product
Rate $= K [A]^m [B]^n$
5. Unit of rate constant
For zero order = mol L^{-1} s^{-1} or mol L^{-1} min^{-1}
For 1st order = $time^{-1}$
For 2nd order = L mol^{-1} s^{-1} or L mol^{-1} min^{-1}
For 3rd order = L^2 mol^{-2} s^{-1} or L^2 mol^{-2} min^{-1}
6. First order reaction
$K_1 = \frac{2.303}{t} \log \frac{a}{a-x}$
Half life period $t_{\frac{1}{2}} = \frac{0.693}{K_1}$
7. Second order reaction
$K_2 = \frac{1}{t} \frac{a}{a(a-x)}$
Half life period $t_{\frac{1}{2}} = \frac{1}{K_2 a}$
8. Thrid order reaction
$K_3 = \frac{1}{2t} \frac{x(2a-x)}{a^2(a-x^2)}$
Half life period $t_{\frac{1}{2}} = \frac{3}{2K_3 a^2}$

Very Short Answer Questions [2 marks]

1. **2076 GIE Set A Q.No. 7** For a reaction, x + y ⟶ z. The rate of reaction is doubled when concentration of 'x' is doubled but there is no effect in rate with change of concentration of 'y'. [1+1]
   i. write rate law equation.
   ii. find the unit of rate constant.
2. **2076 GIE Set B Q.No. 7** For a reaction A + B ⟶ C. The rate reaction w.r. to 'A' is 2nd order and w.r. to 'B' is 1st order. (i) Write the rate law equation. (ii) How many time will the rate increase when the concentration of both (A and B) are doubled? [1+1]
   Ans: 8 times
3. **2076 Set B Q.No. 7** **2076 Set C Q.No. 7** You are given a rate law equation, Rate = K $[A]^2$ [B]. By how many times will the rate increase or decrease for the reaction if
   i. Concentration of Ⓐ is doubled while that of Ⓑ made constant.
   ii. Concentration of Ⓐ is kept constant that of Ⓑ is doubled? [1+1]
   Ans: (i) 4 times (ii) 2 times
4. **2075 GIE Q.No. 7** For a reaction, $2N_2O_5$ (g) ⟶ $4NO_2$ (g) + O_2 (g). If the rate of formation of Oxygen is 2×10^{-1} mol $L^{-1}Sec^{-1}$, what will be the rate of disappearance of N_2O_5? [2]
   Ans: 4×10^{-1}
5. **2075 Set A Q.No. 7** A reaction is I[st] order w.r. to A and II[nd] order w.r. to B. [1+1]
   i. Write the rate law equation.
   ii. How many times will the rate increase when the concentration of B is tripled?
   Ans: 9 times
6. **2075 Set B Q.No. 7** A hypothetical reaction P + Q ⟶ Z is a third order reaction. Write its possible rate law expression. [2]
7. **2074 Supp. Q.No. 7** For a reaction, 2 N_2O_5 ⟶ $4NO_2 + O_2$, The rate of disappearance of N_2O_5 is 4×10^{-6} mol L^{-1} S^{-1} what will be the rate of formation of NO_2? [2]
   Ans: 8×10^{-6} mol $L^{-1}S^{-1}$
8. **2074 Set A Q.No. 7** **2074 Set B Q.No. 7** For a reaction, 2 HI ⟶ $H_2 + I_2$
   If the rate of formation of I_2 is 9.1×10^{-6} mol L^{-1} S^{-1}, What will be the rate of disappearance of HI? [2]
   Ans: $2 \times 9.1 \times 10^{-6}$ mol $L^{-1}S^{-1}$
9. **2073 Supp Q.No. 7** A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is [1+1]
   i. doubled
   ii. reduced to half?
   Ans: (i) n^4 × initial rate (ii) $\frac{n^2}{4}$ × initial rate
10. **2073 Set C Q.No. 7** Draw an energy profile diagram to show influence of catalyst in the rate of chemical reaction. [2]
11. **2073 Set D Q.No. 7** What are the essential conditions for the effective collision of reacting species? [2]
12. **2072 Supp. Q.No. 7** Write the rate expression of each components in the following reaction:
    $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
    What is the unit of reaction rate? [1.5+0.5]
13. **2072 Set C Q.No. 7** What is meant by instantaneous rate of reaction? Write the expression for the rate of the following reaction:
    $2N_2O_5(g) \longrightarrow 4NO_2(g) + O_2(g)$ [1+1]
14. **2072 Set D Q.No. 7** Define the terms [1+1]
    i. activated complex ii. rate of reaction
15. **2072 Set E Q.No. 7** The following hypothetical reaction is second order, A + B ⟶ Z. Write possible rate law expression. [2]
16. **2071 Supp. Q.No. 7** Define 1st order reaction and write the unit of rate constant in the first order reaction. [1+1]
    Ans: $k = S^{-1}$
17. **2071 Set C Q.No. 7** Identify reaction orders if the units of rate constant are: [1+1]
    a. min^{-1} b. $molL^{-1}$ min^{-1}
18. **2071 Set D Q.No. 7** Rate of reaction is doubled when concentration of A is doubled but there is no effect in rate with change in concentration of B. [1+1]
    a. Write rate law
    b. Find out unit of the reaction.

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19. **2070 Supp. Q.No. 7** For a hypothetical reaction A+B⟶Z. The rate of above reaction is doubled when concentration of A is doubled but there is no effect of change of concentration of B. [1+1]
   i. Write down the rate law.
   ii. What is the unit of rate constant?

20. **2070 Set C Q.No. 7** For the reaction P + Q ⟶ product is a third order. Write the possible rate law expressions for the above reaction. [2]

21. **2070 Set D Q.No. 7** Draw energy profile diagram for catalyzed and uncatalyzed reactions. [2]

22. **2069 Set A Q.No. 7** What is meant by effective collision of reacting species? Mention any one condition for a collision. [1+1]

23. **2069 Set B Q.No. 7** Write the rate law for a first order reaction. What is the unit of the reaction? [1+1]

24. **2069 Supp. Set B Q.No. 7** Define
   i. effective collison ii. proper orientation [1+1]

25. **2068 Q.No. 16** Define the half-life period of a reaction. The half-life periods of two reactions A and B are 3.21×10^2 min. and 569 min. respectively. Which of these is a faster reaction? [1+1]
   Ans. Reaction A is faster

26. **2067 Q.No. 15** What is the order of reaction whose rate constant has same unit as the rate of reaction? [2]

27. **2066 Q. No. 15** Write the rate expression for the following reaction: $2\ N_2O_5 \longrightarrow 4NO_2 + O_2$ [2]

28. **2065 Q.No. 15** Write the possible rate Law equations of the following Second order reaction: [2]
   P + Q ⟶ Product

29. **2064 Q.No. 18** Draw a labeled energy profile diagram to show the influence of catalyst in the rate of chemical reaction. [2]

30. **2063 Q.No. 17** Define zero order reaction and find the unit of its rate constant. [2]
   Ans: Mol L^{-1} s^{-1}

31. **2062 Q.No. 17** What is half life period of a reaction? Calculate the half life period of a first order reaction when the rate constant is 5 $year^{-1}$. [2]
   Ans: 0.1386 years

32. **2061 Q.No. 16** How does a Catalyst increase rate of reaction? [2]

33. **2059 Q.No. 18** Give one example of a reaction where order and molecularity are equal. [2]

34. **2058 Q.No. 18** Identify the order of the reaction if the unit of its rate constant is L mol^{-1} s^{-1}. [2]

35. **2057 Q.No. 18** Give the rate law for a reaction which is second order in A and zero order in B. [2]

36. **2056 Q.No. 3** Give the factors which influence the rate of a reaction. [2]

37. **2056 Q.No. 7** Calculate the half-life period of a first order reaction when the rate constant is 5 $year^{-1}$. [2]
   Ans: 0.1386 years

38. **2055 Q.No. 5** The reaction X + Y ⟶ products is a second order reaction. Write three different rate law expressions which may be true to the above reaction. [2]

39. **2054 Q.No. 6** What is meant by rate of a chemical reaction? [2]

40. **2053 Q.No. 11** What is an activation energy? [2]

41. **2053 Q.No. 16** Define the half life of a reaction. [2]

42. **2052 Q.No. 5** Give a chemical reaction to show reaction of first order. [2]

Short Answer Questions [5 marks]

43. **2076 GIE Set B Q.No. 25** How do concentration, temperature, catalyst and surface area of reactants affect the rate of reaction? Why is rate law an experimental parameter? [4+1]

44. **2073 Supp Q.No. 26** Define the terms.
   i. Half-life period of a reaction.
   ii. First order reaction.
   A first order reaction is 90% complete in 30 minutes. How long would it take to be 99% complete? [2+3]
   Ans: 60 minute

45. **2073 Set C Q.No. 26** Define (i) rate law (ii) Half-life period of a reaction.
   In a first order reaction 40% of reactant gets converted into product in 30 minutes. What time would it require to convert 75% into product? **Ans: 86.36 minute** [1+1+3]

46. **2073 Set D Q.No. 26** Define rate law. The reaction P+Q⟶Z is first order with respect to Ⓟ and zero order with respect to ◎. If so, fill in the blanks in the following. [1+4]

Expt	[P] M	[Q] M	initial rate of formation [Z] M min^{-1}
I	0.1	0.1	2×10^{-2}
II	–	0.2	4×10^{-2}
III	0.4	0.4	–
IV	–	0.2	2×10^{-2}

Ans: (II) [P] = 0.2 (III) Rate = 8.0×10^{-2} (IV) [P] = 0.1

47. **2072 Supp. Q.No. 24** Define the terms:
   i. rate law
   ii. order of a reaction
   iii. molecularity of a reaction
   A first order reaction will take 100 minutes to complete 60% of reactant into product. What time will it take to complete 75% of the reactant into product? [1+1+1+2]
   Ans: 151.35 minute

48. **2072 Set E Q.No. 32b** For the reaction $Cl_2+2NO\longrightarrow2NOCl$, the data obtained are:

Expt No.	Initial Concentration of		Initial rate of reaction mol L^{-1} s^{-1}
	$[Cl_2]$ mol L^{-1}	[NO] mol L^{-1}	
1	0.020	0.010	2.40×10^{-4}
2	0.020	0.030	2.16×10^{-3}
3	0.040	0.030	4.32×10^{-3}

   Determine:
   i. Order of reaction with respect to Cl_2 and NO and the overall reaction.
   ii. If the concentration of Cl_2 is [0.50] $molL^{-1}$ and NO is [0.40] $molL^{-1}$, What is the rate? [3+2]
   Ans: (i) 1 and 2 respectively, overall order= 3 (ii) 9.6 $molL^{-1}s^{-1}$

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49. **2065 Q.No. 31 iv** Describe Factors affecting on reaction rate.[5]

50. **2059 Q.No. 25** Define the rate of chemical reaction. How do concentration, temperature, catalyst and surface area of reactants affect the rate of reaction? [1+4]

51. **2058 Q.No. 24** Define rate of reaction. Distinguish between order and molecularity of a reaction. [5]

Long Answer Questions [10 marks]

52. **2077 Set P Q.No. 11** Define
   i. activation energy
   ii. rate law
   iii. zero-order reaction
   iv. half life of reaction.

How does surface area and concentration of reactants affect the rate of chemical reaction?

The experimental data for the reaction $2A + B_2 \rightarrow 2AB$, are as below:

Expt. no.	(A) molL^{-1}	(B) molL^{-1}	Rate molL^{-1}sec^{-1}
1	0.50	0.50	1.6×10^{-4}
2	0.50	1.00	3.2×10^{-4}
3	1.00	1.00	3.2×10^{-4}

Calculate the rate of formation of AB when the initial concentrations of (A) and (B) are 2.00 molL^{-1} and 4.00 molL^{-1} respectively. [6+4]

Ans: 3.2×10^{-4} s^{-1}; 1.28×10^{-3} mol L^{-1}s^{-1}

53. **2077 Set V Q.No. 12** Define the terms:
   i. half-life period of reaction
   ii. rate law
   iii. instantaneous rate
   iv. zero-order reaction

How do surface area of reactant and catalyst affect the rate of chemical reaction?

The experimental data for the reaction $2A + B_2 \rightarrow 2AB$, are as below:

Expt. no.	(A) molL^{-1}	(B) molL^{-1}	Rate molL^{-1}sec^{-1}
1	0.50	0.50	1.6×10^{-4}
2	0.50	1.00	3.2×10^{-4}
3	1.00	1.00	3.2×10^{-4}

Find overall order of reaction and rate constant. [4+2+4]

Ans: Overall reaction order = 1st order, Rate constant = 3.2×10^{-4} s^{-1}

54. **2077 Set W Q.No. 12** Define the terms:
   i. activation energy
   ii. half life of a reaction
   iii. rate law
   iv. molecularity of reaction
   v. effective collision
   vi. order of reaction.

99% of first order reaction is completed in 32 minutes. What time will it take to complete 99.9% of reaction? [1+1+1+1+1+1+4]

Ans: 4.83 × 10^{-1} minute

55. **2076 GIE Set A Q.No. 32**

a. Differentiate between order and molecularity of a reaction. Why is larger value of molecularity of a reaction rare? Give an example of pseudo first order reaction.

b. The following hypothetical data were obtained from a reaction $p + Q \rightarrow Z$.

Expt.	(P) molL^{-1}	(Q) molL^{-1}	rate of formation of (Z) molL^{-1} s^{-1}
1	0.1	0.1	7×10^{-3}
2	0.3	0.2	8.4×10^{-2}
3	0.3	0.4	3.36×10^{-1}
4	0.4	0.1	2.80×10^{-2}

i. Write rate law equation.
ii. Calculate overall order of reaction.
iii. What will be the rate of disappearance of Q, if [P] = 0.4 molL^{-1} and Q = 0.5 molL^{-1}? [4+2+1+1+2]

Ans: (ii) 3rd order (iii) 0.7 mol L^{-1} s^{-1}

56. **2076 Set B Q.No. 32** Define the terms (i) activation energy (ii) order of reaction (iii) molecularity of reaction (iv) effective collision (v) rate law equation.

Why does powder sugar dissolve faster than grain sugar?

The following data were obtained for a hypothetical reaction $x + y \longrightarrow z$

Expt.	[x] mol L^{-1}	[y] mol L^{-1}	formation of z mol L^{-1} s^{-1}
1	0.20	0.20	3×10^{-3}
2	0.40	0.20	1.2×10^{-2}
3	0.20	0.40	6×10^{-3}
4	0.60	0.20	9×10^{-3}

Calculate the rate constant and find out rate of disappearance of y when [x] = 0.2 mol L^{-1} and [y] = 0.4 mol L^{-1}. [5+1+2+2]

Ans: Rate constant (k) = 0.375 L^{2}mol^{-2}s^{-1}, Rate of disappearance of y = 6×10^{-3} mol L^{-1}s^{-1}

57. **2075 GIE Q.No. 32** **2075 Set A Q.No. 32** Define rate law. What are the effects of (i) concentration (ii) temperature (iii) Catalyst and (iv) surface area of reactants on rate of reaction? Why is order of reaction an experimental parameter? The reaction between Ⓧ and Ⓨ is of 1st order w.r. to Ⓧ and zero order w.r. to Ⓨ. Fill in the banks in the following table. [1+4+1+4]

Expt. No.	[x] mol L^{-1}	[y] mol L^{-1}	initial rate mol L^{-1} min^{-1}
1	0.1	0.1	2×10^{-2}
2	-	0.2	4×10^{-2}
3	0.4	0.4	-
4	-	0.2	2×10^{-2}

Ans: (ii) [X] = 0.2, (iii) Rate = 8×10^{-2} (iv) [X] = 0.1

58. **2074 Supp. Q.No. 32** Define:
   i. Rate law equation
   ii. Half life period for a reaction

How is order of a reaction different from molecularity of reaction?

The following rate data were obtained for the reaction $2A + B \longrightarrow C$

Exp.No.	[A] mol L^{-1}	[B] mol L^{-1}	Initial rate of formation of C mol L^{-1}
1	0.1	0.1	6.0×10^{-3}
2	0.3	0.2	7.2×10^{-2}
3	0.3	0.4	2.88×10^{-4}
4	0.4	0.1	2.4×10^{-2}

Calculate the rate of formation of C, When [A] = 0.5 mol L^{-1} and [B] = 0.2 mol L^{-1}. [2+4+4]

Ans: 0.12 mol^2 L^{-2} s^{-1}

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59. **2074 Set A Q.No. 32** Define the terms;
i. Rate Law equation
ii. Activated complex.
How is order of reaction differed from molecularity of reaction?
The following data were obtained for the reaction $2A + B \longrightarrow C$

Experiment	[A] mol L^{-1}	[B] mol L^{-1}	[Initial rate] mol $L^{-1}s^{-1}$
1	0.1	0.1	6.0×10^{-3}
2	0.3	0.2	7.2×10^{-2}
3	0.3	0.4	2.88×10^{-4}
4	0.4	0.1	2.4×10^{-2}

Calculate the rate of formation of C when [A] = 0.5 mol L^{-1} and [B] = 0.2 mol L^{-1} [2+4+4]
Ans: 0.12 mol $L^{-1}s^{-1}$

60. **2074 Set B Q.No. 32** Define
i. Activation energy
ii. Rate law equation
What are the difference between order and molecularity of reaction? From the following data for the reaction between (A) and (B). [2+4+4]
$2A + B_2 \longrightarrow 2AB$

Experiment	[A] mol L^{-1}	[B] mol L^{-1}	[Initial rate] mol L^{-1}
1	0.50	0.50	1.6×10^{-4}
2	0.50	1.00	3.2×10^{-4}
3	1.00	1.00	3.2×10^{-4}

Calculate the rate of formation of AB When [A] = 2 mol L^{-1} and [B] = 4 mol L^{-1}.
Ans: 1.28×10^{-3} mol L^{-1} s^{-1}

61. **2070 Set C Q.No. 32 a** Distinguish between order and molecularity of reaction. What is meant by second order reaction? Write its units. [2+2+1]

62. **2069 Set A Q.No. 30a** Define rate law and rate of a reaction. How does temperature, catalyst, concentration of reactant and surface area of reactant affect the rate of reaction? [2+4]

63. **2063 Q.No. 31(i)** Write short notes on Effect of temperature and catalyst on the rate of reaction. [5]

64. **2054 Q.No. 27(a)** In a reaction $H_2 + I_2 \rightleftharpoons 2HI$ the rate of disappearance of I_2 is found to be 10^{-6} mole per litre per second. What would be corresponding rate of appearance HI. [5]
Ans: 2×10^{-6} mol L^{-1} s^{-1}

Write short notes on [5 marks]

65. **2072 Set D Q.No. 33a** Order and Molecularity of reaction [5]

66. **2067 Q.No. 31 ii** **2054 Q.No. 30(b)** Collision theory of reactions rate [5]

Numerical Problems

67. **2072 Set C Q.No. 30** Give any four points of difference between molecularity and order of a chemical reaction. What is meant by pseudo first order reaction? Write an example of it. [4+2+1.5+1+1.5]
The experimental data for the reaction $2A + B \longrightarrow C$ is

Expt no.	Initial Concentration of		Rate of reaction
	[A] mol L^{-1}	[B] mol L^{-1}	mol L^{-1} sec^{-1}
1	0.1	0.1	7×10^{-3}
2	0.3	0.2	8.4×10^{-2}
3	0.3	0.4	3.36×10^{-1}
4	0.4	0.1	2.8×10^{-2}

Determine:
i. Over all order of reaction
ii. Rate law equation
iii. Calculate the rate of formation of C when concentration of [A] and [B] are 0.6 mol L^{-1} and 0.3 mol L^{-1} respectively.
Ans: (i) 3, (ii) Rate = $k[A]^1 [B]^2$ (iii) 0.378 mol^2 L^{-2} s^{-1}

68. **2071 Supp. Q.No. 24** Define the term. [1+1+1+2]
i. rate law equation
ii. instantaneous rate
What will be the initial rate of a reaction if its rate constant is 1×10^{-3} min^{-1} and the concentration of the reactant is 0.2 mol L^{-1}? How much the reactant will be converted into the product in 500 minute?
Ans: 0.078 mol L^{-1}

69. **2071 Set C Q.No. 24** Define the term:
a. rate law
b. order of reaction
c. activated complex
The rate of a first order reaction is 1.5×10^2 mol L^{-1} min^{-1} at 0.5 M concentration of the reaction. What is the half-life of the reaction? [5]
Ans: 2.31×10^{-3} min

70. **2071 Set D Q.No. 24** What is instantaneous rate of reaction? How do concentration and surface area of reactant affect the rate of reaction? A first order reaction will take 100 minutes to complete 60% of reactant into product. What time will it take to complete 90% of reactant into product? [1+2+2]
Ans: 251.31 min

71. **2070 Supp. Q.No. 32** How does (i) temperature (ii) concentration of reactant and (iii) catalyst affect the rate of reaction? Write any three points to distinguish order from molecularity of a reaction. For a first order reaction, it takes 4 minute for initial concentration of 0.8 mol/L to become 0.2 mol/L. What time will it take to become the concentration to 0.04 mol/L? [6 + 4]
Ans: 8.65 minute

72. **2070 Set C Q.No. 32 b** The following rate data were obtained at 303 K for the reaction
$2A + B \longrightarrow C + D$

Experiment	[A] mol L^{-1}	[B] mol L^{-1}	Initial rate of formation of [D] mol L^{-1} min^{-1}
1	0.1	0.1	6.0×10^{-3}
2	0.3	0.2	7.2×10^{-2}
3	0.3	0.4	2.88×10^{-1}
4	0.4	0.1	2.4×10^{-2}

i. What is the rate law?
ii. Write the order with respect to each reactant and overall order.
iii. Find the unit of the overall reaction. [1+2+2]
Ans: (i) $\frac{dx}{dt} = K[A][B]^2$ (ii) order of reaction w.r. to A = 1; order of reaction w.r. to B = 2; overall order of reaction = 3

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73. **2070 Set D Q.No. 32 b** For a reaction, $2X + Y \longrightarrow X_2Y$, the following data were obtained by experiment.

Experiment	[X] mol L^{-1}	[Y] mol L^{-1}	Rate, mol $L^{-1}s^{-1}$
1	0.10	0.10	1.3×10^{-4}
2	0.10	0.20	2.6×10^{-4}
3	0.20	0.20	1.04×10^{-3}

i. Find the order of reaction with respect to X, Y and overall reaction.
ii. Find the value of rate constant with its units.
iii. What is the initial rate of the reaction when the initial concentration of X and Y are 1M and 0.5 M respectively. [2.5 +1+1.5]

Ans: (i) order of R_x" w.r.to X = 2; Order of R_x" w.r. to Y = 1; Overall order of R_x" = 3 (ii) k = 0.13 $mol^{-2} L^2. s^{-1}$ (iii) 6.5×10^{-2} mol. s^{-1}

74. **2069 Set A Q.No. 30b** From the following experimental data for the reaction: [2+2]

$2A + B_2 \longrightarrow 2AB$

Experiment	[A], $molL^{-1}$	[B], $molL^{-1}$	Rate, mol $L^{-1}s^{-1}$
1	0.5	0.5	1.6×10^{-4}
2	0.5	1	3.2×10^{-4}
3	1	1	3.2×10^{-4}

i. Find overall order of reaction.
ii. Find the rate constant.

Ans: (i) 1st order (ii) $3,2\times 10^{-4}$ sec^{-1}

75. **2069 Set B Q.No. 32**

a. Define the terms: [5 + 5]
i. First order reaction ii. Rate law
iii. Effective collision iv. Activation energy
v. Half-life period of a reaction vi. Instantaneous rate.

b. The following data are given for the reaction

$2x + y \longrightarrow$ product (Z)

Expt. No.	[X], $molL^{-1}$	[Y], $molL^{-1}$	Rate of formation of (Z) mol $L^{-1}s^{-1}$
1	0.1	0.1	7.0×10^{-3}
2	0.3	0.2	8.4×10^{-2}
3	0.3	0.4	3.36×10^{-1}
4	0.4	0.1	2.8×10^{-2}

i. Calculate the order of reaction with respect to X and Y.
ii. Half-life of reaction with respect to X.
iii. The rate of formation of 'Z'
when [X] = 0.6 mol L^{-1}; [Y] = 0.3 mol L^{-1}

Ans: (i) Order of reaction w.r. to X = 1; and w.r. to Y = 2 (ii) 0.099 s (iii) 0.378 mol L^{-1} s^{-1}

76. **2069 Supp. Set B Q.No. 30** Define the terms: [5+5]
i. activation energy ii. First order reaction
iii. rate law iv. half life - period of a reaction
v. Molecularity vi. Instantaneous rate.

For a hypothetical reaction

$2M + N \longrightarrow$ product; The following data are given.

Expt. No.	Initial conc of M (mol L^{-1})	Initial conc of N (mol L^{-1})	Initial rate (mol L^{-1} sec^{-1})
I	0.10	0.20	3×10^2
II	0.30	0.40	3.6×10^3
III	0.30	0.80	1.44×10^4
IV	0.30	1.60	A
V	0.60	0.80	B
VI	0.10	0.40	C

From the above data:
i. Find the overall order of the reaction.
ii. Calculate the value of A, B and C.

Ans: (i) 1 w.r.t. M and 2 w.r.t. N, overall order = (1 + 2) = 3 (ii) $A = 5.76\times 10^4$ mol $L^{-1}S^{-1}$; $B = 2.88\times 10^4$ mol $L^{-1}s^{-1}$; $C = 1.2\times 10^3$ mol L^{-1}

77. **2066 Q. No. 30** What is the rate law of reaction? How does order of a reaction differ from molecularity of a reaction? For the reaction of reaction A+ B $\longrightarrow$ P, is given below as a function of different initial concentration of A and B.

[A] mol L^{-1}	[B] mol L^{-1}	Rate mol L^{-1} min^{-1}
0.01	0.01	0.005
0.02	0.01	0.010
0.01	0.02	0.005

i. Determine the order of reaction with respect to A and B respectively.
ii. What is overall order of reaction?
iii. Write rate Law equation.
iv. Find value of rate constant.
v. What is the half-life of A? [1+4+1+1+1+1]

Ans: (i) 1 w.r.to A and 0 w.r.to B (ii) 1 (iii) Rate = k [A] (iv) (v) 1.386 min

78. **2064 Q.No. 25** Define instantaneous rate of reaction. Compare the rate of reaction of all the components of the following reaction:

$2N_2O_5\,(g) \longrightarrow 4NO_2\,(g) + O_2\,(g)$

Find the rate of each component in mol s^{-1}, when 2.24 litre O_2 at NTP are produced in 30 minutes. [1+4]

Ans: Rate of disappearance of $N_2O_5 = 1.11\times 10^{-4}$ mol s^{-1} Rate of formation of $NO_2 = 2.22\times 10^{-4}$ mol s^{-1} Rate of formation of $O_2 = 5.55\times 10^{-5}$ mol s

79. **2063 Q.No. 16** The half life period of first order reaction is hours. Find the time required to complete 87.5% of the reaction.

Ans: t = 9.003 hour

80. **2062 Q.No. 25** The rate of a reaction, A + B $\longrightarrow$ product is given below as a function of different initial concn. of A and B

Expt.	[A] mol L^{-1}	[B] mol L^{-1}	Initial rate mol L^{-1} min^{-1}
1.	0.01	0.01	0.005
2.	0.02	0.01	0.010
3.	0.01	0.02	0.005

i. Determine the order of reaction with respect to A and B
ii What is the half life of A in the reaction? [5]

Ans: Reaction is 1st order with respect to A and zero order with respect to B. Half life of A = 1.386 minute

81. **2061 Q.No. 25** Suppose that the rate law for the reaction $A \longrightarrow B$ has been found to be of the form Rate = $k[A]^m$. From the following data, determine the overall order of the reaction and the order with respect to A. [5]

Initial Concentration of A (M)	Initial Rate (M/Sec)
0.05	3×10^{-5}
0.10	12×10^{-5}
0.20	48×10^{-5}

Ans: Order of reaction with respect to A is 2 and the over all order of the reaction is also

82. **2060 Q.No. 16** What is meant by order of a reaction? State the order of reaction having rate constant 2×10^{-2} mol $L^{-1}s^{-1}$

Ans: Zero order

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83. **2060 Q.No. 30** For the gaseous reaction,

$A_{(g)} + B_{(g)} \longrightarrow C_{(g)} + D_{(g)}$

It is found that, rate = $K[A]^2[B]^1$

How many times does the rate of reaction increase or decrease if (a) the partial pressure of both A and B are doubled, (b) the partial pressure of A doubles but that of B remains constant. (c) the volume of reacting vessel is doubled (d) an inert gas is added which doubles the overall pressure while the partial pressure of A and B remains constant. (e) the temperature rises by 30°C. [10]

Ans: (a) Rate increases by 8 folds (b) rate increases by 4 folds (c) rate decreases by 4 folds (d) no change in the rate of reaction (e) rate increases by 8 to 27 folds.

84. **2055 Q.No. 28**

a. List the factors that affect the rate of a reaction.

b. Hydrogen and nitrogen oxide react according to the following equation.

$2H_2(g) + 2NO(g) \longrightarrow H_2O(g) + N_2(g)$

Experiments were performed at 800°C in order to determine the order of reaction and the following results were obtained.

Initial concentration of nitrogen oxide (mol litre^{-1})	Initial concentration of hydrogen (mol litre^{-1})	Initial rate of production of nitrogen (mol litre^{-1} sec^{-1})
6×10^{-3}	1×10^{-3}	3×10^{-3}
6×10^{-3}	2×10^{-3}	6×10^{-3}
6×10^{-3}	3×10^{-3}	9×10^{-3}
1×10^{-3}	6×10^{-3}	0.5×10^{-3}
2×10^{-3}	6×10^{-3}	2.0×10^{-3}
3×10^{-3}	6×10^{-3}	4.5×10^{-3}

a. What is the order of this reaction with respect to (i) nitrogen oxide (ii) hydrogen?

b. Write the rate equation for the reaction of nitrogen oxide with hydrogen.

c. What is the unit of rate constant, k?

d. Why are chemists interested in obtaining order of reaction and rate equations? [10]

Ans: (a) The reaction is 1st order with respect to H_2 and 2nd order with respect to nitrogen oxide (c) $Mol^{-2} L^2 Sec^{-1}$

85. **2053 Q.No. 25(a)** What is meant by the term rate of reaction? How is it expressed? [2.5]

Write short notes on [5 marks]

86. **2075 Set B Q.No. 33ii** Order and molecularity of reaction. [5]

87. **2068 Q.No. 31iv** Rate of chemical reaction and Rate Law [5]

ORGANIC CHEMISTRY (SECTION B)

UNIT 8: AROMATIC HYDROCARBON

Very Short Answer Questions [2 marks]

1. **2076 GIE Set A Q.No. 8** How is sodiumbenzoate converted to benzene hexachloride? [2]

2. **2076 GIE Set B Q.No. 8** What happen's when
   i. Sodium benzoate is heated with sodalime.
   ii. Chlorobenzene is heated with $LiAlH_4$? [1+1]

3. **2076 Set B Q.No. 8** Write down correct reactions for the conversion of ethyne into BHC. [2]

4. **2075 GIE Q.No. 8** Identify the major products Ⓐ and Ⓑ in the following reaction sequence.

$$\text{Chlorobenzene} \xrightarrow[\Delta]{LiAlH_4} \text{Ⓐ} \xrightarrow[\Delta]{Ni/H_2} \text{Ⓑ}$$ [1+1]

5. **2075 Set A Q.No. 8** Identify the major products Ⓐ and Ⓑ in the following reaction sequence

$$\text{Sodium benzoate} \xrightarrow[\Delta]{NaOH+CaO} \text{Ⓐ} \xrightarrow[\Delta]{H_2/Ni} \text{Ⓑ}$$ [1+1]

6. **2075 Set B Q.No. 8** Identify Ⓐ and Ⓑ in the following reaction sequence. [1+1]

$$\text{Ⓐ} \xrightarrow[\Delta]{NaOH/CaO} \text{Ⓑ} \xrightarrow[light]{Cl_2} C_6H_6Cl_6$$

7. **2074 Supp. Q.No. 8** $CaC_2 \xrightarrow{H_2O} A \xrightarrow[\Delta]{\text{Red hot Cu}} B$

Identify A and B in the above reaction. [1+1]

8. **2074 Set A Q.No. 8** Identify the major product (A) and (B) in the following reaction sequence. [1+1]

$$\text{Chlorobenzene} \xrightarrow[\Delta]{LiAlH_4} (A) \xrightarrow[AlCl_3]{CH_3Cl/\Delta} (B)$$

9. **2074 Set B Q.No. 8** Identify the major product (A) and (B) in the following reaction sequence. [1+1]

$$\text{Sodium benzoate} \xrightarrow[\Delta]{NaOH/CaO} (A) \xrightarrow[light]{Cl_2} (B)$$

10. **2073 Supp Q.No. 8** How is benzene obtained form toluene? [2]

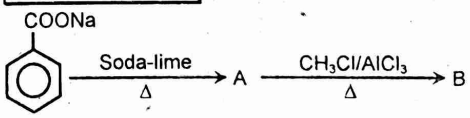
11. **2073 Set C Q.No. 8** What happens when: [1+1]
   i. Sodium benzoate is heated with soda-lime.
   ii. Benzene is heated with hydrogen in presence of nickel powder.

12. **2072 Supp. Q.No. 8** What are aromatic compounds according to Huckel's rule? [2]

13. **2072 Set C Q.No. 8** How would you prepare benzene from:
   i. ethyne ii. sodium benzoate [1+1]

14. **2072 Set D Q.No. 8** State Huckel's rule for aromaticity. [2]

15. **2072 Set E Q.No. 8**



Identify A and B of the above reaction. [1+1]

16. **2071 Supp. Q.No. 8** What are aromatic compounds according to Huckel's rule? [2]

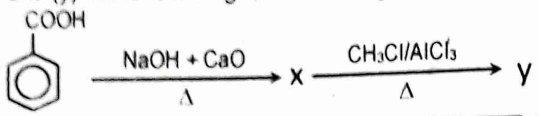
17. **2071 Set C Q.No. 8** Write resonance hybrid structure of arene containing meta director and ortho director substituents of each. [1+1]

18. **2071 Set D Q.No. 8** State Huckel's rule for aromaticity. [2]

19. **2070 Supp. Q.No. 8** Why is benzene called aromatic compound according to Huckel's rule? [2]

20. **2070 Set C Q.No. 8** What happens when: [1+1]
   i. Sodium benzoate is heated with soda-lime.
   ii. Phenol is heated with zinc dust.

21. 2070 Set D Q.No. 8 What happens when:
   i. Benzene is heated with acetic anhydride in presence of anhydrous $AlCl_3$.
   ii. Sodium benzoate is heated with sodalime. [1+1]
22. 2069 Set A Q.No. 32d Give the example of Friedel Craft's alkylation [1]
23. 2069 Set B Q.No. 8 2069 Supp. Set B Q.No. 8 Identify (x) and (y) in the following reaction and give their names. [2]



24. 2062 Q.No. 5(i) 2060 Q.No. 5(ii) 2057 Q.No. 5 Write an example of each of the following reactions giving appropriate conditions: Friedel-Craft acylation [2]
25. 2054 Q.No. 17 Explain with any one example of electrophilic substitution in aromatic compounds. [2]

Short Answer Questions [5 marks]

26. 2056 Q.No. 30 b-(ii) Show your acquaintance with the following: Friedel Craft's reaction [5]

Write short notes on [5 marks]

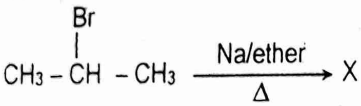
27. 2053 Q.No. 28(a) 2062 Q.31(a) Friedel-Craft's reaction [5]

UNIT 9: HALOALKANES AND HALOARENES

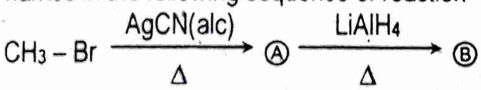
9.1. HALOALKANES

Very Short Answer Questions [2 marks]

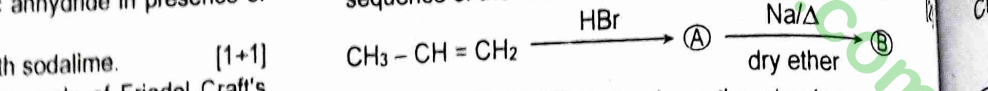
1. 2077 Set W Q.No. 2 How does chloroform react with (i) acetone (ii) silver powder. [1+1]
2. 2076 GIE Set B Q.No. 9 Identify the compounds (x) and write its IUPAC name. [2]



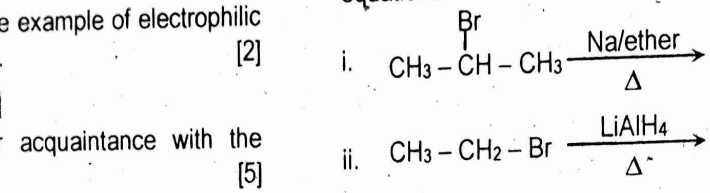
3. 2074 Supp. Q.No. 9 What happens when [2]
   i. chlorobenzene is treated with chloral
   ii. trichloromethane is heated with conc. Nitric acid
4. 2074 Set A Q.No. 9 What happens when chloroform is
   i. exposed to atmospheric air
   ii. heated with silver powder [1+1]
5. 2074 Set B Q.No. 9 Why is chloroform stored in dark coloured bottle containing ethanol? [2]
6. 2073 Supp Q.No. 9 An alkene Ⓐ undergoes addition with HBr to give Ⓑ. When Ⓑ is heated with sodium in presence of dry ether give 2,3–dimethylbutane. Identify Ⓐ and Ⓑ. [1+1]
7. 2073 Set C Q.No. 9 Identify Ⓐ and Ⓑ and give their IUPAC names in the following sequence of reaction [1+1]



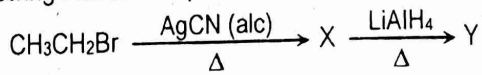
8. 2073 Set D Q.No. 9 Identify Ⓐ and Ⓑ in the following sequence of the reaction and give their IUPAC name. [2]



9. 2072 Supp. Q.No. 9 Write down the structure and IUPAC name of secondary haloalkane of C_3H_7X. What happens when the secondary haloalkane is heated with Na in presence of dry ether? [1+1]
10. 2072 Set C Q.No. 9 A haloalkane Ⓜ reacts with aq. NaOH to give isopropyl alcohol. What major product would you get when Ⓜ is heated with Na in presence of dry ether? [2]
11. 2072 Set D Q.No. 9 Give the major products in the following equations: [1+1]

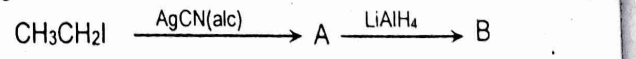


12. 2071 Supp. Q.No. 9 Give the IUPAC name of X and Y in the following reaction sequence. [1+1]

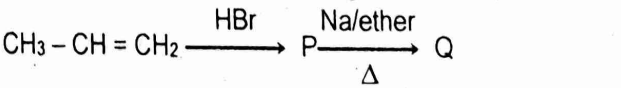


Ans: x = Ethylisocyanide, y = N–methylethanamine

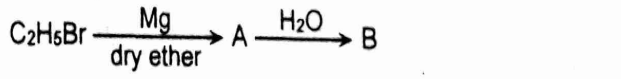
13. 2071 Set C Q.No. 9 Starting from iodomethane, how would you prepare: [1+1]
   i. Ethane ii. Ethene
14. 2071 Set D Q.No. 9 Write down the structure of secondary haloalkane of C_3H_7X. What happen when the secondary haloalkane is heated with Na in presence of dry ether? [1+1]
15. 2070 Supp. Q.No. 9 Identify the major products A and B and give their IUPAC name. [1+1]



16. 2070 Set C Q.No. 9 Write down the IUPAC name of major products P and Q in the following reaction sequence [2]



17. 2070 Set D Q.No. 9 Convert 1-bromopropane to 2-bromopropane. [2]
18. 2069 Set A Q.No. 9 Convert 1-chloropropane into 2-chloropropane [2]
19. 2069 Set A Q.No. 13 i Write an example of each of carboxylamine reaction. [1]
20. 2069 Supp. Set B Q.No. 9 What happens when [1+1]
   i. chlorobenzene is treated with chloral in acidic medium.
   ii. chloroethane is heated with alcoholic KOH
21. 2068 Q.No. 2 Identify the major products A and B in the following reaction. [1+1]



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2. **2066 Q. No. 2** Identify A and B in the following reaction: [2]

$$CH_3 - CH_2 - Br \xrightarrow[\Delta]{\text{alc KOH}} A \xrightarrow[\text{(ii) } Zn/H_2O]{\text{(i) } O_3} B$$

Ans: A ⇒ $CH_2 = CH_2$, B ⇒ HCHO

3. **2065 Q.No. 2** Identify 'A' and write its IUPAC name in the following reaction

$$\begin{matrix} CH_3 \\ CH_3 \end{matrix}\!\!>\!CH\!-\!Br + Na \xrightarrow[\Delta]{\text{dry ether}} A + NaBr$$ [2]

4. **2065 Q.No. 2 ii** What happens when chloroform is heated with Silver powder? [2]

5. **2063 Q.No. 2** Identify (x) and (y) in the following reaction: [2]

$$(x) \xrightarrow{Mg/\text{ether}} (y) \xrightarrow[\text{(ii) } H_2O/H^+]{\text{(i) } CO_2} \text{Propanoic acid.}$$

6. **2062 Q.No. 2** A primary holoalkane (x), if allowed to react with KCN yields a compound (y), which on acidic hydrolysis gave propanoic acid. Identify (x) and (y). [2]

7. **2060 Q.No. 2** Convert bromoethane to ethyne. [2]

8. **2058 Q.No. 2** Why does chloroform not give white precipitate with aqueous silver nitrate? [2]

9. **2056 Q.No. 15** Why is chloroform stored in a dark brown bottle? [2]

10. **2056 Q.No. 19** Give the uses of chloroform. [2]

Short Answer Questions [5 marks]

11. **2077 Set P Q.No. 8** Give the laboratory method of preparation of trichloromethane from ethanol. Why does trichloromethane not give white ppt. with silver nitrate solution? [4+1]

12. **2077 Set V Q.No. 10** Write down the laboratory method preparation of trichloromethane from ethanol. What product would you obtain when trichloromethane is treated with acetone? [4+1]

13. **2076 GIE Set A Q.No. 29** An aliphatic haloalkane Ⓐ is heated with aq. KOH to give Ⓑ. The compound Ⓑ reacts with $SOCl_2$ to produce Ⓒ. The compound Ⓒ further reacts with AgCN to yield Ⓓ. On reduction of compound Ⓓ with $LiAlH_4$ produces Ⓔ. The compound Ⓐ undergoes wurtz reaction to give an alkane of molecular formula C_4H_{10}. Identify Ⓐ, Ⓑ, Ⓒ, Ⓓ and Ⓔ. Also write reactions involved. [4+1]

14. **2076 Set B Q.No. 28** How is trichloromethane prepared in the laboratory? Why is chloroform stored in a dark room air tied bottle containing a little ethyl alcohol? [4+1]

15. **2076 Set C Q.No. 28** How is trichloromethane prepared in the laboratory? Why is it discouraged to use chloroform as an anesthesia? [5]

16. **2075 Set B Q.No. 27** Write down the chemical reaction for the preparation of trichloromethane from acetone. How would you convert trichloromethane into
i. chloretone ii. methane iii. formic acid. [2+1+1+1]

17. **2074 Supp. Q.No. 27** How is trichloromethane prepared in the laboratory from propanone? What product would you expect when trichloromethane is condensed with acetone? Give IUPAC name of the product. [4+1]

18. **2073 Supp Q.No. 28** Write chemical reactions for the preparation of trichloromethane from propanone. How does trichloromethane react with
i. Phenol
ii. Silver powder
iii. Conc. nitric acid [2+1+1+1]

19. **2072 Set C Q.No. 27** Describe laboratory method of preparation of chloroform. How does chloroform react with acetone? [4+1]

20. **2072 Set D Q.No. 27** Give the chemical reaction for the preparation of trichloromethane from ethanal. What happens when it is heated with silver powder? Identify the product Ⓐ and write its IUPAC name. [2+1+2]

$$CHCl_3 \xrightarrow[\text{alkali}]{\text{acetone}} Ⓐ$$

21. **2072 Set E Q.No. 24** How is trichloromethane prepared in the laboratory from propanone in pure and dry state? Write its action with oxygen. [4+1]

22. **2071 Supp. Q.No. 27** How would you obtain [1+1+1+1+1+1]
i. ethane from bromoethane
ii. ethylene from trichloromethane

Identify the major product Ⓐ and Ⓑ in the following reaction sequence.

$$C_2H_5Br \xrightarrow[\Delta]{Mg/\text{ether}} Ⓐ \xrightarrow{H_2O/H^+} Ⓑ$$

Give reactions to convert Ⓐ into ethanoic acid.

23. **2071 Set C Q.No. 27** A haloalkane Ⓟ reacts with aq. KOH to give Ⓠ. The compound Ⓠ on oxidation with $K_2Cr_2O_7 + H^+$ gives Ⓡ and Ⓡ undergoes Clemmenson reduction to peoduce Ⓢ. The compound Ⓟ react with sodium in presence of dry ether to form 2, 3– dimethylbutane, write chemical reactions involved and identify P, Q, R and S. [5]

24. **2071 Set D Q.No. 27** How would you obtain:
a. ethane from bromoethane
b. ethyne from trichloromethane

Identify the major product Ⓐ and Ⓑ in the following reaction sequence:

$$C_2H_5Br \xrightarrow[\Delta]{Mg/\text{ether}} Ⓐ \xrightarrow{H_2O/H^+} Ⓑ$$

Give reactions to convert Ⓐ into ethanoic acid. [1+1+1+1+1]

25. **2070 Supp. Q.No. 26** How is trichloromethane prepared in the laboratory? Write its action on acetone. [4 + 1]

46. 2070 Set C Q.No. 29 An organic compound Ⓐ reacts with HCN to give Ⓑ. On hydrolysis of Ⓑ in acidic medium gives Ⓒ. Compound Ⓐ also produces propane when treated with zinc -amalgam and HCl. Identify Ⓐ, Ⓑ and Ⓒ with reaction and give their IUPAC names. What product would you expect when A is treated with trichloromenthane in alkaline medium? [5]

47. 2070 Set D Q.No. 24 Write any three methods of preparation of iodoethane. What happens when iodoethane is heated with: [5]
   i. Sodium in presence of dry ether
   ii. alc. NaOH

48. 2069 Set B Q.No. 23 Starting from trichoromethane, how would you prepare:
   i. ethyne ii. Methane
   iii. Chloropicrin iv. Carbonyl chloride
   v. Chloretone [5]

49. 2069 Supp. Set B Q.No. 23 A secondary halolkane Ⓐ gives compound Ⓑ when heated with alc.KOH. Ⓑ on ozonolysis produces ethanal and methanal as major products. Identify Ⓐ and Ⓑ, also write chemical reaction. What product would you expect when Ⓐ is heated with sodium in presence of dry ether? [4+1]

50. 2068 Q.No. 22 How is trichloromethane prepared in the laboratory? Give a chemical equation for the conversion of chloroform into ethyne. [4+1]

51. 2066 Q. No. 22
   a. Give the chemical reactions for the Laboratory Preparation of trichloromethane.
   b. Why is trichloromethane stored in dark-brown air tied bottle? [3+2]

52. 2065 Q.No. 21 Starting from Methyl magnesium bromide (CH_3MgBr) how would you prepare: [5×1= 5]
   i. ethanol ii. propan-2-ol
   iii. ethanoic acid iv. 2-methylpropan-2-ol

53. 2065 Q.No. 22 How is trichloromethane prepared in laboratory? How does it react with propanone? [4+1]

54. 2064 Q.No. 31(ii) Write short notes on Laboratory preparation of chloroform. [5]

55. 2062 Q.No. 21 Write the chemical reactions involved in the laboratory preparation of chloroform from ethanol. Why does chloroform not give white precipitate with aqueous $AgNO_3$? Write two important uses of chloroform. [5]

56. 2055 Q.No. 27 How is trichloromethane (chloroform) prepared in the laboratory? [5]

57. 2053 Q.No. 21 Describe the laboratory preparation of chloroform. [5]

58. 2052 Q.No. 24(a) What happens when Chloroform is allowed to react with NaOH solution? [2.5]

Long Answer Questions [10 marks]

59. 2077 Set V Q.No. 11ii An aliphatic haloalkane Ⓐ gives compound Ⓑ when heated with alc.NaOH. The compound Ⓑ reacts with HBr to give major product Ⓒ. On heating the compound Ⓒ with sodium in presence of dry ether yields 2,3-dimethylbutane. What product would you expect when the compound Ⓑ is subjected to ozonolysis? [4

60. 2070 Set C Q.No. 31 b Give a suitable chemical reaction for the laboratory preparation of trichloromethane. What happens when chloromethane reacts with [5×1=
   i. phenol ii. nitric acid
   iii. Silver powder iv. atmospheric air

61. 2063 Q.No. 28 Describe the preparation of pure and dry chloroform in the laboratory. Give its action upon:
   a. heated silver
   b. aq. KOH
   c. aniline in presence of alc. KOH. [5+

62. 2061 Q.No. 28 How is Grignard reagent prepared? What precautions should be taken for preparation of Grignard reagents? How does CH_3CH_2MgBr react with

   a. $CH_3-\overset{\overset{O}{\|}}{C}-Cl$ b. H_2O

   c. $H-\overset{\overset{O}{\|}}{C}-H$ d. CO_2

   Show the final product after aqueous work-up. [2+2+1.5×

63. 2053 Q.No. 27 An organic compound A on catalytic reduction gives B, B on chlorination gives C, C on heating with sodium metal in presence of ether gives D, D on chlorination gives 2–chlorobutane as a major product. Give names for A, B, C and D. [5

Write short notes on [5 marks]

64. 2076 GIE Set B Q.No. 33ii 2072 Supp. Q.No. 33ii 207 Supp. Q.No. 33b 2071 Set C Q.No. 33 b 2071 Set D Q.No 33 b 2069 Supp. Set B Q.No. 33 d Laboratory preparation of trichloromethane. [5

65. 2053 Q.No. 28(c); 2055 Q.31(d); 2056 31(c); 2056 Q.31 (d) 2057 Q.31 (d); 2058 Q.31 (d)
   a. Markovnikor's rule b. Inductive effect
   c. Wurtz reaction d. Inductive effect
   e. Laboratory preparation of chloroform [5

9.2. HALOARENES

Very Short Answer Questions [2 marks]

1. 2076 GIE Set A Q.No. 9 Explain, why are haloarenes less reactive towards nucleophilic substitution reactions?

2. 2076 Set B Q.No. 9 Why is haloarene less reactive than benzene in electrophilic substitution reaction?

3. 2076 Set C Q.No. 9 Explain, why is chlorobenzene less reactive than benzene in electrophilic substitution reaction?

4. 2075 GIE Q.No. 9 Why is haloarene less reactive towards nucleophilic substitution reaction than haloalkane?

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2075 Set A Q.No. 9 Why is haloarene less reactive towards nucleophilic substitution reaction than haloalkane? [2]

2075 Set B Q.No. 9 What products would you expect when [1+1]
i. Benzene diazonium chloride is heated with copper powder in presence of HCl.
ii. Chlorobenzene is heated with 2,2,2–trichloroethanal.

2072 Set E Q.No. 9 Why is nucleophilic substitution difficult in haloarenes? [2]

2069 Set A Q.No. 8ii How would you obtain benzene from chlorobenzene? [1]

2069 Set B Q.No. 9 What happens when chlorobenzene is: [1+1]
i. treated with chloral in acidic medium.
ii. heated with Ni-Al in alkaline medium.

10. **2067 Q.No. 2** How would you convert chlorobenzene into: [1+1]
i. DDT ii. Toluene

11. **2064 Q.No. 2** Why is nucleophilic substitution reaction in chlorobenzene difficult as compared to chloroethane? [2]

12. **2063 Q.No. 3(ii)** Write the action of Monohydroxy benzene with trichloromethane in presence of alcohoiic NaOH. [2]

13. **2059 Q.No. 2** Why is it difficult to undergo nucleophilic substitution in haloarene? [2]

14. **2056 Q.No. 18a** Write the name of the following components according to the IUPAC rule. [1]

Short Answer Questions [5 marks]

15. **2069 Set A Q.No. 27** Write any three methods of preparation of chlorobenzene. How does it react with?
a. chloral and
b. Melthyl chloride in the presence of sodium metal and dry ether. [3+2]

16. **2060 Q.No. 23** Write two chemical reactions for the preparation of chlorobenzene. Why does it give ortho and para products during electrophilic substitution reaction? Give its action on chloral. [5]

Long Answer Questions [10 marks]

17. **2059 Q.No. 29 (b-i)** Predict the major products of the following reactions:

$$Ar\,N_2Cl \xrightarrow[\Delta]{Cu_2Br_2/HBr} \ldots\ldots\ldots \quad [1]$$

UNIT 10: ALCOHOLS AND PHENOLS

10.1. ALCOHOLS

Very Short Answer Questions [2 marks]

1. **2076 GIE Set B Q.No. 10** Write reactions for the conversion of cane sugar into ethyl alcohol. [2]
2. **2076 GIE Set B Q.No. 12** An organic compound, C_3H_6O gives positive Tollen's test. Identify the compound and write the reaction involved. [1+1]
3. **2075 GIE Q.No. 10** Give reactions for the conversion of propan-1-ol into propan-2-ol. [2]
4. **2075 Set A Q.No. 10** Give reactions for the conversion of cane sugar into ethyl alcohol. [2]
5. **2075 Set B Q.No. 10** Write a structural formula of 3° alcohol of $C_4H_{10}O$. How is this alcohol prepared by using Grignard reagent? [1+1]
6. **2074 Supp. Q.No. 10** Starting from cane sugar, how would you obtain ethyl alcohol? [2]
7. **2072 Supp. Q.No. 10** What is the structure of isomeric alcohol of C_3H_8O that gives iodoform test? Write the test reaction. [1+1]
8. **2072 Set C Q.No. 10** Write a structural formula of secondary alcohol of C_3H_8O and give its method of preparation using Grignard reagent. [1+1]
9. **2072 Set D Q.No. 10** Write down the structural formula and IUPAC name of tert-butyl alcohol. [1+1]
10. **2072 Set E Q.No. 10** Prepare butan –2–ol and 2-methylpropan –2–ol by using CH_3MgBr. [1+1]
11. **2071 Supp. Q.No. 10** Name any suitable secondary alcohol that gives iodoform test and write the test reaction. [1+1]
12. **2071 Set C Q.No. 10** Write structure of tertiary alcohols of $C_4H_{10}O$ and give their IUPAC names. [1+1]
13. **2070 Supp. Q.No. 10** Write down the secondary and tertiary alcohols of $C_4H_{10}O$ and give their IUPAC names. [1+1]
14. **2070 Set C Q.No. 10** A dihydric alcohol $C_2H_6O_2$ Ⓐ undergoes step wise oxidation with $K_2Cr_2O_7/H^+$ to give a dicarboxylic acid $C_2H_2O_4$ Ⓑ as final product. Identify Ⓐ and Ⓑ with reactions and give their IUPAC name. [2]
15. **2070 Set D Q.No. 10** What is the laboratory test of ethanol? [2]
16. **2069 Set A Q.No. 32b** Give the example of Esterification [1]
17. **2069 Supp. Set B Q.No. 10** Give a suitable chemical test of ethanol that distinguishes it from propanol. [2]
18. **2067 Q.No. 3** Name the isomer of C_3H_8O which undergoes idoform test. [2]
19. **2066 Q. No. 3** How would you obtain ethanol from Cane sugar? Write reaction only. [2]
20. **2065 Q.No. 3i** What happens when: Ethanol is heated with iodine in presence of aq. NaOH? [2]
21. **2064 Q.No. 4** Convert ethanol to propanoic acid. [2]
22. **2062 Q.No. 3(i)** Write the action of: Propan– 2– ol with PCl_5 [1]
23. **2061 Q.No. 3** Alcohols of low molecular weight are moderately soluble in water, whereas ethers of about the same molecular weight are not. Explain. [2]
24. **2060 Q.No. 3** Identify the organic compounds A, B, C and D.

$$(CH_3)_2CHOH \xrightarrow{PCl_5} A \xrightarrow{\text{alc. KOH}} B \xrightarrow{\text{ozonolysis}} C + D \quad [2]$$

25. **2059 Q.No. 3** **2058 Q.No. 3** Write a chemical reaction for the preparation of primary alcohol by Oxo process. [2]
26. **2059 Q.No. 4** Why is the boiling point of ethanol higher than its isomer methoxymethane? [2]
27. **2056 Q.No. 16** What is fermentation? [2]
28. **2055 Q.No. 16** Why is boiling point of ethanol greater than that of ethoxyethane? [2]
29. **2054 Q.No. 11(b)** Give the IUPAC name of the following compounds: $CH_2 = CH\,CH_2\,OH$ [1]

Short Answer Questions [5 marks]

30. 2076 GIE Set A Q.No. 27 Starting from Grignard's reagent, how would you prepare i. propan -1-ol, ii. propan-2-ol. Which one of them has higher boiling point and why? Give the chemical test to distinguish them. [2+1+2]

31. 2076 GIE Set B Q.No. 28 An organic compound gives H_2 gas when reacts with sodium. On treatment with alkaline iodine yields yellow precipitate and on dehydration with P_2O_5 forms an alkene (C_2H_4). Name the compound and write the reactions involved. [5]

32. 2076 Set B Q.No. 27 Starting from CH_3MgI how would you prepare
    i. propan-2-ol
    ii. 2-methylpropan-2-ol
    Give the chemical test to distinguish them. Why are lower member of alcohol highly soluble in water? [2+2+1]

33. 2076 Set C Q.No. 27 Starting from Grignard's reagent, how would you prepare (i) propan-1-ol (ii) propan-2-ol. Mention the chemical test to distinguish them. Write down the structural formula of neo-pentyl alcohol and its IUPAC name. [1+1+2+1]

34. 2075 GIE Q.No. 29 An organic compound gives H_2 gas with Sodium metal. On treatment with alkaline iodine gives yellow ppt and on oxidation with CeO_2/H^+ form an aldehyde (C_2H_4O). Name the compound and write reactions involved. How would you convert the compound into ethene? [4+1]

35. 2075 Set A Q.No. 29 An organic compound Ⓜ gives H_2 gas with sodium metal. On treatment with alkaline iodine gives yellow ppt and on oxidation with CeO_2/H^+ forms an aldehyde (C_2H_4O). Name the compound Ⓜ and write reactions involved. What happens when Ⓜ is heated with P_2O_5? [4+1]

36. 2072 Set E Q.No. 31a Distinction of 1°, 2 ° and 3° alcohol by Victor-Meyer's method. [5]

37. 2072 Set E Q.No. 23 A monohydric alcohol reacts with PBr_3 to give 'B'. The compound B, if heated with alc. KOH gives 'C'. C on ozonlysis produces ethanal and methanal as major products. The compound 'A" responses iodoform test. Identify A, B and C with reactions involved. What happens when 'B' is heated with sodium in presence of dry ether. [5]

38. 2072 Set E Q.No. 25 How is ethanol prepared from (i) ethyne (ii) 1, 1 – dichloroethane. Convert ethanol to propanone. What is the laboratory test of carbonyl compounds? [1+1+2+1]

39. 2070 Set C Q.No. 28 Write down the Isomeric alcohols of C_3H_8O and IUPAC name. Explain Victor-Meyer's method to distinguish them. [2+3]

40. 2069 Set A Q.No. 29 Write the functional isomers of C_3H_6O with their IUPAC name. Also, give a chemical test to distinguish them which one gives Iodoform test and why? [1+1+1+2]

41. 2069 Set A Q.No. 32 Describe Victor Meyer's method to distinguish primary, secondary and tertiary alcohols. [5]

42. 2069 Set B Q.No. 25 An Organic Compound (A) reacts with PBr_3 to give (B). Compound (B) produces (C) when heated with alc. KOH. The compound (C) undergoes ozonolysis to yield ethanal and methanal as major products. The compound 'A' responses Iodoform test. Identify A, B, C, and the reactions involved. How is (A) obtained from CH_3MgBr. [5]

43. 2069 Supp. Set B Q.No. 25 Write chemical reaction for the preparation of
    i. ethanol
    ii. propan –2 – ol from methyl magnesium bromide.
    How would you distinguish them by Victor Meyer's method?

44. 2067 Q.No. 21 Write down the isomers of monohydric alcohols from C_3H_8O and give their IUPAC name. What chemical test would you apply to distinguish them? Write the chemical reaction for it. How would you convert the one isomer to the other and vice versa? [1+1+1+2]

45. 2067 Q.No. 31 iv Write short notes on fermentation of ethyl alcohol.

46. 2066 Q. No. 21 Write down the oxidation of Primary, Secondary and Tertiary alcohols. How would you convert Propan-1- ol into Propon-2- ol? [3]

47. 2065 Q.No. 29 b Write the Victor Meyer's test for distinction of primary, secondary and tertiary alcohols.

48. 2064 Q.No. 21 What is meant by Grignard's reagent? How could you convert a primary alcohol to Grignard's reagent? By using a suitable Grignard's reagent how would you synthesise:
    i. 2-methylpropan -2- ol ii. ethanoic acid?

49. 2063 Q.No. 22(v) What action takes place when: Ethanol heated with conc. H_2SO_4 at about 160-170° C?

50. 2061 Q.No. 21 Write down the oxidation products of primary, secondary and tertiary alcohols.

51. 2060 Q.No. 21 Describe Victor Meyer's method for the distinction between 1°, 2° and 3° alcohols.

52. 2060 Q.No. 22

i. Consider a reaction. [2.5+2]

$$A \xrightarrow[\Delta]{PBr_3} B \xrightarrow{KCN} C \xrightarrow[\Delta]{H_2O/H^+} D \xrightarrow[\Delta]{P_2O_5} E$$

The compound A is a primary alcohol which gives positive iodoform test. Identify the organic compounds A, B, C, D and E.

ii. Convert the above compound D into ethanoic acid.

53. 2059 Q.No. 21 A secondary alcohol (X) reacts with PCl_5 to give an alkyl halide (Y), which on dyhydrohalogenation yields an alkene (Z). The alkene (Z) upon ozonolysis gives a mixture of ethanal and methanal. Identify X, Y and Z. Suggest your answer with chemical reaction.

54. 2052 Q.No. 24(b); 2053 Q.No. 23(c) What happens when
    a. Ethyl alcohol is treated with acetic acid
    c. Ethanol is heated with conc H_2SO_4

Long Answer Questions [10 marks]

55. 2077 Set W Q.No. 11a What are the oxidation products of primary, secondary and tertiary alcohols?

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56. **2076 GIE Set B Q.No. 31a** Write Victor Meyer's test for the distinction of 1°, 2° and 3° alcohol. [5]

57. **2075 GIE Q.No. 30** Explain Victor-Meyer's test for the distinction of 1°, 2° and 3° alcohol. How is 2-bromopropane converted into 1-bromopropane? Write an example of each of:
i. Reimer-Tiemann reaction
ii. Wurtz reaction
iii. Iodoform reaction [5+2+3]

58. **2075 Set A Q.No. 30** Explain Victor-Meyer's test for the distinction of primary, secondary and tertiary alcohol. How is 1-chloropropane converted into 2-chloropropane? Write an example of each. [5+2+3]
i. Carbylamine reaction
ii. Reimer-Tiemann reaction
iii. Cannizzaro's reaction

59. **2075 Set B Q.No. 32** Describe Victor Meyer's method to distinguish propan-2-ol and 2-methylpropan-2-ol. Give a reaction to show that the H-atom of the -OH in alcohol is weakly acidic. Convert the followings.
i. propan -1-ol into propan -2-ol
ii. ethanal into propanone [5+1+2+2]

60. **2074 Supp. Q.No. 31** Write down a structural formula and its IUPAC name of $C_4H_{10}O$. How would you apply Victor Meyer's method for the distinction of propan-1-ol from propan-2-ol? Write an example of:
i. Oxo-Process ii. Baeyer's test
Convert propan-2-ol into propan-1-ol. [2+4+2+2]

61. **2074 Set A Q.No. 31** Write example of each of primary, secondary and tertiary alcohols. How are they distinguished by Victor Meyer's method? Give an example of, [2+4+2+2]
i. Oxo-process ii. Dehydration of alcohol
How would you convert popan-1-ol into propan-2-ol?

62. **2074 Set B Q.No. 31** Write down the structural formula of tertiary alcohol and its IUPAC name of $C_4H_{10}O$. How would you apply Victor Meyer's method for the distinction of propan-1-ol from propan-2-ol? Write an example of;
i. Oxo-process ii. Baeyer's test
Convert propan -2-ol into propan-1-ol. [2+4+2+2]

63. **2073 Supp Q.No. 31a** What are the oxidation products of primary, secondary and tertiary alcohols?

64. **2073 Set C Q.No. 31** What are the oxidation products of primary, secondary and tertiary alcohol? Write down suitable methods for the conversion of [5+2.5+2.5]
i. ethanol to propanol
ii. Chloroform to dimethyl amine.

65. **2073 Set D Q.No. 31** How would you distinguish propan-2-ol from 2-methylpropan-2-ol by using Victor Meyer's method. Write down suitable method for the conversion of:
i. Chloroform into dimethylamine
ii. Ethanamine into methanamine [5+2.5+2.5]

66. **2072 Supp. Q.No. 31b** Write Victor-Meyer's method for the distinction of 1°, 2° and 3° alcohol. [5]

67. **2072 Set C Q.No. 32** Describe Victor Meyer's method to distinguish propan –2 – ol and 2-methylpropan –2 – ol. Give a reaction to show that the H-atom of the -OH in alcohol is weakly acidic. Convert the followings. [5+1+2+2]
i. Propan –1 – ol into Propan –2 – ol
ii. Ethanal into propanone.

68. **2072 Set D Q.No. 32** Describe Victor Meyer's method to distinguish propan–2-ol and 2-methylpropan-2-ol. Why is phenol more acidic than alcohol? How would you convert ethanal into propanone and vice-versa? [5+1+4]

69. **2070 Supp. Q.No. 31 a** Explain the chemical method of distinction of primary alcohol, secondary alcohol and tertiary alcohol introduced by Victor Meyer's. [5]

70. **2069 Set B Q.No. 30 a** How would you distinguish between propan-1-ol and propan-2-ol by Victor-Meyer's method? Give suitable method of conversion of propan-1-ol into propan-2-ol. [3+2+1+1]

71. **2068 Q.No. 28a** How will you make a distinction of primary, secondary and tertiary alcohol by the Victor Meyer's Method? [5]

72. **2063 Q.No. 29(a)** Describe Victor Meyer's method for the distinction between primary secondary and tertiary alcohols.[5]

Write Short Notes: [5 marks]

73. **2072 Set D Q.No. 33d** **2070 Set D Q.No. 33 c** Distinction of 1°, 2° and 3° alcohol by Victor Meyer's method. [5]

74. **2063 Q.31 (iv); 2059 Q.31(a); 2055 Q.31(c); 2054 Q.No. 30(d)**
a. Use of Grignard's reagent in the synthesis of 1°, 2°, 3° alcohols.
b. Victor Meyer's method for distinction between primary, secondary and tertiary alcohols.
c. Distinction between 1°, 2° and 3° alcohols by Victor Meyer's Method.
d. Fermentation. [5]

75. **2062 Q.No. 29**
a. Consider the following reaction

$$A \xrightarrow{PI_3} B \xrightarrow{KCN} C \xrightarrow{H_2O/H^+} D \xrightarrow{P_2O_5} E$$

The compound, A is a primary alcohol which gives iodoform test. Identify the organic compounds A, B, C, D and E; giving complete reaction.
b. Describe Victor Meyer's method for the distinction between 1°, 2° and 3° alcohols. [5]

76. **2058 Q.No. 29a** Consider the following reaction

$$A \xrightarrow[\Delta]{PCl_5} B \xrightarrow[\text{dry ether}]{Mg} C \xrightarrow{CO_2} D \xrightarrow[H_2O/H^+]{\Delta} E$$

The compound, A is a primary alcohol, which on oxidation gives ethanal. Identify A, B, C, D and E.
Convert the above compound A into methanol and ethyne.[5]

10.2. PHENOLS

Very Short Answer Questions [2 marks]

1. **2076 GIE Set A Q.No. 10** What products would you obtain when phenol is treated with [1+1]
i. phthalic anhydride ii. ferric chloride solution

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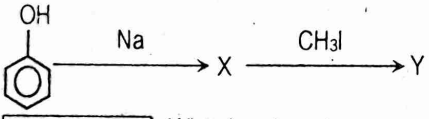
2. 2076 Set B Q.No. 10 Starting from phenol how would you obtain [1+1]
   i. Phenolphthalein ii. p-hydroxyazobenzene
3. 2076 Set C Q.No. 10 What product would you obtain when phenol is treated with [1+1]
   i. Benzene diazonium chloride?
   ii. Phthalic anhydride?
4. 2074 Set A Q.No. 10 Starting from phenol, how would you obtain p-hydroxyazobenzene? [2]
5. 2074 Set B Q.No. 10 Starting from phenol, how would you obtain benzaldehyde? [2]
6. 2073 Supp Q.No. 10 What is the laboratory test of phenol? What happens when phenol is heated with Zn–dust? [1+1]
7. 2073 Set C Q.No. 10 How does phenol react with [1+1]
   i. aqueous bromine
   ii. Benzene diazonium chloride.
8. 2073 Set D Q.No. 8 Starting from phenol how would you obtain cyclohexane? [2]
9. 2073 Set D Q.No. 10 How is phenol obtained from [1+1]
   i. benzene diazonium chloride
   ii. chlorobenzene
10. 2071 Set D Q.No. 10 What happens when phenol is treated with: [1+1]
    a. Benzene diazonium chloride
    b. Methanal in acidic medium
11. 2070 Set C Q.No. 14 How is picric acid prepared? Write its one use. [2]
12. 2069 Set A Q.No. 8i How would you obtain benzene from phenol? [1]
13. 2069 Set B Q.No. 10 Starting from phenol, how would you prepare methoxybenzene? [2]
14. 2068 Q.No. 3 Why is phenol more acidic than aliphatic alcohol? [2]
15. 2067 Q.No. 7 Name the compound (X) and (Y) in the following reaction. [1+1]



16. 2067 Q.No. 8 Why is phenol more acidic than aliphatic alcohol? [2]
17. 2066 Q. No. 8 How would you prepare methoxybenzene from phenol? [2]
18. 2063 Q.No. 3(ii) Write the action of Monohydroxy benzene with aqueous bromine. [1]
19. 2061 Q.No. 7 Show your acquaintance with Reimer-Tiemann's reaction. [2]
20. 2057 Q.No. 3 Write the reaction between phenol and aq. Br_2. [2]

Short Answer Questions [5 marks]

21. 2063 Q.No. 22(iv) What action takes place when: Phenol reacts with ethanoyl chloride? [1]
22. 2062 Q.No. 22(i) Convert the following Organic compounds: Phenol to m-nitrobenzoic acid [1]
23. 2061 Q.No. 23 How is phenol prepared from (a) aniline (b) benzene? How do you explain that the –OH group phenol is ortho/para directing? [3]
24. 2059 Q.No. 22(a) How could you synthesise? toluene phenol. [2]
25. 2058 Q.No. 22(a) Convert the following organic compound Benzene to m-bromophenol. [2]
26. 2057 Q.No. 23(c) Write the chemical equation conditions for the following reaction.Phenol is coupled benzene diazonium chloride. [3]
27. 2052 Q.No. 27 An aromatic compound A on reduction yie parent hydrocarbon B.B on nitration gives C.C on reduct in acidic solution gives D. On coupling with diazonium sa D gives diazoaminobenzene. Give name for A, B, C and Write the chemical reaction involved. [5]

Long Answer Questions [10 marks]

28. 2071 Supp. Q.No. 30b Identify the major products A, B, and D in the following reaction sequences.

$$A \xrightarrow[\Delta]{Zn} B \xrightarrow[\Delta]{CH_3Cl/AlCl_3} C \xrightarrow[\Delta]{CeO_2/H^+} D$$

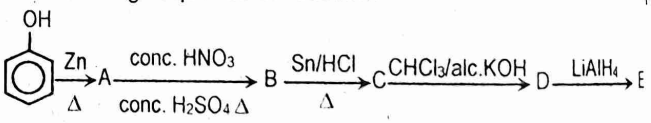
Compound D gives methylbenzene when heated wit alc. KOH and hydrazine.

29. 2070 Set C Q.No. 30 b Identify A, B, C, D and E in the following reaction sequences.

$$(A) \xrightarrow[Conc.H_2SO_4\Delta]{Conc.HNO_3} (B) \xrightarrow[\Delta]{Sn/HCl} (C) \xrightarrow[\Delta]{CHCl_3/KOH(alc.)} (D) \xrightarrow[\Delta]{LiAlH_4} (E)$$

Compound A can be obtained by heating phenol in presence of Zn-dust. [5×1=5]

30. 2069 Supp. Set B Q.No. 31 b Identify A, B, C, D and E in the following sequence of reaction. [5]



UNIT 11: ETHERS

11.1 ALIPHATIC ETHERS

Very Short Answer Questions [2 marks]

1. 2076 GIE Set A Q.No. 11 Identify the major products Ⓐ and Ⓑ giving their IUPAC names, in the given reaction sequence. [1+1]

$$\text{Ethoxyethane} \xrightarrow[\Delta]{PCl_5} Ⓐ \xrightarrow{\text{sodiummethoxide}} Ⓑ$$

2. 2076 GIE Set B Q.No. 11 How would you prepare following ethers by Williamson's synthesis? (i) Methoxyethane (ii) Methoxybenzene
3. 2076 Set C Q.No. 11 2076 Set B Q.No. 11 Identify the major products Ⓐ and Ⓑ giving their IUPAC names in the given reaction sequence. [1+1]

$$\text{Methoxymethane} \xrightarrow[\Delta]{\text{Excess HI}} Ⓐ \xrightarrow[\Delta]{\text{Sodium phenoxide}} Ⓑ$$

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4. 2075 GIE Q.No. 11 Prepare methoxyethane by Williamson's synthesis method. What happens when methoxyethane is treated with excess HI? [1+1]
5. 2075 Set A Q.No. 11 How would you obtain [1+1]
   i. Anisole from phenol
   ii. Methoxyethane from ethoxyethane.
6. 2075 Set B Q.No. 11 Give an example of unsymmetrical ether and write Williamson's synthesis process for its preparation. [1+1]
7. 2074 Supp. Q.No. 11 2074 Set A Q.No. 11 2074 Set B Q.No. 11 Write an example of Williamson's etherification reaction. What is its importance? [1+1]
8. 2073 Supp Q.No. 11 Convert ethoxyethane to methoxyethane. [2]
9. 2073 Set C Q.No. 11 Write down isomeric ether of isopropyl alcohol and use Williamson's synthesis process for the preparation of such ether. [1+1]
10. 2073 Set D Q.No. 11 Write down an isomeric ether of isopropyl alcohol. What happens when the isomeric ether is heated with excess HI? [1+1]
11. 2072 Supp. Q.No. 11 Write down the possible unsymmetrical ethers of $C_4H_{10}O$ and their IUPAC names. [2]
12. 2072 Set C Q.No. 11(ii) How would you obtain: methoxyethane from ethanol. [1]
13. 2072 Set D Q.No. 11 Write IUPAC name of $CH_3OCH(CH_3)_2$ and use Williamson's synthesis method for its preparation. [1+1]
14. 2072 Set E Q.No. 11 How is unsymmetrical ether prepared by Williamson's ether synthesis? [2]
15. 2071 Supp. Q.No. 11 What are unsymmetrical ethers? Give Williamson's synthesis to prepare unsymmetrical ethers. [1+1]
16. 2071 Set C Q.No. 11 Write an unsymmetrical ether of C_3H_8O. How would you prepare the ether by using Willam's synthesis? [1+1]
17. 2071 Set D Q.No. 11 b Give correct chemical reaction for the preparation of 2-methoxypropane. [1]
18. 2070 Set C Q.No. 11 What is unsymmetrical ether? Write an example and IUPAC name. [1+1]
19. 2070 Set D Q.No. 11 Prepare $CH_3–O–CH_2CH_3$ by using Williamson's ether synthesis. [1]
20. 2069 Set A Q.No. 10 Give an example of Williamson's etherification. [2]
21. 2069 Set B Q.No. 11 2069 Supp. Set B Q.No. 11 Name the isomer of C_2H_6O which reacts with excess HI, gives Iodomethane as major product and write reaction for it. [1+1]
22. 2068 Q.No. 5 Write chemical equation for the reactions taking place when: [1+1]
    i. Sodium phenoxide reacts with iodomethane.
    ii. Ethoxyethane is exposed to light and air.
23. 2066 Q. No. 6 What is Williamson's etherification reaction? [2]
24. 2065 Q.No. 6 Give reason: [2]
    i. It is dangerous to boil sample of ether stored for a long time.
    ii. Ether is stored in a bottle containing iron wire.
25. 2064 Q.No. 8 There are three possible isomeric ethers of $C_4H_{10}O$. One of them is ethoxyethane. Write other two isomers and give their IUPAC name. [2]
26. 2062 Q.No. 4 Write the sequence of chemical reactions for the conversion of ethoxyethane to methoxy ethane. [2]
27. 2061 Q.No. 2 Write IUPAC names of ethers represented by the molecular formula $C_5H_{12}O$. [2]
28. 2060 Q.No. 4 What is the action of ethoxyethane on: [2]
    i. PCl_5 and ii. aq. HI (cold)
29. 2057 Q.No. 4 Write the structure of [2]
    i. anisole and ii. 2 – methoxypropane.
30. 2058 Q.No. 4 What action takes place when excess of ethanol is heated with conc. Sulphuric acid at about 140°C? [2]
31. 2053 Q.No. 15 What is the functional group of ether and amide? [2]

Short Answer Questions [5 marks]

32. 2076 GIE Set A Q.No. 28 How is ethoxyethane prepared in laboratory? Why is ether not evaporated to dryness in air? [5]
33. 2076 GIE Set B Q.No. 26 Describe the laboratory preparation of ethoxyethane with a neat and labelled diagram. [5]
34. 2074 Set A Q.No. 27 Describe the laboratory method of preparation of ethoxyethane. How is ethoxyethane converted into methoxyethane? [4+1]
35. 2074 Set B Q.No. 27 Describe the laboratory method of preparation of ethoxyethane. Why is it dangerous to boil old sample of ether? [4+1]
36. 2073 Set D Q.No. 27 Describe the laboratory method of preparation of ethoxyethane. What happens when ethoxyethane is exposed to air? [4+1]
37. 2072 Supp. Q.No. 28 Write down laboratory method of preparation of ethoxyethane. [5]
38. 2071 Supp. Q.No. 28 2071 Set C Q.No. 26 2071 Set D Q.No. 28 Write down suitable chemical reaction for the preparation of ethoxyethane from ethanol. How is ethoxyethane converted into methoxyethane? What happens when ethoxyethane is heated with: [1+2+1+1]
    i. air ii. conc. H_2SO_4
39. 2070 Set D Q.No. 23 How is ethoxyethane prepared in the laboratory in pure and dry state? [5]
40. 2069 Set A Q.No. 28 Describe laboratory preparation of ethoxyethane with a neat and labelled diagram. [5]
41. 2069 Set B Q.No. 24 How is ethoxyethane prepared in the laboratory? Write Williamsons' synthesis for the preparation of an unsymmetrical ether. [1+4]
42. 2065 Q.No. 23 ii Ethoxyethane into methoxyethane [2.5]
43. 2063 Q.No. 23 Describe the preparation of ethoxyethane in the laboratory. [5]
44. 2058 Q.No. 22(b) Convert the following organic compounds. Ethoxyethane to ethanoylchloride. [2.5]

Write short notes on [5 marks]

45. 2076 Set C Q.No. 33iv 2072 Set E Q.No. 33(iii) 2070 Supp. Q.No. 33 b 2070 Set C Q.No. 33 d 2068 Q.No. 31iii 2066 Q. No. 31i Laboratory preparation of ethoxyethane [5]
46. 2060 Q.No. 31(iv) Laboratory preparation of diethyl ether [5]

47. 2059 Q.No. 29(iv) Predict the major products of the following reactions:

$C_2H_5OC_2H_5 \xrightarrow[0°C]{\text{Conc. HCl}}$ ..... [1]

11.2 AROMATIC ETHER

Very Short Answer Questions [2 marks]

1. 2072 Set C Q.No. 11.2 (i) How would you obtain: anisole from phenol. [1]
2. 2071 Set D Q.No. 11 a Give correct chemical reaction for the preparation of anisole. [1]
3. 2070 Supp. Q.No. 11 Starting from CH_3ONa, how would you prepare methoxybenzene? What happens when methoxybenzene is treated with excess HI? [1+1]
4. 2070 Set D Q.No. 11 Prepare by using Williamson's ether synthesis. [2]
5. 2069 Set A Q.No. 12 How is Methoxybenzene prepared from phenol? [2]
6. 2064 Q.No. 22(v) What happens when Sodium phenolate reacts with iodomethane? [1]
7. 2063 Q.No. 3(i) Write the action of Sodium phenolate with iodomethane. [2]

UNIT 12: ALDEHYDES AND KETONES

12.1 ALIPHATIC ALDEHYDES AND KETONES

Very Short Answer Questions [2 marks]

1. 2077 Set P Q.No. 6 Write an example of
   i. Cannizzaro's reaction
   ii. DNP-test. [1+1]
2. 2077 Set V Q.No. 6 Write an example of
   i. Rosennmund's reaction
   ii. Coupling reaction. [1+1]
3. 2076 GIE Set A Q.No. 12 An organic compound C_3H_6O does not give silver mirror with Tollen's reagent but given yellow precipitate with NaOH and I_2. Identify the compound and write the reactions involved. [1+1]
4. 2076 Set B Q.No. 12 An organic compound C_3H_6O gives orange precipitate with 2,4-dinitrophenyl hydrazine but does not produce silver mirror with tollen's reagent. Identify the compound and write the reaction involved. [2]
5. 2076 Set C Q.No. 12 An organic Compound C_3H_6O does not give silver mirror with Tollen's reagent but gives yellow precipitation with NaOH and I_2. Identify the compound and write the reactions involved. [2]
6. 2076 Set C Q.No. 8 How is sodiumbenzoate converted into acetophenone? [2]
7. 2075 GIE Q.No. 12 An alkene Ⓐ undergoes ozonolysis to give ethanal and methanal as the major products. Identify Ⓐ and give its IUPAC name. [1+1]
8. 2075 GIE Q.No. 13 Write an example of
   i. Carboxylation reaction ii. Rosemunnd's reduction [1+1]
9. 2075 Set A Q.No. 12 An alkene Ⓐ undergoes ozonlysis to give ethanal and propanone as the major products. Identify Ⓐ and write its IUPAC name. [1+1]
10. 2075 Set A Q.No. 13 Write an example of each of the followings.
    i. Rosemund's reduction ii. Decarboxylation reaction [1+1]
11. 2075 Set B Q.No. 12 What major product would you obtain when methanal reacts with ammonia? Write an important use of the product. [1+1]
12. 2074 Supp. Q.No. 12 Write an example of each of the following.
    i. Aldol condensation ii. Rosenmund's reduction [1+1]
13. 2074 Set A Q.No. 12 Write an example of each of the following
    i. Cannizzaro's reaction ii. DNP Test [1+1]
14. 2074 Set B Q.No. 12 Write an example of each of the following
    i. Tollen's test ii. Aldol condensation [1+1]
15. 2073 Supp Q.No. 12 Starting from ethanal, how would you obtain
    i. 3 - hydroxybutanal ii. 2-hydroxypropanoic acid [1+1]
16. 2073 Set C Q.No. 12 How would you obtain [1+1]
    i. 3-hydroxybutanal and
    ii. 2-hydroxypropanoic acid from ethanal?
17. 2073 Set D Q.No. 12 Write an example of [1+1]
    i. Cannizzaro's reaction
    ii. Aldol Condensation
18. 2072 Set C Q.No. 12 Write an example of: [1+1]
    i. Rosenmund's reduction
    ii. Cannizzaro's reaction
19. 2072 Set E Q.No. 12(i) What happens when Propanone is treated with dilute NaOH solution? [2]
20. 2071 Supp. Q.No. 12 How is ethanal converted into propanone? [2]
21. 2071 Set C Q.No. 12 Give an application of each: [1+1]
    i. DNP test ii. Tollen's test
22. 2071 Set D Q.No. 12 2069 Supp. Set B Q.No. 12 Starting from propanone, how would you prepare 2-hydroxy-2-methylpropanoic acid? [2]
23. 2070 Supp. Q.No. 12 2070 Set D Q.No. 12 How does methanal reacts with [2]
    i. ammonia (NH_3) ii. conc. NaOH
24. 2069 Set A Q.No. 11 How would you obtain 2-hydroxy-2-methylpropanoic acid from propanone? [2]
25. 2069 Set A Q.No. 32a Give the example of Aldol condensation [1]
26. 2069 Set A Q.No. 32c Give the example of DNPH test [1]
27. 2069 Set B Q.No. 12 Give a reaction for each: [1+1]
    i. DNP test ii. Cannizzaro's reaction
28. 2068 Q.No. 4 How is 3-hydroxybutanal obtained from ethanal? [2]

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29. 2068 Q.No. 7a Write an examples of each of the followings: Cannizzaro's reaction. [1]
30. 2068 Q.No. 9 Write the functional isomer of CH_3COCH_3 and give a chemical test to distinguish them. [1+1]
31. 2067 Q.No. 4 Identify the product (A) and give its one important use in the following: [1+1]
$HCHO + NH_3 \longrightarrow A + H_2O$
32. 2067 Q.No. 5 What is decarbonylation reaction? Write an example of it. [1+1]
33. 2066 Q. No. 4 ii Write an example of each of the followings: Carbonylation reaction [2]
34. 2066 Q. No. 5 Give balanced chemical equations for the followings: [2]
i. Ethanal is heated with Iodine and aqueous NaOH.
ii. Propanone is heated with hydrazine in presence of glycerol.
35. 2065 Q.No. 4 Write a reaction of each of the following: [2]
i. Tollen's test ii. Cannizzaro's reaction
36. 2064 Q.No. 3 What happens when the product obtained by dehydrogenation of ethanol is allowed to react with Tollen's reagent? [2]
37. 2064 Q.No. 5(i) Write the action of Methanal with Ammonia.[1]
38. 2064 Q.No. 5(ii) Write the action of Propanone with sodium bisulphite. [1]
39. 2064 Q.No. 22(ii) What happens when Propanone reacts with PCl_5? [1]
40. 2064 Q.No. 22(iii) What happens when Ethanal if allowed to react with hydroxyl amine? [1]
41. 2063 Q.No. 5(b) Give an example of each of the following reactions: Wolf Kishner reduction [1]
42. 2063 Q.No. 6(ii) What happens when Ethanal reacts with semicarbazide? [1]
43. 2062 Q.No. 5(ii) Write an example of each of the following reactions giving appropriate conditions: Cannizzaro's reaction [1]
44. 2062 Q.No. 6 Suggest a suitable chemical test to distinguish ethanal from propanone. Give chemical reaction too. [2]
45. 2061 Q.No. 4 Write an example of each of the following reaction: [2]
a. Aldol condensation b. Cannizzaro's Reaction
46. 2060 Q.No. 7 Write the action of
i. ammonia with methanal
ii. acetone with hydrazine. [2]
47. 2059 Q.No. 6 What happens when ethanal is warmed with Tollen's reagent? [2]
48. 2058 Q.No. 6 Identify the products (x) and (y) in the following reaction. [2]
$CH_3CHO \xrightarrow{HCN} (x) \xrightarrow{H_2O/H^+} (y)$
49. 2057 Q.No. 2 Identify X and Y in the following reaction [2]
$CH_3CHO \xrightarrow[\Delta]{I_2/NaOH} X \xrightarrow[\Delta]{Ag} Y$
50. 2057 Q.No. 6 Give an example (with formula) each from aliphatic and aromatic aldehydes, which give aldol condensation reaction. [2]
51. 2056 Q.No. 17 What reagent is used to diagnose diabetes in human urine? [2]
52. 2055 Q.No. 12 What is functional group present in a compound that gives a positive Tollen's test? Write an equation showing the reaction involved in a positive Tollen's test. [2]
53. 2055 Q.No. 13 Complete and balance the following equation: [2]
$CH_3 - \overset{O}{\overset{\|}{C}} - CH_3 + I_2 \xrightarrow{NaOH}$
54. 2054 Q.No. 11a Give the IUPAC name of the following compounds: $CH_3\,CO\,CO\,CH_2\,CH_3$ [1]
55. 2054 Q.No. 14 Identify the product X in the reaction. [2]
$HCHO + CH_3MgI \xrightarrow{\text{dry ether}} \text{intermediate} \xrightarrow{H^+/H_2O} X$
56. 2053 Q.No. 6 What is Tollen's reagent? What happens when acetaldehyde is heated with Tollen's reagent? [2]

Short Answer Questions [5 marks]

57. 2077 Set W Q.No. 10 Write an example of each of the followings: [5]
i. DNP test ii. Rosenmund's reduction
iii. Aldol condensation iv. Tollen's test
v. Cannizzaro's reaction
58. 2076 GIE Set B Q.No. 27 Write any three methods for the preparation of propanone. How is it converted into 2-hydroxy-2 methyl propanoic acid? [3+2]
59. 2075 GIE Q.No. 27 Give any three methods of preparation of ethanal. How would you convert ethanal into propanone? [3+2]
60. 2075 Set A Q.No. 27 Write down any three methods of preparation of propanone. What products would you expect when propanone is treated with
i. I_2 and NaOH ii. 2, 4-DNPH [3+2]
61. 2074 Supp. Q.No. 29 2074 Set A Q.No. 29 An alkene (A) undergoes ozonolysis to give an aldehyde and a ketone as the major products. The aldehyde gives positive iodoform reaction and the ketone undergoes Clemmensen's reduction to yield propane. Identify (A) abd gives its IUPAC name. Also write reactions involved. [5]
62. 2074 Set B Q.No. 29 An alkene (A) undergoes ozonolysis to give an aldehyde and ketone as the major products. The aldehyde and the ketone further go Clemensen's reduction to yield ethane and propane respectively. Identify (A) and give its IUPAC name. What product your expect when (A) is treated with HBr? [4+1]
63. 2073 Supp Q.No. 29 2073 Set C. Q.No. 29 An aliphatic compound Ⓐ react with aq. NaOH to give Ⓑ. Ⓑ on oxidation with $K_2Cr_2O_7/H^+$ produce Ⓒ. The compound Ⓒ undergoes Clemmensen's reduction to give propane. If compound Ⓒ responses positive iodoform test, identify Ⓐ, Ⓑ and Ⓒ. What product would you expect when Ⓐ is heated with H_2/Ni ? [5]

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64. **2073 Set C Q.No. 28** Give chemical reactions for the preparation of propanone from [1+1+1+2]
i. 2, 2-dibromopropane
ii. calcium acetate
iii. propan-2-ol.
How is propanone converted into 2-methylpropan-2 ol?

65. **2073 Set D Q.No. 28** Give chemical reactions for the preparation of ethanal from
i. 1,1-dibromoethane ii. ethyne
iii. ethanoyl chloride.
How is ethanal converted into propan-2-ol? [3+2]

66. **2073 Set D Q.No. 29** An aliphatic compound Ⓐ reacts with $SOCl_2$ to give Ⓑ. Ⓑ on dehydrohalogenation yields Ⓒ. The compound Ⓒ on ozonolysis gives a mixture of ethanal and methanal. If Ⓐ is an alcohol which responses iodoform test. Identify Ⓐ, Ⓑ and Ⓒ. What product would you expect when compound Ⓑ is heated with H_2/Ni ? [5]

67. **2070 Supp. Q.No. 28** Write any three methods of preparation of ethanal. How would you convert ethanal into
i. 3-hydroxybutanal
ii. 2-hydroxy-2- methylpropanoic acid [3+1+1]

68. **2068 Q.No. 21** An organic compound A reacts with sodium metal to give hydrogen gas. The compound A on treatment with alkaline iodine forms a yellow crystalline substance and on oxidation with acidified dicromate forms an aldehyde with molecular formula C_2H_4O. Identify the compound and write equation for these reactions. [5]

69. **2067 Q.No. 22** How is propanone prepared form:
i. Isopropyl alcohol ii. Ethanoic acid
iii. 2, 2-dichloropropane.
Give the action of propanone on
a. Grignard's reagent b. Chloroform [1+1+1+1+1]

70. **2066 Q. No. 23** An organic compound 'P' which reduces Tollen's reagent. On oxidation with potassium permanganate, formed a compound 'Q' having same number of carbon atoms as 'P'. Q reacts with Na_2CO_3 (aq.) to give carbondioxide. 'Q' on reaction with ethanol in the presence of Sulphuric acid formed an ester having molecular formula $C_4H_8O_2$(R). Identify P, Q, R and write their IUPAC names. [5]

71. **2065 Q.No. 23i** Convert Ethanal into Methanal [2.5]

72. **2064 Q.No. 23** An alcohol (A), reacts with thionyl chloride to produce (B), which on dehydrohalogenation yielded a compound (C). The compound (C), on ozonolysis gave the mixture of ethanal and methanal. If the alcohol, (A) responses positive iodoform test. Identify A, B and C.
How could you convert the above compound, (B) into propanone? [3+2]

73. **2063 Q.No. 22(iii)** What action takes place when:
Propanone is warmed with iodine and aqueous sodium hydroxide [1]

74. **2063 Q.No. 22a** What action takes place when: Methanal is warmed with Tollen's reagent [2.5]

75. **2062 Q.No. 23 b** What happens when: Methanal reacts with ammonia. [2.5]

76. **2062 Q.No. 23(d)** What happens when: Acetone reacts with hydroxyl amine. [2.5]

77. **2058 Q.No. 21** An organic compound ($C_5H_{10}O$) reacts with phenyl hydrazine to form phenyl hydrazone. The compound does not reduce Fehling's solution but gives iodoform test. The compound on Clemmensen's reduction gives pentane. Identify the organic compound giving necessary chemical equations. [5]

78. **2057 Q.No. 21**
a. A carbonyl compound (X) gives addition product (Y) with methyl magnesium bromide. The compound (Y) on hydrolysis gives isopropyl alcohol. Identify X and Y.
b. Convert acetaldehyde to acetone. [5]

79. **2054 Q.No. 21** An alkene A on ozonolysis yields acetone and an aldehyde. The aldehyde is easily oxidised to an acid B. When B is treated with Br_2/P it yields a compound C which on hydrolysis gives a hydroxy acid D. This acid can also be obtained from acetone by the reaction with HCN followed by hydrolysis. Identify the compounds A, B, C and D. [5]

Write short notes on [5 marks]

80. **2052 Q.No. 28(a); 2053 Q.28(b)** Cannizzaro's reaction [5]

Long Answer Questions [10 marks]

81. **2076 GIE Set A Q.No. 31a** How is propanone prepared from
i. ethanoic acid
ii. 2, 2– dichloropropane
iii. 2, 3– dimethylbut –2-ene?
Write the reaction for the conversion of propanone into 2-hydroxy-2-methyl propanoic acid. [3+2+1]

82. **2076 GIE Set B Q.No. 31b** Write an example of each of [3+2]
i. Rosemund's reduction
ii. Cannizzaro's reaction
iii. Wurtz reaction
How is CH_3 MgI used to prepare
i. Propan-2-ol
ii. ethanoic acid

83. **2076 Set B Q.No. 31a** How is ethanal prepared from
(i) Ethyne (ii) But-2-ene (iii) 1,1 - dichloroethane?
Write down suitable method for the conversion of ethanal into 2-hydroxypropanoic acid. [1.5×4]

84. **2076 Set C Q.No. 31a** How is propanone one prepared from
i. 2,2-dichloropropane ii. Isopropyl alcohol
iii. Propyne
Give the suitable chemical reaction for the conversion of ethanoic acid into (i) methane (ii) methyl ethanoate. [3+2]

85. **2073 Supp Q.No. 31b** How is ethanal converted into methanal? Write the action of methanal on [2+1.5+1.5]
i. ammonia ii. conc. NaOH

86. **2072 Supp. Q.No. 31a** How is propanone prepared from:
i. 2, 2-dichloropropane ii. isopropyl alcohol
iii. propyne.
Give suitable chemical reaction for the conversion of ethanoic acid into
i. Methane ii. Methyl ethanoate [3+2]

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87. 2071 Supp. Q.No. 31b | 2071 Set D Q.No. 31 b An alkene Ⓐ undergoes ozonolysis to give two carbonyl compounds Ⓑ and Ⓒ. The compound Ⓑ on reduction with Zn-Hg/H⁺ gives propane. The compound Ⓒ reacts with HCN and followed by Hydrolysis to produce 2-hydroxypropanic acid as the major product. Write chemical reactions involved and give the IUPAC name of A, B and C. [10]

88. 2070 Set C Q.No. 31 a Write any three methods of preparation of ethanal. How is ethanal converted into [5]
   i. 3 - hydroxylbutanal
   ii. Ethanoic acid

89. 2070 Set D Q.No. 31 a Show your acquaintance with Cannizzaro's reaction and Perkin's Condensation. What happens when propanone is treated with 2, 4 - dinitrophenylhydrazine. [2+2+1]

90. 2069 Supp. Set B Q.No. 32 b Give suitable chemical reaction for the preparation of ethanal from. [5]
   i. ethyne
   ii. ethanoylchloride
   iii. 1, 1-dichloroethane
   How would you convert ethanal to propanone? [5+3+2]

91. 2060 Q.No. 29
   i. Write the possible isomeric aldehydes and ketones that can be formed from C_4H_8O. Give their IUPAC names. Which one of these isomers give iodoform test and why?
   ii. Convert benzaldehyde into aniline and vice versa. [5+5]

92. 2059 Q.No. 29 An organic compound A(C_4H_8O) forms phenyl hydrazone with phenyl hydrazine and reduces Fehling's solution. It has negative Iodoform test. Identify the organic compound A. [5]

93. 2059 Q.No. 29b-(iii) Predict the major products of the following reactions:

$$CH_3COCH_3 \xrightarrow{NH_2OH} \ldots\ldots\ldots$$ [1]

94. 2056 Q.No. 30 b-(iii) Show your acquaintance with the following: Aldol condensation [5]

95. 2055 Q.No. 30 Give three general methods of preparation of aldehydes. [5+5]
   Show your acquaintance with the following reactions
   i. Aldol condensation ii. Cannizzaro's reaction

12.2 AROMATIC ALDELYDES AND KETONES

Very Short Answer Questions [2 marks)

1. 2072 Supp. Q.No. 12 What happens when benzaldehyde is treated with: [1+1]
   i. conc. NaOH solution ii. hydrazine.

2. 2072 Set D Q.No. 12 How does benzaldehyde reacts with:[1+1]
   i. Conc. NaOH ii. Acetic anhydride

3. 2072 Set E Q.No. 12(ii) What happens when Benzaldehyde is heated with conc. NaOH solution. [1]

4. 2070 Set C Q.No. 12 What happens when benzaldehyde is heated with
   i. $LiAlH_4$
   ii. Acetic anhydride in presence of sodium acetate. [1+1]

5. 2069 Set A Q.No. 32e Give the example of Perkin's condensation [1]

6. 2065 Q.No. 7i Mention one example of each of the following: Rosenmund's reduction [1]

7. 2064 Q.No. 22(i) What happens when Benzaldehyde is warmed with aqueous NaOH? [1]

8. 2063 Q.No. 5(a) Give an example of each of the following reactions: Benzoin condensation [1]

9. 2060 Q.No. 5(i) | 2059 Q.No. 5 Write an example of each of the following reaction: Perkin's condensation [1]

10. 2058 Q.No. 5 Give an example (with formula) each from aliphatic and aromatic aldehydes which give Cannizzaro's reaction. [2]

Short Answer Questions [5 marks]

11. 2063 Q.No. 22 ii What action takes place when: Benzaldehyde is heated with ethanoic anhydride in presence of sodium ethanoate? [2.5]

12. 2062 Q.No. 23 a What happens when: Benzaldehyde is refluxed with alcoholic KCN. [2.5]

Long Answer Questions [10 marks]

13. 2072 Supp. Q.No. 30b Identify the major products A, B, C, D in the following reaction sequence:

$$A \xrightarrow[\Delta]{Zn} B \xrightarrow[\Delta]{CH_3Cl/AlCl_3} C \xrightarrow[\Delta]{CeO_2/H^+} D$$

   Compound Ⓓ gives methylbenzene when heated with alc. KOH and hydrazine. [4+1]

14. 2055 Q.No. 30 iii Show your acquaintance in the following reactions: Perkin reaction. [5]

Write short notes on [5 marks]

15. 2052 Q.No. 28(a); 2053 Q.28(b) Benzoin condensation [5]

UNIT 13: CARBOXYLIC ACIDS

13.1 ALIPHATIC CARBOXYLIC ACIDS

Very Short Answer Questions [2 marks]

1. 2076 GIE Set B Q.No. 13 What happens when ethanoic acid is heated with: [1+1]
   i. Ethanol in the presence of concentrated H_2SO_4?
   ii. Phosphorus pentoxide?

2. 2075 Set B Q.No. 15i | 2069 Set A Q.No. 13 ii | 2066 Q. No. 4i Write an example of Decarbonxylation reaction [1]

3. 2074 Supp. Q.No. 13 What is meant by decarboxylation reaction? Give an example of it. [1+1]

4. 2074 Set A Q.No. 13 | 2074 Set B Q.No. 13 What is meant by carboxylation reaction? Write an example of it. [1+1]

5. 2073 Supp Q.No. 13 | 2073 Set D Q.No. 13 | 2059 Q.No. 7 Why is chloroacetic aicd stronger acid than acetic acid? [2]

6. 2072 Supp. Q.No. 13 Identify the product Ⓐ and Ⓑ and give their IUPAC name. [1+1]

$$CH_3COOH \xrightarrow[\Delta]{P_2O_5} A \xrightarrow[\Delta]{LiAlH_4} B$$

7. 2072 Set E Q.No. 13 Why methanoic acid is more acidic than ethanoic acid? [2]

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8. 2071 Supp. Q.No. 13 What happens when ethanoic acid is heated
   i. With P_2O_5
   ii. With alcohol in presence of H_2SO_4 [1+1]
9. 2071 Set C Q.No. 13 2065 Q.No. 8 Write a chemical test to distinguish ethanoic acid from methanoic acid. [2]
10. 2071 Set D Q.No. 13 a Write an example of each of Carboxylation reaction. [1]
11. 2070 Supp. Q.No. 13 2070 Set D Q.No. 13 What is the functional isomer of ethanoic acid? Give its IUPAC name. [1+1]
12. 2070 Set C Q.No. 13 Why is ethanoic acid weaker acid than methanoic acid? [2]
13. 2069 Set B Q.No. 13 'Methanoic acid gives Tollen's test but ethanoic acid does not give reason. [2]
14. 2069 Supp. Set B Q.No. 13 How does enthanoic acid reacts with [2]
    i. ethanol ii. PCl_5
15. 2064 Q.No. 7 The boiling point of methanoic acid is higher than ethanol though they have same molecular mass. Explain. [2]
16. 2063 Q.No. 7 You are given two test tubes, one containing methanoic acid and other ethanoic acid. Suggest a suitable chemical test to identify them. Give chemical reaction too. [2]
17. 2060 Q.No. 6 Suggest a suitable chemical test to identify methanoic acid from ethanoic acid. [2]
18. 2060 Q.No. 8 What is decarbonylation? Give one example. [2]
19. 2058 Q.No. 7 Why is methanoic acid stronger than ethanoic acid? [2]
20. 2056 Q.No. 18(b) Write the name of the following components according to the IUPAC rule. [2]
    $CH_3 - C(CH_3)_2 - CH_2 - COOH$
21. 2052 Q.No. 10(b) Name: $CH_3–CH_2–C(CH_3)_2–CH_2–COOH$ according to IUPAC rule [2]

Short Answer Questions [5 marks]

22. 2076 Set B Q.No. 29 2076 Set C Q.No. 29 An aliphatic compound Ⓐ reacts with $SOCl_2$ to give Ⓑ. The compound Ⓑ is heated with ammonia to produce Ⓒ. The compound Ⓒ is further heated with Br_2/KOH to yield Ⓓ. The compound Ⓓ gives Ⓔ when treated with $NaNO_2$/HCl at low temperature. The compound Ⓔ is primary alcohol which gives positive idoform test. Identify ⒶⒷⒸⒹ and Ⓔ. Write reactions involved. [5]
23. 2075 GIE Q.No. 28 2075 Set A Q.No. 28 Describe the laboratory preparation of anhydrous formic acid. [5]
24. 2075 Set B Q.No. 28 How is anhydrous formic acid prepared in the laboratory? Why does methanoic acid give Tollen's test? [3+2]
25. 2075 Set B Q.No. 29 An aliphatic compound Ⓐ reacts with $SOCl_2$ to give Ⓑ. Ⓑ on reduction with H_2 in presence of Pd/$BaSO_4$ to give Ⓒ. When HCN is added to Ⓒ produces Ⓓ. On hydrolysis of Ⓓ in acidic medium forms Ⓔ. Compound Ⓒ can be obtained by heating a mixture of sodium formate and sodium acetate. Identify A, B, C, D, E and write reactions involved. [5]
26. 2074 Supp. Q.No. 28 2074 Set B Q.No. 28 Give chemical reaction for the preparation of ethanoic acid from
    i. 1,1,1-trichloroethane
    ii. Methyl magnesium iodide
    iii. Ethanenitrile
    How is ethanoic acid converted into methanoic acid? [3+2]
27. 2074 Set A Q.No. 28 Give chemical reaction for the preparation of methanoic acid from oxalic acid. How is anhydrous methanoic acid obtained from hydrous methanoic acid? Convert methanoic acid into ethanoic acid. [1+2+2]
28. 2073 Supp Q.No. 27 2073 Set C Q.No. 27 Describe the laboratory method of preparation of anhydrous formic acid. How does it react with Tollen's reagent? [4+1]
29. 2072 Supp. Q.No. 27 Write down a chemical reaction for the preparation of methanoic acid from Oxalic acid. How is methanoic acid converted into ethanoic acid? [2+3]
30. 2072 Set C Q.No. 28 Give the chemical reactions for the preparation of ethanoic acid from (i) sodium ethoxide (ii) ethanenitrile (iii) methyl magnesium iodide
    Why is acetic acid weaker acid than chloroacetic acid? [3+2]
31. 2072 Set C Q.No. 29 2072 Set D Q.No. 29 An aliphatic compound Ⓐ reacts with $SOCl_2$ to give Ⓑ. Ⓑ on reduction with H_2 in presence of Pd/$BaSO_4$ to give Ⓒ. When HCN is added to Ⓒ, produces Ⓓ. On hydrolysis of Ⓓ in acidic medium forms Ⓔ. Compound Ⓒ gives iodoform test and produces silver mirror with Tollen's reagent. Identify Ⓐ, Ⓑ, Ⓒ, Ⓓ, Ⓔ and write reactions involved. [5]
32. 2072 Set D Q.No. 28 Suggest any three suitable chemical reactions for the preparation of ethanoic acid. How is ethanoic acid converted into methanoic acid? [3+2]
33. 2072 Set E Q.No. 31b Write any three methods of preparation of ethanoic acid. How is ethanoic acid distinguished from methanoic acid? [3+2]
34. 2071 Set C Q.No. 31 b Starting from CH_3MgI, how would you prepare ethanol? Convert [5]
    i. ethanol into propanol
    ii. ethanal into propanone
35. 2071 Set D Q.No. 31 a How will you prepare ethanoic acid from
    i. tribromoethane ii. ethanenitrile
    iii. methyl magnesium iodide?
    What happens when ethanoic acid is: [3+2]
    a. Heated with P_2O_5 b. Treated with $SOCl_2$

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36. 2070 Supp. Q.No. 27 Identify A, B, C, D and E in the following reaction sequence and write reactions involved.

$$A \xrightarrow{NH_3} B \xrightarrow[\Delta]{Br_2/aq\ KOH} C \xrightarrow{HNO_2} D \xrightarrow[\Delta]{NaOH/I_2} E$$

The compound E produces ethyne when heated with silver powder. [5]

37. 2070 Set C Q.No. 27 Describe the method of preparation of anhydrous formic acid in the laboratory. [5]

38. 2069 Supp. Set B Q.No. 24 How is anhydrous formic acid prepared in the laboratory? Why does formic acid give silver mirror with Tollen's reagent? [5]

39. 2068 Q.No. 23 Write any three important methods of preparation of ethanoic acid. How would you obtain anhydrous formic acid from its aqueous solution? [3+2]

40. 2065 Q.No. 31i Describe Laboratory preparation of anhydrous methanoic acid. [5]

41. 2063 Q.No. 23(e) What happens when Methanoic acid is warmed with ammoniacal silver nitrate? [2.5]

42. 2062 Q.No. 22(ii) Convert the following organic compounds: Ethanoic acid to methanoic acid [2.5]

43. 2061 Q.No. 22 What products are obtained when CH_3COOH is allowed to react with

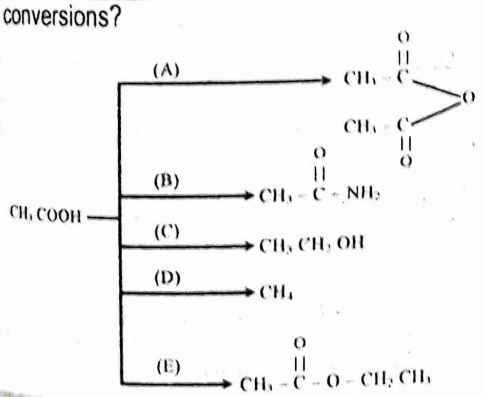
a. NaOH b. NaOH/CaO c. PCl_5
d. P_2O_5 e. $LiAlH_4$

Also mention reaction condition where ever relevant. [5]

44. 2059 Q.No. 23 Why is P_2O_5 not used for the preparation of anhydrous formic acid? Suggest a suitable method for the preparation of anhydrous formic acid. [5]

45. 2056 Q.No. 26 a Convert Ethane to ethanoic acid [2.5]

46. 2055 Q.No. 26 How would you bring about the following conversions? [5]



Long Answer Questions [10 marks]

47. 2071 Supp. Q.No. 31a How will you prepare ethanoic acid from [5+5]

i. Tribromoethane ii. Ethanenitrile
iii. CH_3MgI.

What happens when ethanoic acid is

a. heated with P_2O_5 b. treated with $SOCl_2$

48. 2071 Set C Q.No. 31 a How is anhydrous formic acid prepared from hydrous formic acid? Write suitable chemical reaction to convert ethanoic acid into: [1+2+2]

i. Methane ii. Methylethanoate
iii. Ethanoic anhydride

49. 2070 Supp. Q.No. 31 b How is ethanoic acid prepared from methyl magnesium iodide? What happens when ethanoic acid is, [5×1]

i. Heated with P_2O_5.
ii. Heated with HI in presence of red phosphorous.
iii. Passed over heated MnO.
iv. Warmed with ethanol in presence of conc. H_2SO_4.

50. 2068 Q.No. 28 b Identify each lettered in the following reaction sequence:

$$CH_3COOH \xrightarrow{SOCl_2} (A) \xrightarrow[\Delta]{H_2/Pd/BaSO_4} (B) \xrightarrow{HCN} (C) \xrightarrow{H_2O/H^+} (D)$$

What major product would you obtain when B is treated with alkaline solution of hydrazine and ethylene glycol? [5+4+1]

51. 2067 Q.No. 28 How is formic acid prepared in laboratory? Suggest suitable chemical methods for the conversion of formic acid into ethanoic acid and vice versa. [5+5]

52. 2066 Q. No. 29 a Write any three methods of preparation of ethanoic acid. How would you convert ethanoic acid into

i. Ethanoic anhydride ii. Methylethanoate. [3+2]

53. 2064 Q.No. 29 Describe the preparation of methanoic acid in the laboratory. How is anhydrous acid obtained from it? How does methanoic acid act upon:

i. Fehling's solution ii. Methanol / H^+
iii. Conc. H_2SO_4? [5+2+3]

54. 2057 Q.No. 28 Describe the preparation of anhydrous formic acid in laboratory. How is it converted to acetic acid? [5]

55. 2057 Q.No. 29(a) Consider the following reaction

$$A \xrightarrow[(ii)\ NH_3]{(i)\ PCl_5} B \xrightarrow[\Delta]{Br_2/NaOH} C \xrightarrow[\Delta]{HNO_2} D$$

The compound, A is a carboxylic acid. Calcium salt of A on heating gives acetone. Identify A, B, C and D. [5]

56. 2053 Q.No. 29(b) Consider a reaction:

$$A \xrightarrow{SOCl_2} B \xrightarrow[\Delta]{NH_3} C \xrightarrow[\Delta]{Br_2/KOH} D \xrightarrow[\Delta]{NaNO_2/HCl} E$$

The compound, E is a primary alcohol which has positive iodoform test. Identify A, B, C, D and E. [5]

Write short notes on [5 marks]

57. 2077 Set P Q.No. 12iv Laboratory method of preparation of anhydrous formic acid. [5]

58. 2076 GIE Set A Q.No. 33iv 2076 Set B Q.No. 33iii 2073 Set D Q.No. 33iv 2053 Q.No. 28(a) 2062 Q.31(b) Laboratory preparation on the anhydrous formic acid. [5]

13.2 DERIVATIVES OF CARBOXYLIC ACID

Very Short Answer Questions

1. 2076 GIE Set A Q.No. 15 Write down the functional isomer of methyl methanoate. What product would you expect when the isomer is heated with P_2O_5? [1+1]

2. 2076 Set B Q.No. 15 2076 Set C Q.No. 15 Write down the functional isomer of methyl methanoate. What product would you expect when the isomer is heated with P_2O_5? [1+1]

3. 2075 Set B Q.No. 13 Predict the major products of the following reactions. [1+1]

i. $(CH_3CO)_2O \xrightarrow[\Delta]{LiAlH_4}$ ii. $CH_3COOH \xrightarrow[\Delta]{NaOH/CaO}$

4. 2073 Set C Q.No. 13 Predict the major products of the following reactions [1+1]

i. $CH_3COOH \xrightarrow[\Delta]{P_2O_5}$ ii. $CH_3COCl \xrightarrow[\Delta]{Pd/BaSO_4}$

5. 2072 Set C Q.No. 13 Identify A and B in the following sequence of reaction and give their IUPAC name.

$(CH_3CO)_2O \xrightarrow[\Delta]{LiAlH_4} A \xrightarrow[Conc.\ H_2SO_4]{CH_3COOH} B$

6. 2072 Set D Q.No. 13 Predict the major products of the following reaction: [1+1]

i. $(CH_3CO)_2O \xrightarrow[\Delta]{LiAlH_4}$

ii. $(CH_3COO)_2Ca \xrightarrow{\Delta}$

7. 2072 Set E Q.No. 15(i) Define and give an example of Hoffmann's hypobromite reaction. [1]

8. 2071 Set D Q.No. 13 b 2069 Supp. Set B Q.No. 15i Write an example of each of decarboxylation reaction [1]

9. 2063 Q.No. 4 Convert ethanoyl chloride to methanol. [2]

10. 2062 Q.No. 7 What happens when the product obtained by the action of ethanoyl chloride and ammonia is heated with Br_2 and aqueous KOH? [2]

11. 2059 Q.No. 8 What happens when benzamide is heated with bromine and aq. KOH? [2]

12. 2059 Q.No. 29b (v) Predict the major products of the following reactions:

$CH_3COOCOCH_3 \xrightarrow[\Delta]{LiAlH_4}$ ..... [1]

13. 2057 Q.No. 7 Write chemical reaction when an amide is hydrolyzed. [2]

14. 2052 Q.No. 11 What is functional group of:
a. Ester b. Amide [2]

Long Answer Questions

15. 2070 Set D Q.No. 31 b

$(A) \xrightarrow{NH_3} (B) \xrightarrow{Br_2/aq.KOH} (C) \xrightarrow{HNO_2} (D) \xrightarrow{NaOH/I_2} (E)$

Compound E produces ethyne when heated with silver powder. [5×1=5]

16. 2069 Set B Q.No. 30 b Identify A, B, C, D and E in the following sequence of reactions. [1+1+1]

$(A) \xrightarrow{NH_3} (B) \xrightarrow[\Delta]{Br_2/aq.KOH} (C) \xrightarrow{HNO_2} (D) \xrightarrow{KMnO_4/H^+} (E)$

The compound (E) can be obtained by heating oxalic acid in presence of glycerol.

13.3 AROMATIC CARBOXYLIC ACIDS

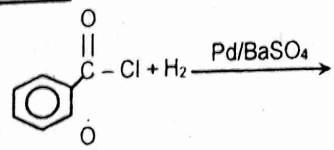
Very Short Answer Questions [2 marks]

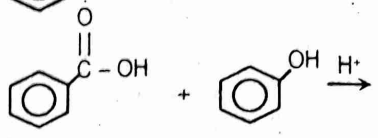
1. 2068 Q.No. 6 Mention suitable method for the conversion of benzoic acid to benzene. [2]

2. 2067 Q.No. 6 2066 Q. No. 7 How is benzoic acid prepared from benzene? [2]

3. 2064 Q.No. 22(iv) What happens when Benzoic acid is nitrated? [2]

4. 2061 Q.No. 5 Complete the following equations: [2]

(a) 

(b) 

Short Answer Questions [5 marks]

5. 2059 Q.No. 22(b) How could you synthesize benzoic acid from aniline? [2]

6. 2057 Q.No. 23(b) Write the chemical equation with conditions for the following reaction benzoic acid is nitrated. [2]

Long Answer Questions [10 marks]

7. 2059 Q.No. 29b-(ii) Predict the major products of the following reactions:

Ar COOH $\xrightarrow[(ii)\ NH_3]{(i)\ PCl_5}$ ..... [1]

UNIT 14: NITROCOMPOUNDS

14.1 ALIPHALIC NITROCOMPOUNDS (NITROALKANE)

Very Short Answer Questions [2 marks]

1. 2076 Set B Q.No. 13 2076 Set C Q.No. 13 Why is nitro group called an ambident group? [2]

2. 2075 GIE Q.No. 14 Give a reaction to prepare nitroalkane from haloalkane and name the test used for the detection of nitro compound. [1+1]

3. 2075 Set A Q.No. 14 How is chloropicrin obtained from nitromethane? Give an important use of chloropierin. [1+1]

4. 2072 Supp. Q.No. 14 Mention any two important uses of nitroalkane. [2]

5. 2072 Set C Q.No. 14(i) How are the following conversion carried out: Nitroethane into N-ethylhydroxylamine. [1]

6. 2071 Set C Q.No. 14 How does nitroalkane react with:
i. Zn/NH_4Cl ii. Sn/HCl [2]

14.2 AROMATIC NITROCOMPOUNDS

Very Short Answer Questions [2 marks]

1. 2076 GIE Set A Q.No. 13 What happens when nitrobenzene is reduced with neutral medium? [2]

2. 2076 GIE Set B Q.No. 14 What happens when nitrobenzene is reduced in acidic medium? [1+1]

3. 2075 Set B Q.No. 14 Starting from nitrobenzene how would you obtain picric acid? [2]

4. 2074 Supp. Q.No. 14 How would you predict that nitro group in nitrobenzene is an electron-withdrawing group? [2]

5. 2074 Set A Q.No. 14 Why halogenation in nitrobenzene occurs at meta position? [2]

6. 2074 Set B Q.No. 14 2073 Supp Q.No. 14 2073 Set C Q.No. 14 Why does nitrobenzene undergo electrophillic substitution at meta position? [2]

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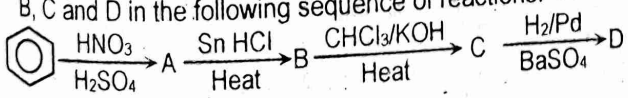
7. 2073 Set D Q.No. 14 What happens when Nitrobenzene is
   i. subjected to electrolytic reduction
   ii. treated with Zn/NaOH [1+1]
8. 2072 Set C Q.No. 14(ii) How are the following conversion carried out: Nitrobenzene into azobenzene. [1]
9. 2072 Set D Q.No. 14 Convert nitrobenzene into: [1+1]
   i. p-aminophenol ii. Hydrazobenzene
10. 2071 Supp. Q.No. 14 2071 Set D Q.No. 14 Electrophilic substitution reaction in nitrobenzene occurs at meta position. Give reason. [2]
11. 2070 Supp. Q.No. 15 Convert nitrobenzene in p-aminoazobenzene. [2]
12. 2070 Set D Q.No. 14 2062 Q.No. 8 2057 Q.No. 8 2055 Q.No. 17 Why is $-NO_2$ group a meta directing towards electrophilic aromatic substitution? [2]
13. 2069 Supp. Set B Q.No. 14 2069 Set A Q.No. 14 Why does nitrobenzene undergo electrophilic substitution at meta position? [2]
14. 2069 Set B Q.No. 15 What products would you expect when Nitrobenzene is treated with: [1+1]
   i. Zn/NaOH ii. Electrolytic reduction
15. 2058 Q.No. 8 Account for the fact that $-NO_2$ is a meta directing group towards electrophilic aromatic substitution. [2]

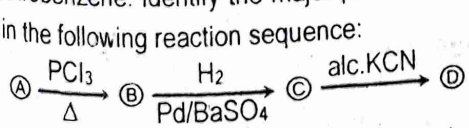
Short Answer Questions [5 marks]

16. 2071 Set C Q.No. 32 How is pure nitrobenzene prepared in the laboratory? Perform the following conversions:
   a. nitrobenzene to p-hydroxyazobenzene
   b. Benzoic acid to p-aminoazobenzene [5+2.5+2.5]
17. 2070 Set D Q.No. 25 What happens when nitrobenzene is reduced in acidic, neutral, alkaline and electrolytic conditions. [5]
18. 2063 Q.No. 21 Write the reasonating structures of nitrobenzene and explain why does it give meta substituted product during electrophilic substitution? How is nitrobenzene converted to p-hydroxyazobenzene? [2]
19. 2057 Q.No. 23(d) Write the chemical equation with conditions for the following reaction:
   Nitrobenzene is reduced in neutral medium. [2.5]
20. 2056 Q.No. 27 How is nitrobenzene prepared in laboratory? [5]
21. 2056 Q.No. 25 Write the structures of organic compound A, B, C and D in the following sequence of reactions. [5]



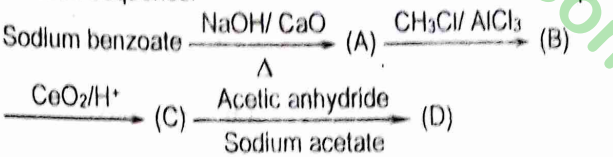
Long Answer Questions [10 marks]

22. 2077 Set W Q.No. 11b How is pure nitro benzene prepared in the laboratory? [5]
23. 2076 Set B Q.No. 30 2076 Set C Q.No. 30 Describe laboratory method of preparation of pure and dry nitrobenzene. Identify the major products Ⓐ, Ⓑ, Ⓒ and Ⓓ in the following reaction sequence:

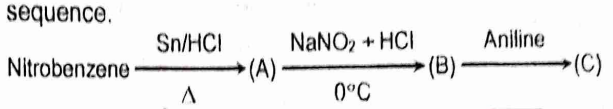


The compound Ⓒ can be obtained by heating toluene in presence of CeO_2/H^+. [6+1+1+1+1]

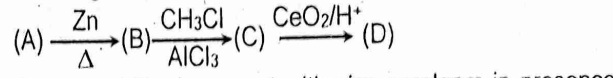
24. 2074 Supp. Q.No. 30 How is pure nitrobenzene prepared in the laboratory? Identify (A), (B), (C) and (D) in the following reaction sequence. [6+4]



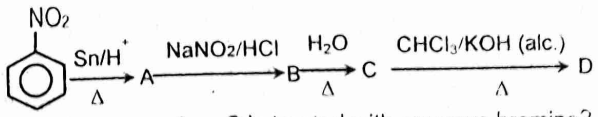
25. 2074 Set A Q.No. 30 How is pure nitrobenzene prepared in the laboratory? Identify (A), (B) and (C) in the reaction sequence.



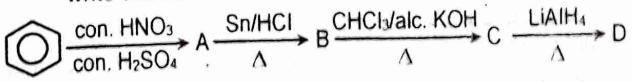
26. 2072 Supp. Q.No. 30a 2071 Supp. Q.No. 30a Give a chemical reaction for the preparation of nitrobenzene from benzene. Starting from nitrobenzene how will you prepare: [1+4]
   i. azobenzene ii. oxyazobenzene
   iii. hydrazobenzene iv. TNT
27. 2072 Set C Q.No. 31 How is dry and pure nitrobenzene prepared in the laboratory? Identify A, B, C and D in the following reaction sequence:



   Compound D when react with zinc amalgam in presence of acid to give toluene. [6+4]
28. 2071 Set D Q.No. 30 How is pure nitrobenzene prepared in the laboratory? Perform the following conversions.
   a. nitrobenzene to *p*-hydroxyazobenzene.
   b. Benzoic acid to *p*-aminoazobenzene [5 + 2.5 + 2.5]
29. 2070 Set D Q.No. 30 a How is nitrobenzene prepared in the laboratory in pure and dry state? [5]
30. 2069 Set B Q.No. 31
   a. How is nitrobenzene prepared in the laboratory?
   b. Convert the following:
      i. Aniline into azodye
      ii. Benzaldehyde into cinnamic acid. [6+2+2]
31. 2069 Supp. Set B Q.No. 31a Sketch a well-labelled diagram for the preparation of nitrobenzene in the laboratory. [5]
32. 2067 Q. No. 30 How is pure nitrobenzene prepared in the laboratory? [6 + 4 = 10]



   What happens when C is treated with aqueous bromine?
33. 2066 Q. No. 28
   (a) How is dry and pure nitrobenzene prepared in laboratory? [6]
   (b) Identify compounds A, B, C and D in the followings and write the reactions involved: [4]



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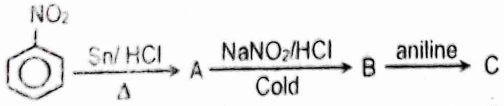
34. 2065 Q.No. 28
a. How is dry and pure nitrobenzene prepared in laboratory? [6]
b. Consider the following reaction: [4]



Identify compounds A, B and C and write the reactions involved.

35. 2059 Q.No. 28 How is nitrobenzene prepared in laboratory in pure and dry state? How is it converted to p-hydroxyazobenzene? [5]

36. 2058 Q.No. 28 Describe the preparation of pure and dry nitrobenzene in laboratory. How is it converted to (i) phenol and (ii) hydrazobenzene? [5]

37. 2053 Q.No. 26 Describe the laboratory method for the preparation of Nitrobenzene. How is it purified?
What happens when Nitrobenzene is subjected to reduction in
a. Acidic medium b. Neutral medium [5]

UNIT 15: AMINO COMPOUNDS (AMINES AND ANILINE)

15.1 ALIPHATIC AMINES

Very Short Answer Questions [2marks]

1. 2077 Set V Q.No. 4 Give a chemical test to distinguish ethanamine from N-methylmethanamine. [2]
2. 2076 GIE Set A Q.No. 14 How does ethanamine reacts with:[1+1]
i. chloroform in presence of alc. KOH?
ii. $NaNO_2$/Hcl at low temperature?
3. 2076 GIE Set B Q.No. 15 Write the isomeric amines of C_2H_7N and give the chemical test to distinguish them. [1+1]
4. 2075 GIE Q.No. 15 Write down two isomeric amines and their names from C_2H_7N. What chemical test is used to distinguish them? [1+1]
5. 2075 Set A Q.No. 15 2073 Supp Q.No. 15 2073 Set C Q.No. 15 2073 Set D Q.No. 15 2072 Set E Q.No. 14 2070 Supp. Q.No. 14 Give a chemical test to distinguish ethanamine from N-methylmethanamine. [2]
6. 2075 Set B Q.No. 15ii Write an example of Carbylamine reaction [1]
7. 2074 Supp. Q.No. 15 2074 Set A Q.No. 15 Write down the structure of a primary amine and a secondary amine from C_3H_9N and give their IUPAC name. [1+1]
8. 2074 Set B Q.No. 15 Write down the structure of a secondary amine and a tertiary amine from C_3H_9N and give their IUPAC name. [1+1]
9. 2072 Supp. Q.No. 15 Write a chemical test to distinguish aliphatic amine from aromatic amine. [2]
10. 2071 Supp. Q.No. 15 Why is methanamine more basic than aniline? [2]
11. 2071 Set C Q.No. 15a 2064 Q.No. 6(ii) Give an example of Hoffmann's bromamide reaction [1]
12. 2071 Set D Q.No. 15 Write the structure of isomeric amines of propanamine and their IUPAC name. [1+1]
13. 2070 Set C Q.No. 15 Convert methanamine into ethanamine. [2]
14. 2069 Set A Q.No. 15 Why is amine more basic than ammonia? [2]
15. 2069 Set B Q.No. 14 Why are aliphatic amines more basic than aniline? [2]
16. 2065 Q.No. 5 There are three possible isomeric amines of C_3H_9N. One of them is propanamine. Write other two isomers and give their IUPAC name. [2]
17. 2063 Q.No. 8 Write the possible isomeric amines of C_3H_9N and give their IUPAC names. [2]
18. 2055 Q.No. 14 Convert $CH_3 - CH_2 - NH_2$ into $CH_3 - CH_2 - CH_2 - NH_2$. [2]
19. 2054 Q.No. 15 Which of the following has most basic character? Explain.
a. NH_3 b. $(CH_3)_2NH$
c. CH_3NH_2 d. $C_6H_5NH_2$ [2]
20. 2052 Q.No. 10(a) Write IUPAC name:
$CH_3 - CH_2 - CH(CH_3)\ CH(NH_2) - CH_3$ [2]

Short Answer Questions [5 marks]

21. 2072 Supp. Q.No. 29 2071 Set C Q.No. 29 Write down a chemical reaction to distinguish ethanamine from N-methylmethanamine. How is ethanamine prepared from:
i. propanamide ii. ethanenitrile
Covert ethanamine into methamine. [1+1+1+2]
22. 2071 Supp. Q.No. 28 How will you prepare ethanamine from
i. propanamide ii. ethanenitrile
What happens when elthanamine is treated with $NaNO_2$ + HCl at low temperature? Convert methanamine into ethanamine. [1+1+1+2]
23. 2071 Set D Q.No. 29 Mention an example of each of Primary, Secondary and Tertiary amine. How are they separated from their mixture by Hoffmann's method? [1+4]
24. 2070 Set D Q.No. 30 b What are amines? How would you separate 1°, 2° and 3° amines from their mixture by Hoffmann's method? [1+4]
25. 2065 Q.No. 29 a Mention any three suitable methods of preparation of Primary amine. How would you convert methenamine into ethanamine? [3+2]
26. 2058 Q.No. 23 What are amines? How are they classified? How do different classes of amines react with diethyl oxalate? [5]
27. 2057 Q.No. 22 How would you separate 1°, 2° and 3° amines from their mixture by Hoffmann's method? [5]
28. 2056 Q.No. 26 b Convert Ethylamine to methylamine [1.5]
29. 2054 Q.No. 20 Discuss any one method that can be used for separation of primary, secondary and tertiary amines. [2]

Long Answer Questions [10 marks]

30. 2077 Set V Q.No. 11i How is primary, secondary and tertiary amines separated from their mixture by Hoffmann's method? [5]
31. 2076 GIE Set A Q.No. 31b Use Hoffmann's method for the separation of 1°, 2° and 3° amines from their mixture. [4]

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2. 2076 Set B Q.No. 31b Write down a structural formula of primary, secondary and tertiary amine of each from C_3H_9N. How is Hoffmann's method applied to separate them from their mixture? [4]

3. 2076 Set C Q.No. 31b Write down a structural formula of primary, secondary and tertiary amines of each from C_3H_9N. How would you apply Hoffmann's method to separate them from their mixture? [3+2]

34. 2069 Supp. Set B Q.No. 32 a Explain the method of separation of 1°,2°, 3° amines from their mixture. [5]

35. 2066 Q. No. 29 b Describe the chemical method of separation of 1°, 2° and 3° amines from their mixture. [5]

36. 2064 Q.No. 28(i) What are amines? How are they classified? Describe a suitable method for the separation of amines from their mixtures. [1+1+5]

37. 2064 Q.No. 28(ii) How could you convert methanamine to ethanamine and vice versa? [1.5+1.5]

Write short notes on [5 Marks]

38. 2075 GIE Q.No. 33ii 2075 Set A Q.No. 33ii 2075 Set B Q.No. 33iv 2074 Supp. Q.No. 33(iv) 2074 Set A Q.No. 33c 2074 Set B Q.No. 33b 2073 Supp Q.No. 33iii 2073 Set C Q.No. 33iv 2072 Set C Q.No. 33d 2069 Set A Q.No. 33 d 2069 Set B Q.No. 33a
Separation of 1°, 2° and 3° amines by Hoffman's method. [5]

15.2 AROMATIC AMINE (ANILINE)

Very Short Answer Questions [2 marks]

1. 2076 Set B Q.No. 14 Write an example of each of the following reactions:
   i. Decarboxylation
   ii. Coupling reaction [1+1]

2. 2076 Set C Q.No. 14 What happens when aniline is
   i. Treated with benzene diazonium chloride.
   ii. Heated with chloroform in presence of alc. KOH. [1+1]

3. 2072 Set C Q.No. 15 Give the major products of the following reactions: [1+1]
   i. $\text{Benzamide} + Br_2 \xrightarrow[\Delta]{\text{aq. NaOH}}$
   ii. $\text{Aniline} + \text{Benzenediazonium chloride} \xrightarrow{\text{warm}}$

4. 2072 Set D Q.No. 15 How does aniline react with:
   i. aqueous bromine
   ii. $NaNO_2$+ HCl at low temperature [1+1]

5. 2072 Set E Q.No. 15(ii) 2069 Supp. Set B Q.No. 15 ii Define and give an example of coupling reaction. [1]

6. 2071 Set C Q.No. 15 b Give an example of Carbylamine reaction [1]

7. 2070 Set D Q.No. 15 How are sulphanilic and acetanilide prepared from aniline? [1+1]

8. 2068 Q.No. 7b 2064 Q.No. 6(i) Write an examples of each of the followings: Diazotization reaction. [1]

9. 2065 Q.No. 7ii Mention one example of each of the following: Diazotization reaction [1]

10. 2063 Q.No. 6(i) What happens when: Aniline is shaken well with aq. Br_2. [2]

11. 2061 Q.No. 6 Why is $-NH_2$ group of aniline protected before nitration? [2]

Short Answer Questions [5 marks]

12. 2062 Q.No. 23(c) What happens when: Aniline is coupled with benzene diazonium chloride? [5]

13. 2057 Q.No. 23(a) Write the chemical equation with conditions for the following reaction: Aniline is diazotized. [5]

Long Answer Questions [10 marks]

14. 2076 GIE Set A Q.No. 30 Describe laboratory method of preparation of pure aniline. Identify the major products Ⓐ, Ⓑ, Ⓒ and Ⓓ in the following reaction sequences. [6+1+1+1+1]

$$\text{Ⓐ} \xrightarrow{SOCl_2} \text{Ⓑ} \xrightarrow[Pd/BaSO_4]{H_2} \text{Ⓒ} \xrightarrow[\text{Conc.HCl}]{Zn/Hg} \text{Ⓓ}$$

The compound Ⓓ can be obtained by heating benzene and chloromethane in presence of $AlCl_3$.

15. 2076 GIE Set B Q.No. 32

a. How is pure and dry aniline is prepared in the laboratory? Explain with well-labelled diagram.

b. Identify the compound Ⓐ, Ⓑ, Ⓒ and Ⓓ in the following sequence of reaction:

$$\text{Ⓐ} \xrightarrow[\Delta]{Br_2/KOH} \text{Ⓑ} \xrightarrow[0°C]{NaNO_2/HCl} \text{Ⓒ} \xrightarrow[OH^-]{\text{Aniline}} \text{Ⓓ}$$

The compound Ⓒ gives phenol on warming with water. [6+4]

16. 2075 GIE Q.No. 31 How is dry and pure aniline prepared in laboratory? Identify Ⓐ, Ⓑ, Ⓒ and Ⓓ in the following reaction sequence. [6+4]

$$\text{Aniline} \xrightarrow[\text{Cold}]{NaNO_2+HCl} \text{Ⓐ} \xrightarrow[\Delta]{H_2O} \text{Ⓑ} \xrightarrow[\Delta]{Zn} \text{Ⓒ} \xrightarrow[\Delta/AlCl_3]{CH_3Cl} \text{Ⓓ}$$

17. 2075 Set A Q.No. 31 How is dry and pure aniline prepared in laboratory? Identify Ⓐ, Ⓑ and Ⓒ in the following reaction sequence.

$$\text{Aniline} \xrightarrow[\text{Cold}]{NaNO_2+HCl} \text{Ⓐ} \xrightarrow[\Delta]{H_2O} \text{Ⓑ} \xrightarrow{aq.Br_2} \text{Ⓒ}$$

What product would you expect when Ⓐ is treated with phenol in alkaline condition? [6+3+1]

18. 2075 Set B Q.No. 31 2072 Set D Q.No. 31 How is pure and dry aniline prepared in the laboratory? Identify A, B, C, D in the following reaction sequences

$$A \xrightarrow[\Delta]{Zn} B \xrightarrow[AlCl_3]{CH_3Cl} C \xrightarrow{CeO_2/H^+} D$$

Compound D when react with zinc amalgam in presence of acid to give toluene. [6+4]

19. 2074 Set B Q.No. 30 How is pure aniline prepared in the laboratory? Identify (A), (B), (C), and (D) in the following reaction sequences. [6+4]

$$\text{Sodium benzoate} \xrightarrow[\Delta]{NaOH/CaO} (A) \xrightarrow[AlCl_3]{CH_3Cl/\Delta} (B) \xrightarrow{CeO_2/H^+} (C) \xrightarrow[\text{Sodium acetate}]{\text{Acetic anhydride}} (D)$$

20. **2073 Supp Q.No. 30** How is pure and dry aniline prepared in the laboratory? Identify the major products Ⓐ, Ⓑ, Ⓒ and Ⓓ in the following reaction sequence. [6+4]

$$A \xrightarrow[0°C]{NaNO_2 + HCl} B \xrightarrow[HCl]{CuCl} C \xrightarrow[H^+]{Cl_3CCHO} D$$

The compound Ⓒ undergoes reduction with $LiAlH_4$ to give benzene.

21. **2073 Set C Q.No. 30** How is pure aniline prepared in the laboratory? Identify the major products A, B, C and D in the following reaction sequence. [6+4]

$$A \xrightarrow{Aq.NaOH + Br_2} B \xrightarrow[0°C]{NaNO_2 + HCl} C \xrightarrow[HCl]{CuCl} D$$

The compound D if heated with chloral in presence of acid gives DDT.

22. **2073 Set D Q.No. 30** How is pure and dry aniline prepared in the laboratory? Identify the major products Ⓐ, Ⓑ, Ⓒ and Ⓓ in the following reaction sequences. [6+4]

$$Ⓐ \xrightarrow[HCl]{CuCl} Ⓑ \xrightarrow[\text{dry ether}/\Delta]{CH_3Br/Na} Ⓒ \xrightarrow[\Delta]{CeO_2/H^+} Ⓓ$$

The compound D undergoes Clemmensen's reduction to give Toluene.

23. **2072 Set E Q.No. 30** How is aniline prepared in the laboratory in pure and dry state? How does aniline react with. [7+3]
   i. Chloroform.
   ii. benzene diazonium chloride
   iii. aq. Br_2

24. **2070 Supp. Q.No. 30 a** Sketch a well-labelled diagram for the preparation of pure aniline in laboratory. Write the principle and process involved in it. [7]

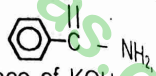
25. **2070 Supp. Q.No. 30 b** Explain why,
   i. Amino group of aniline is ortho or para directing.
   ii. Amino group of aniline is protected before nitration.
   iii. Aniline is a weaker base than aliphatic amine. [3]

26. **2070 Set C Q.No. 30 a** How is pure aniline prepared in the laboratory? [5]

27. **2069 Set A Q.No. 31**
   a. How is pure aniline prepared in the laboratory? [6]
   b. Convert aniline into: [2+2]
      i. azodye ii. N-methylaniline

28. **2068 Q.No. 29** How is pure aniline prepared in the laboratory? Starting from aniline, how would you obtain:
   i. Ortho nitroaniline
   ii. N-methylaniline [6+2+2]

29. **2062 Q.No. 28** Describe the preparation of pure and dry aniline in the laboratory. Give its action upon:
   i. aq. Br_2
   ii. methyl iodide [5]

30. **2061 Q.No. 29** How is aniline prepared in the laboratory? What happens when (a) benzamide,  is allowed to react with bromine in presence of KOH solution (b) aniline is warmed with Chloroform and ethanolic potassium hydroxide? Why is aniline less basic than methylamine? [10]

31. **2060 Q.No. 28** How is aniline prepared in laboratory? Give its action upon (a) $CHCl_3$/alc KOH (b) $NaNO_2$/HCl under ice cold condition and (c) aq. Br_2. [7+3]

32. **2057 Q.No. 29(b)** Starting from aniline how would you obtain
   i. o-nitro aniline and
   ii. picric acid? [5]

33. **2054 Q.No. 28** How is aniline prepared in the laboratory? How would you convert aniline into:
   a. Phenol b. Phenyl isocyanide
   c. Sulphanilic acid d. p-benzoquinone
   e. Benzene diazonium chloride [10]

UNIT 16: MOLECULES OF LIFE

Very Short Answer Questions [2marks]

1. **2077 Set P Q.No. 1** Illustrate the formation of peptide bond with an example. [2]

2. **2077 Set W Q.No. 6** Distinguish between essential and non-essential amino acid. [2]

3. **2076 GIE Set A Q.No. 16** Name the constituents present in nucleic acid. [2]

4. **2076 GIE Set A Q.No. 17** What is meant by (i) sugar and (ii) non sugar? [1+1]

5. **2076 GIE Set B Q.No. 16** Distinguish between reducing sugar and non-reducing sugar with an example of each. [1+1]

6. **2076 GIE Set B Q.No. 17** What happens when: [1+1]
   i. fat gets hydrolyzed
   ii. protein gets heated?

7. **2076 Set B Q.No. 16** **2075 GIE Q.No. 18** How does DNA differ from RNA in respect of sugar and base units present in it? [1+1]

8. **2076 Set B Q.No. 17** Define sugar and non-sugar giving an example of each. [1+1]

9. **2076 Set C Q.No. 16** What are lipids? Name the products formed when simple lipids undergo hydrolysis. [1+1]

10. **2076 Set C Q.No. 17** What is meant by (i) invert sugar and (ii) non-reducing sugar? [1+1]

11. **2075 GIE Q.No. 19** **2071 Set D Q.No. 16** **2070 Set D Q.No. 16** Distinguish between sugar and non-sugar with an example of each. [1+1]

12. **2075 Set A Q.No. 18** Name the chemical components which constitute nucleotides. Give a biological function of nucleotides. [1+1]

13. **2075 Set A Q.No. 19** Distinguish between reducing and non-reducing sugar with an example of each. [1+1]

14. **2075 Set B Q.No. 16** Define the terms
   i. invert sugar ii. reducing sugar

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15. **2075 Set B Q.No. 17** What are nitrogen bases? Name the nitrogen bases present in DNA. [1+1]
16. **2074 Supp. Q.No. 16** Define non-reducing sugar and give an example of it. [1+1]
17. **2074 Supp. Q.No. 17** What are fats? What happens when fats get hydrolyzed? [1+1]
18. **2074 Set A Q.No. 16** How is sugar differed from non-sugar? Give an example of each. [1+1]
19. **2074 Set A Q.No. 17** What are protein? What happens when protein get heated? [1+1]
20. **2074 Set B Q.No. 16** Write down the structural formula of monosacharides obtained by the hydrolysis of sucrose. [2]
21. **2074 Set B Q.No. 17** Define denaturation of protein. Mention the factors which are responsible for denaturation. [1+1]
22. **2073 Supp Q.No. 18** Name the nitrogen bases present in nucleic acid. [2]
23. **2073 Supp Q.No. 19** What are monosaccharides? Give a structure formula of it. [1+1]
24. **2073 Set C Q.No. 18** **2073 Set D Q.No. 18** Illustrate the formation of peptide bond with an example. [2]
25. **2073 Set C Q.No. 19** What are reducing sugars? Write an example of it. [1+1]
26. **2073 Set D Q.No. 19** What are non-reducing sugars? Write an example of it. [1+1]
27. **2072 Supp. Q.No. 16** What are carbohydrates? Write molecular formula of a disaccharides. [1+1]
28. **2072 Supp. Q.No. 17** Define the terms: [1+1]
    i. Co-enzyme ii. Protein
29. **2072 Set C Q.No. 16** **2070 Set C Q.No. 17** What are disaccharides? What happens when they get hydrolysed? [1+1]
30. **2072 Set C Q.No. 17** Write an example of simple lipid. What happens when lipid gets hydrolysed? [1+1]
31. **2072 Set D Q.No. 16** Define the terms: [1+1]
    i. Zwitter ions ii. denaturation of protein
32. **2072 Set D Q.No. 17** What is saponification? Give an example of it. [1+1]
33. **2072 Set E Q.No. 16** Define sugar and non-sugar with an example of each. [2]
34. **2072 Set E Q.No. 17** What are essential and non-essential amino acids? Give examples in each case. [1+1]
35. **2071 Supp. Q.No. 16** Distinguish between monosaccharides and diasaccharides with an example of each. [1+1]
36. **2071 Supp. Q.No. 17** Why are amino acids amphoteric? [2]
37. **2071 Set C Q.No. 16** Write an example of each of the following [4×0.5]
    i. reducing sugar ii. simple lipid
    iii. non-sugar iv. disaccharide
38. **2071 Set C Q.No. 17** Name a simple lipid. What happens when simple lipid gets hydrolysed. [1+1]
39. **2071 Set D Q.No. 17** What is meant by peptide bond? Write an example of dipeptide. [1+1]
40. **2070 Supp. Q.No. 16** Write molecular formula of each of the followings. [1+1]
    i. Simple lipid ii. Dipeptide
41. **2070 Supp. Q.No. 18** Name the products obtained by the hydrolysis of cane sugar. What is meant by invert sugar? [1+1]
42. **2070 Set C Q.No. 16** Define essential and non-essential amino-acid with an example of each. [1+1]
43. **2070 Set D Q.No. 17** What is a peptide linkage? Give an example of dipeptide. [1+1]
44. **2069 Set A Q.No. 16** What happens when fat gets hydrolysed. [2]
45. **2069 Set A Q.No. 17** What is denaturation of protein? Give an example: [2]
46. **2069 Set B Q.No. 18** What are lipids? Give one example of it. [1+1]
47. **2069 Set B Q.No. 19** Mention one example of each of sugar and non-sugar. [1+1]
48. **2069 Supp. Set B Q.No. 18** What happens when; [1+1]
    i. fats get hydrolysed ii. Protein is heated
49. **2069 Supp. Set B Q.No. 19** What are disachharides? Write an example of non-sugar. [1+1]
50. **2068 Q.No. 8** What is meant by simple protein? Give an example of it. [1+1]
51. **2068 Q.No. 12** How would you obtain glucose from cane sugar? [2]
52. **2067 Q.No. 10** Define following terms with correct example of each. [1+1]
    i. Sugar ii. Non-sugar
53. **2067 Q.No. 11** What are the constituent of nucleic acid? [2]
54. **2066 Q. No. 11** What is different between essential and non-essential amino acids? [2]
55. **2066 Q. No. 12** How do glucose and fructose differ in their functional group? [2]
56. **2065 Q.No. 11** Name any four nitrogen bases present in nucleic acid. [2]
57. **2065 Q.No. 12** What are the essential conditions of denaturation of Protein? [2]
58. **2064 Q.No. 9(i)** Define lipid. [2]
59. **2064 Q.No. 9(ii)** Name the pyrimidine bases found in RNA. [2]
60. **2064 Q.No. 10(i)** What happens when a disaccharide is hydrolysed. [2]
61. **2064 Q.No. 10(ii)** What happens when a protein is denatured. [2]
62. **2063 Q.No. 11** What is meant by peptide bond? Write the structure of dipeptide. [2]
63. **2063 Q.No. 12** **2062 Q.No. 12** Point out any two differences between RNA and DNA molecules. [2]
64. **2062 Q.No. 11** Define protein. What is meant by denaturation of protein? [2]
65. **2061 Q.No. 8** Explain how amino acids are combined to form a protein molecule? [2]

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66. 2061 Q.No. 9 Distinguish both chemically and physically between a fat and a vegetable oil. [2]
67. 2061 Q.No. 10 What is the role of hydrogen bonding in the structure of DNA? [2]
68. 2060 Q.No. 10 Define Protein and Lipid. [2]
69. 2060 Q.No. 12 Write the open chain structure of glucose and fructose [2]
70. 2059 Q.No. 9 Write the names and structures of monosaccharides produced by the hydrolysis of cane sugar.[2]
71. 2059 Q.No. 10 What happens when a protein is denatured?[2]
72. 2058 Q.No. 9 Write the names of two pyrimidine bases present in RNA and DNA molecules. [2]
73. 2058 Q.No. 10 2057 Q.No. 9 What is a peptide bond? Write an example of a dipeptide. [2]
74. 2057 Q.No. 10 What happens when oil is hydrogenated? [2]
75. 2055 Q.No. 19 What are enzymes and what are their role in the body? [2]
76. 2055 Q.No. 20 What are two differences between DNA and RNA. [2]
77. 2054 Q.No. 18 What are carbohydrates? Give two examples. [2]
78. 2053 Q.No. 8 What is soap? How is soap obtained from fat?[2]
79. 2053 Q.No. 9 Give the main functions of carbohydrates for living beings. [2]
80. 2052 Q.No. 13 Classify carbohydrates and give an example for each. [2]
81. 2052 Q.No. 14 Give a chemical reaction for hydrolysis of dipeptide. [2]
82. 2052 Q.No. 15 Name four types of base residues present in DNA. [2]
83. 2052 Q.No. 16 What is saponification? [2]
84. 2052 Q.No. 17 What happens when protein is (a) Heated (b) Hydrolysed. [2]

UNIT 17: CHEMISTRY IN SERVICE TO MANKIND

Very Short Answer Questions [2 marks]

1. 2077 Set V Q.No. 7 Give structural formula and a major use of an antipyretics drug. [1+1]
2. 2076 GIE Set A Q.No. 18 Mention an important function of each of the following: [2]
   i. NPK fertilizer ii. fungicides
   iii. Analgesics iv. broad spectrum antibiotics
3. 2076 GIE Set A Q.No. 19 Define condensation polymerization. Write an example of such polymer. [1+1]
4. 2076 GIE Set B Q.No. 18 What is an azodye? Write one example with its structure. [1+1]
5. 2076 GIE Set B Q.No. 19 Name any two synthetic polymers specifying the monomer of each. [1+1]
6. 2076 Set B Q.No. 18 Mention an important function of each of the following: [0.5×4=2]
   i. DDT ii. Nitrogen fertilizer
   iii. Broad spectrum antibiotics
   iv. Tranquilizers
7. 2076 Set B Q.No. 19 What is meant by homo... polymerization? Write an example of such polymer. [1+1]
8. 2076 Set C Q.No. 18 Mention an important function of each of the following: [0.5×4=2]
   i. DDT ii. Nitrogen fertilizer
   iii. Tranquilizers iv. Broad spectrum antibiotics
9. 2076 Set C Q.No. 19 Name the monomers of bakelite and state the polymerization process of it. [1+1]
10. 2075 GIE Q.No. 16 Name the monomers which on polymerization yields polyamide. What type of polymerization is this? [1+1]
11. 2075 GIE Q.No. 17 Mention an example of each of: [0.5×4]
    i. Antipyretic ii. Pesticides
    iii. Analgesics iv. Phosphatic fertilizer
12. 2075 Set A Q.No. 16 Name the monomers which on polymerization yields bakelite. What type of polymerization is this? [1+1]
13. 2075 Set A Q.No. 17 Give an important use of each of the followings: [0.5×4]
    i. Weedicides ii. Antibiotics
    iii. Analgesics iv. Nitrogen fertilizer
14. 2075 Set B Q.No. 18 Distinguish between homopolymer and co-polymer with an example of each. [1+1]
15. 2075 Set B Q.No. 19 What are antipyretic drugs? Give the name and structure of an antipyretic drug. [1+1]
16. 2074 Supp. Q.No. 18 Name with the structures the monomers of [1+1]
    i. Bakelite ii. PVC
17. 2074 Supp. Q.No. 19 2074 Set B Q.No. 19 Mention an important use of each of the following. [0.5 × 4 = 2]
    i. Antipyretic drug ii. BHC
    iii. Herbicides iv. NPK fertilizers
18. 2074 Set A Q.No. 18 Write an example of each of condensation polymer and an addition polymer. What are their monomers? [1+1]
19. 2074 Set A Q.No. 19 Mention an important use of each of the following [0.5 × 4]
    i. Analgesic drug ii. Herbicides
    iii. BHC iv. Nitrogen fertilizer
20. 2074 Set B Q.No. 18 Name a condensation polymer and an addition polymer. What are the structures of their monomers? [1+1]
21. 2073 Supp Q.No. 16 Distinguish between addition polymer and condensation polymer with an example of each. [1+1]
22. 2073 Supp Q.No. 17 What is meant by synthetic dye? Write a structure of it. [1+1]
23. 2073 Set C Q.No. 16 Distinguish between synthetic polymer and natural polymer with an example of each. [1+1]
24. 2073 Set C Q.No. 17 What is meant by antipyretic drug? Write a structure of it. [1+1]
25. 2073 Set D Q.No. 16 Distinguish between homopolymer and co-polymer with an example of each. [1+1]

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26. 2073 Set D Q.No. 17 Write down the structure of [1+1]
i. aspirin
ii. Paracetamole and mention their one use of each.

27. 2072 Supp. Q.No. 18 Give suitable example of each of the following. [2]
i. Homopolymer ii. Co-polymer
iii. Pesticides iv. Synthetic dye

28. 2072 Supp. Q.No. 19 Give structural formula of each of the following: [2]
i. antibiotic drug ii. antipyretic drug

29. 2072 Set C Q.No. 18 Write down the molecular formula of monomers of [1+1]
i. Bakelite ii. Nylon-6,6

30. 2072 Set C Q.No. 19 Mention an important use of each of the followings: [0.5×4]
i. Antiseptics ii. Antibiotics
iii. Germicides iv. Herbicides

31. 2072 Set D Q.No. 18 Write down the molecular formula of monomers of: [1+1]
i. Bakelite ii. Nylon - 6,6

32. 2072 Set D Q.No. 19 Write down the structural formula of each of the following: [0.5×4]
i. azo-dye ii. analgesic drug
iii. pesticides iii. nitrogen fertilizer

33. 2072 Set E Q.No. 18 What type of polymer is bakelite? Mention its monomers. [1+1]

34. 2072 Set E Q.No. 19 Name any two fertilizers which supply potassium and nitrogen to the plants. [1+1]

35. 2071 Supp. Q.No. 18 2070 Supp. Q.No. 17 Distinguish between addition and condensation polymers with an example of each. [1+1]

36. 2071 Supp. Q.No. 19 What is meant by analgesics? Write an example of it. [1+1]

37. 2071 Set C Q.No. 18 What is meant by Co-polymer? Name a Co-polymer and monomers associated with it. [1+1]

38. 2071 Set C Q.No. 19 Define antiseptics giving a suitable example. [1+1]

39. 2071 Set D Q.No. 18 Write the monomers of: [1+1]
a. Nylon – 6,6 b. Bakelite

40. 2071 Set D Q.No. 19 Mention suitable use of each of: [1+1]
a. antipyretics b. pesticides

41. 2070 Supp. Q.No. 19 Mention a suitable example of each: [4 ×0.5]
i. antibiotics ii. phosphatic fertilizer
iii. herbicides iv. insecticides

42. 2070 Set C Q.No. 18 What are insecticides? Give an example. [1+1]

43. 2070 Set C Q.No. 19 Name any one condensation polymer and addition polymer. What are their monomers? [1+1]

44. 2070 Set D Q.No. 18 What are chemical fertilizers? Give two examples. [1+1]

45. 2070 Set D Q.No. 19 Write a method of preparation of each of the following polymers:
i. Bakelite ii. PVC [1 + 1]

46. 2069 Set A Q.No. 18 Name the monomers of (i) bakelite (ii) Nylon-6,6 [1+1]

47. 2069 Set A Q.No. 19 Give the name of any two insecticides with their chemical formulae. [2]

48. 2069 Set B Q.No. 16 What are the starting materials for preparing the followings:
i. polyvinyl chloride ii. Bakelite [1+1]

49. 2069 Set B Q.No. 17 Distinguish between antipyretics and analgesics with an example of each. [1+1]

50. 2069 Supp. Set B Q.No. 16 Name of the monomers of baketile and what type of polymer is bakalite. [1+1]

51. 2069 Supp. Set B Q.No. 17 Write an example of each of the followings. [0.5×4]
i. Synthetic dye ii. insecticides
iii. phosphatic fertilizer iv. antipyretic drug

52. 2068 Q.No. 10 Give the names of one natural and one synthetic polymer. What are the monomers present in them? [1+1]

53. 2068 Q.No. 11 What are antibiotics? Give an example of broad spectrum antibiotic. [1+1]

54. 2067 Q.No. 9 Name the monomer which on polymerization can give benzene. What type of polymerization is this? [1+1]

55. 2067 Q.No. 12 Distinguish between antibiotic and antiseptics with one example of each. [1+1]

56. 2066 Q. No. 9 Mention one examples of each of the followings: [2]
i. Mixed Fertilizer ii. Analgesic Drug
iii. Antiseptic iv. Azo-dye

57. 2066 Q. No. 10 Classify polymers on the basis of monomer unit. [2]

58. 2065 Q.No. 9 What is meant by condensation polymer? Write an example of it. [2]

59. 2065 Q.No. 10 Give an example of each of the following. [2]
i. Antipyretic drug ii. Phosphorus fertilizer
iii. Disaccharide iv. Insecticide

60. 2064 Q.No. 11 Name any two synthetic polymers specifying the monomers of each. [2]

61. 2064 Q.No. 12 Write any two examples of azo-dyes with their formulae. [2]

62. 2063 Q.No. 9 What are natural and synthetic dyes? Give one example of each. [2]

63. 2063 Q.No. 10 Write an example of each of the following with their formula.
i. A synthetic fertilizer ii. An insecticide [2]

64. 2062 Q.No. 9 2061 Q.No. 11 2060 Q.No. 9 What are insecticides? Write any two example of insecticides. [2]

65. 2062 Q.No. 10 What is an antipyretic drug? Write an example with its structure. [2]

66. 2061 Q.No. 12 What is meant by a synthetic fertilizer? Write the formula of any two synthetic fertilizers. [2]

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67. 2060 Q.No. 11 Specify the monomers of Bakelite and Nylon-6,6. [2]
68. 2059 Q.No. 11 Give an example each from analgesic and antipyretic drugs. [2]
69. 2059 Q.No. 12 What is an azo dye? Give one example with structure. [2]
70. 2058 Q.No. 11 Give an example of azodye and write its structure. [2]
71. 2058 Q.No. 12 Define polymerization and write an example. [2]
72. 2057 Q.No. 11 Give the name and structure of an antipyretic drug. [2]
73. 2057 Q.No. 12 Name the monomers of Bakelite and Nylon-6, 6. [2]
74. 2056 Q.No. 10 Give two characteristics of a Dye. [2]
75. 2055 Q.No. 18 Name any two synthetic polymers. [2]
76. 2054 Q.No. 19 What is the difference between an antiseptic and an antipyretic drug? [2]
77. 2053 Q.No. 10 What is an azo dye? [2]

UNIT 18: HEAVY METALS
18.1. COPPER

Very Short Answer Questions

1. 2074 Supp. Q.No. 20 2074 Set A Q.No. 20 Give the balanced chemical reaction for the preparation of black oxide from blue vitriol. How is black oxide converted into red oxide? [1+1]
2. 2074 Set B Q.No. 20 Give the balanced chemical reaction for the preparation of copper sulphate from copper. What happens when blue vitriol is heated at 100°C? [1+1]
3. 2073 Supp Q.No. 20 What happens when copper sulphate solution is treated with ammonia solution? [2]
4. 2073 Set C Q.No. 20 Starting from copper how would you obtain blue vitriol? [2]
5. 2073 Set D Q.No. 20 Write the action of heat on blue vitriol. [2]
6. 2072 Supp. Q.No. 21 Write down the molecular formula of: [2]
   i. Copper pyrite ii. Calamine
   iii. Calomel iv. Cinnabar
7. 2072 Set C Q.No. 21(ii) Give reason: Metalic copper turns black when exposed to moist air? [1]
8. 2071 Supp. Q.No. 21i 2071 Set D Q.No. 21 a Write an important use of red oxide. [0.5]
9. 2071 Supp. Q.No. 21 iii 2071 Set D Q.No. 21 c Write an important use of blue vitriol. [0.5]
10. 2071 Set C Q.No. 21 What is meant by copper matte? [2]
11. 2070 Set C Q.No. 22 Write a reaction for the preparation of each of the following: [1+1]
    i. CuO ii. Cu_2O.
12. 2069 Supp. Set B Q.No. 22 How is red oxide of copper converted into black oxide and vice versa? [1+1]
13. 2062 Q.No. 28a Copper sulphate crystal turns white powder on heating. [1]
14. 2062 Q.No. 28c A brown gas is obtained when copper is treated with conc. nitric acid. [1]
15. 2062 Q.No. 28 (d) Copper becomes green when exposed to air for long time. [1]
16. 2060 Q.No. 18 A light blue colored precipitate 'A' obtained by the addition of caustic soda in the solution of cupric sulphate is converted to a black precipitate 'B' on heating. What are 'A' and 'B'? [2]
17. 2059 Q.No. 16 Write a compound of Cu (II) which is insoluble in water but soluble in dilute acid without effervescence. [2]
18. 2058 Q.No. 14 What happens when NH_3 is passed over red hot CuO. [2]
19. 2057 Q.No. 18 Name two important ores of copper with formulae. [2]
20. 2056 Q.No. 18 Group B Give any one method of conversion of cupric sulphate into cuprous oxide with chemical equations. [2]
21. 2054Q.No. 27(b) Ammonium hydroxide is added to a solution of copper sulphate. [1]
22. 2051 Q.No. 7(c) A copper coin is dropped into concentrated nitric acid in a test tube. [1]
23. 2053 Q.No. 2 Group A When copper wire is put into a solution of silver nitrate beautify crystals are deposited on the surface of the copper. What are these crystals chemically? Write the reaction involved. [2]
24. 2053 Q.No.7(c) Copper turning is treated with conc. HNO_3. [1]
25. 2053 Q.No. 18 Group A 2053 Q.No. 18 Group A What is the effect of heat on copper sulphate penta-hydrate? [2]

Short Answer Questions

26. 2077 Set W Q.No. 8 How is blister copper extracted from its pyrite ore? [5]
27. 2076 Set B Q.No. 26 2076 Set C Q.No. 33ii 2074 Set B Q.No. 26 2072 Supp. Q.No. 26 2072 Set C Q.No. 26 2072 Set D Q.No. 26 2072 Set E Q.No. 29 2070 Supp. Q.No. 29 2069 Supp. Set B Q.No. 29 How is blister copper extracted from copper pyrites? [5]
28. 2070 Set D Q.No. 29 2069 Set A Q.No. 23 2069 Set B Q.No. 29 2068 Q.No. 29 OR 2065 Q. No. 28 Write the preparations, properties and uses of Blue vitriol. [5]
29. 2067 Q.No. 29 How would you convert copper blue vitriol? Name any one alloy of each of: [4+1]
    i. Copper and Zinc. ii. Copper and tin.
30. 2063 Q.No. 31 How is metal copper extracted from its pyrite ore? How is it refined? Rite the action of it upon: (i) moist air and (ii) Conc. H_2SO_4 [5]

Ans: (i) $2Cu + H_2O + CO_2 + O_2 \rightarrow CuCO_3 . Cu(OH)_2$ (green basic carbonate)
(ii) SO_2 is produced. $Cu + H_2SO_4 \rightarrow CuSO_4 + 2H_2O + SO_2$

Long Answer Questions

31. 2066 Q.No. 32 Starting from copper pyrite, how would you obtain pure copper? Explain the steps involved in the process with necessary diagram for it. Give the chemical reaction for the followings:
    i. Copper is exposed to moist air.
    ii. Conversion of copper into blue vitriol. [7+1+2]

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32. 2064 Q.No. 32 How is blister copper extracted from copper pyrite? How does the metal react with:
a. moist air b. conc. H_2SO_4
c. conc HNO_3
Mention the important uses of the metal. [6+3+1]

33. 2060 Q.No. 30 How is pure copper extracted from copper pyrite? Discuss its metallurgical operations with necessary chemical reactions and diagrams. [10]

34. 2059 Q.No. 28 Write a method of preparation of blue vitriol. Describe its action with [1+2+2]
i. ammonia solution till excess
ii. aqueous potassium iodide

35. 2057 Q.No. 32 How is metal copper extracted from its sulphide ore? How is it refined? [7+3]

36. 2056 Q.No. 31 How is blister copper extracted starting from concentrated copper pyrites one? How is it refined electrolytically? [8+2]

37. 2055 Q.No. 31(c)2057 Q.No. 33(b) Write short notes on: Chemistry of Blue Vitriol. [5]

38. 2053 Q.No. 2 Group B Point out the important processes involved in the extraction of copper from its sulphide ore. [5]

Write Short Notes on [5marks]

39. 2077 Set P Q.No. 12iii 2076 GIE Set B Q.No. 33iv 2075 Set A Q.No. 33iii 2070 Set C Q.No. 33 a Chemistry of blue vitriol. [5]

40. 2076 GIE Set A Q.No. 33i 2075 GIE Q.No. 33iv 2075 Set B Q.No. 33i 2074 Supp. Q.No. 33(i) 2074 Set A Q.No. 33b 2073 Supp Q.No. 33i 2073 Set C Q.No. 33i 2073 Set D Q.No. 33i 2071 Supp. Q.No. 33d 2071 Set C Q.No. 33 d Extraction of blister copper from copper pyrites. [5]

41. 2071 Set D Q.No. 33 d Chemistry of black oxide of copper. [5]

18.2 ZINC

Very Short Answer Questions [2 marks]

1. 2077 Set P Q.No. 5 What happens when ZnO is,
i. dissolved in excess caustic alkali
ii. heated with cobalt nitrate? [1+1]

2. 2077 Set P Q.No. 7 What happens when zinc white is
i. dissolved in excess caustic alkali?
ii. heated with cobalt-nitrate? [1+1]

3. 2076 GIE Set A Q.No. 20 How is Rinman's green prepared? Write its an important application. [1+1]

4. 2076 GIE Set B Q.No. 20 How is Rinmann's green prepared? Write its two uses. [1+1]

5. 2076 Set B Q.No. 20 How is lithopone prepared? Write its an important application. [1+1]

6. 2076 Set C Q.No. 20 How is granulated zinc obtained? Write its an important application. [1+1]

7. 2075 Set B Q.No. 22 Give balanced chemical equations for the followings. [1+1]
i. Zinc white is heated with cobaltnitrate.
ii. Zinc is exposed to moist air.

8. 2074 Supp. Q.No. 22 2074 Set A Q.No. 22 2074 Set B Q.No. 22 What product would you expect when zinc white is heated with cobalt nitrate? Write an application of the product. [1+1]

9. 2073 Supp Q.No. 21 2073 Set D Q.No. 21 Give reactions for the extraction of metallic zinc from zinc blende. [2]

10. 2073 Set C Q.No. 21 What happens when Zinc white is [1+1]
i. heated
ii. treated with caustic alkali.

11. 2072 Supp. Q.No. 22 Starting from metalic Zinc, how would you prepare white vitriol? [2]

12. 2072 Set C Q.No. 22 2071 Supp. Q.No. 22 2070 Supp. Q.No. 22 What is Rinman's green? Write its important uses. [1+1]

13. 2072 Set E Q.No. 20 What happens when: [1+1]
i. Zinc is exposed to moist air.
ii. What happens when White vitriol is strongly heated.

14. 2071 Set C Q.No. 22 Give a correct balanced chemical reaction for the preparation of [1+1]
a. White vitriol b. Philosopher's wool

15. 2071 Set D Q.No. 22 What happens when zinc white is: [1+1]
a. heated with cobaltnitrate
b. dissolved with caustic alkali

16. 2070 Set C Q.No. 22 Or Write action of heat on white vitriol. [2]

17. 2070 Set D Q.No. 21 What happens when:
i. Zinc white is heated with cobalt nitrate.
ii. Metallic zinc is dissolved in hot conc. NaOH. [1+1]

18. 2069 Set A Q.No. 20 What happens when zinc white is heated? [2]

19. 2069 Set B Q.No. 20 i, ii, iv Write the molecular formula of:
i. Philosopher's wool ii. Rinman's green
iii. Calamine [0.5×3]

20. 2069 Supp. Set B Q.No. 20 How would you obtain white vitriol from zinc? [2]

21. 2068 Q.No. 18 Give the molecular formula of: [0.5×4]
i. Philosopher's wool ii. Calamine

22. 2068 Q.No. 20 What is the action of heat on white vitriol? [2]

23. 2067 Q.No. 19 Why do zinc become dull in contact of moist air? [2]

24. 2066 Q. No. 18i Name one important ore of each of the followings: Zinc [2]

25. 2065 Q.No. 20i Give the balanced chemical equation:
Zinc is dissolved in hot and conc. NaOH solution. [2]

26. 2064 Q.No. 19 Write an important use of each of following substances:
i. calomel ii. green vitriol
iii. Zinc white [2]

27. 2063 Q.No. 19b What happens when: Zinc oxide is heated with cobalt nitrate. [2]

28. 2063 Q.No. 20 Write the formulae of the following ores of metals:
i. Magnetite ii. Calamine [2]

29. 2062 Q.No. 19 What is meant by galvanisation? [2]

30. 2062 Q.No. 20 iii Write an important use of each of the following substances: White vitriol [2]

31. 2061 Q.No. 18 Write the name of two ores of Zinc with their molecular formulae. [2]

32. 2059 Q.No. 20 What action takes place when aqueous sodium hydroxide is added to zinc sulphate solution drop by drop till excess? [2]
33. 2058 Q.No. 19 Name two ores of zinc with their formulae. [2]
34. 2056 Q.No. 6 Why zinc displace copper from copper sulphate solution? [2]
35. 2056 Q.No. 12 Why is zinc not considered as a transition element? [2]
36. 2052 Q.No. 6 b Write action of cobalt nitrate heat on zinc oxide [2]
37. 2052 Q.No. 7 How will you obtain crystals of white vitriol? Give a chemical reaction. [2]

Short Answer Questions [5 marks]

38. 2071 Supp. Q.No. 26 How is zinc extracted from zinc blende? [5]
39. 2069 Set B Q.No. 29 OR Give the chemistry of Zinc white. [5]
40. 2067 Q.No. 27 Starting from zinc blende, how would you obtain pure zinc? What is galvanization? [5]
41. 2066 Q. No. 27 2064 Q.No. 31(iv) Write the chemistry of white vitriol. [5]
42. 2065 Q.No. 27 Explain the principle and process sketching a well-labelled diagram for the extraction of zinc from its ore. What happens when zinc is exposed to moist air? [4+1]
43. 2062 Q.No. 27 Write two chemical reactions for the preparation of Zinc white, and justify its amphoteric nature by giving suitable chemical reactions. Write its one important use. [5]
44. 2061 Q.No. 24 How is Zinc extracted from its ore? [5]
45. 2058 Q.No. 27 Write the preparation, properties and uses of white vitriol. [5]
46. 2054 Q.No. 26 Describe the different steps involved in extraction of zinc from zinc blende. [5]

Long Answer Questions [10 marks]

47. 2056 Q.No. 29 Name the important ores of zinc. Describe the extraction of pure zinc from its sulphide ore. Give the chemistry of white vitriol. [1+4]

Write Short notes on

48. 2075 GIE Q.No. 33iii 2075 Set B Q.No. 33iii 2072 Set C Q.No. 33b 2070 Supp. Q.No. 33 c 2070 Set D Q.No. 33 a 2069 Supp. Set B Q.No. 33 b 2063 Q.No. 31iii 2057 Q.No. 31c Chemistry of white vitriol. [5]
49. 2075 Set A Q.No. 33iv 2074 Set B Q.No. 33d 2070 Set C Q.No. 33 b 2069 Set A Q.No. 33 v 2068 Q.No. 31i 2060 Q.No. 31(ii) Extraction of zinc from zinc blende. [5]
50. 2072 Set D Q.No. 33c 2071 Set C Q.No. 33 c Chemistry of zinc white [5]

18.3 MERCURY

Very Short Answer Questions [2 marks]

1. 2075 GIE Q.No. 20 2075 Set A Q.No. 20 How is Nessler's reagent prepared from corrosive sublimate? Give a Laboratory use of Nessler's reagent. [1+1]
2. 2075 Set B Q.No. 20 What happen when ammonia gas is passed through the aqueous solution of (i) Corrosive sublimate (ii) Calomel. [1+1]
3. 2072 Set C Q.No. 20 Write down a balanced chemical equation for the preparation of calomel. What happens when calomel is treated with ammonia solution? [1+1]
4. 2072 Set D Q.No. 20 What happens when Corrosive sublimate is: [1+1]
   i. treated with excess KI solution?
   ii. heated with excess $SnCl_2$ solution.
5. 2072 Set E Q.No. 21 How would you convert calomel into corrosive sublimate and vice versa giving suitable chemical equations? [1+1]
6. 2071 Supp. Q.No. 21 ii 2071 Set D Q.No. 21 b Write an important use of corrosive sublimate. [0.5]
7. 2071 Supp. Q.No. 21 iv 2071 Set D Q.No. 21 d Write an important use of calomel. [0.5]
8. 2070 Supp. Q.No. 21 Given a balanced chemical equation for the preparation of corrosive sublimate. What is its action on KI solution? [1+1]
9. 2070 Set C Q.No. 21 2070 Set D Q.No. 20 What is Nessler's reagent? How it is prepared? [2]
10. 2069 Set A Q.No. 21 How is corrosive sublimate converted into calomel and vice-versa? [2]
11. 2069 Set B Q.No. 21 How is Nessler's reagent prepared? Give its one use. [1+1]
12. 2069 Supp. Set B Q.No. 21 What is meant by mercury poisoning? [2]
13. 2068 Q.No. 18iii Give the molecular formula of: Nessler's reagent [0.5]
14. 2065 Q.No. 20 ii Give the balanced chemical equation. Corrosive Sublimate reacts with excess KI solution. [2]
15. 2065 Q.No. 18 iv Write any one use of each of the following Calomel [2]
16. 2064 Q.No. 20 Write the action of Mercury with aqua regia. [2]
17. 2062 Q.No. 20 ii Write an important use of each of the following substances: Corrosive sublimate [2]
18. 2061 Q.No. 20 What happens when $HgCl_2$ is allowed to react with $SnCl_2$. [2]
19. 2060 Q.No. 20 How can you obtain calomel from corrosive sublimate and vice versa? [2]
20. 2058 Q.No. 20 What happens when mercuric chloride reacts with excess of KI solution. [2]

Short Answer Questions [5 marks]

21. 2077 Set P Q.No. 10 Write down the chemistry of corrosive sublimate. [5]
22. 2076 GIE Set B Q.No. 29 Describe the extraction of mercury from its cinnabar ore. How is it refined? [4+1]
23. 2076 Set C Q.No. 26 Write the chemistry of corrosive sublimate. [5]
24. 2074 Supp. Q.No. 26 2074 Set A Q.No. 26 Explain the process of extraction of mercury from cinnabar. Why is mercury called quick silver? [4+1]

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25. 2073 Supp Q.No. 28 2073 Set C Q.No. 28 Write down the chemistry of corrosive sublimate. [5]
26. 2073 Set D Q.No. 28 Write down the chemistry of calomel. [5]
27. 2070 Supp. Q.No. 29 OR Explain the process of extraction of mercury from its ore. [5]
28. 2070 Set C Q.No. 26 2069 Set A Q.No. 23 OR How is mercury extracted from Cinnabar? [5]
29. 2070 Set D Q.No. 29 Or How is mercury extracted from its ore and refined? [5]
30. 2069 Supp. Set B Q.No. 29 Or How is mercury extracted from its ore? [5]
31. 2068 Q.No. 27 Write one method of preparation of $HgCl_2$ and Hg_2Cl_2 of each. What happens when an aqueous solution of $HgCl_2$ is treated with: [2+2+1]
    i. an aqueous solution of KI
    ii. an aqueous solution of $SnCl_2$
    What peculiar behaviour does mercury have?
32. 2067 Q.No. 31i Write short notes on chemistry of calomel [5]
33. 2065 Q.No. 31 ii Describe Chemistry of calomel [5]
34. 2064 Q.No. 31(iii) Write short notes on Extraction of Hg. [5]
35. 2057 Q.No. 27 Write two methods of preparation of corrosive sublimate. Give its action upon. [5]
    a. excess of KI and b. NH_3.
36. 2055 Q.No. 24 How is mercury extracted from its ore? [5]
37. 2053 Q.No. 20 How is calomel prepared? Give its important properties and uses. [2]
38. 2052 Q.No. 20 Briefly describe the metallurgy of mercury. [2]

Write Short Notes on

39. 2076 GIE Set A Q.No. 33ii Chemistry of corrosive sublimate. [5]
40. 2076 Set B Q.No. 33ii 2071 Set D Q.No. 33 c 2069 Set B Q.No. 33b Extraction of mercury from cinnabar [5]
41. 2072 Supp. Q.No. iv 2066 Q. No. 31 ii 2063 Q.No. 31(ii) 2059 Q.No. 31(d) 2062 Q.No. 31(b) /2058 Q.No. 31(b) Extraction of mercury. [5]
42. 2072 Set E Q.No. 33(ii) 2061 Q.No. 31(i) 2056 Q.No. 31(b) Chemistry of calomel. [5]
43. 2071 Supp. Q.No. 33c Write short notes on chemistry of corrosive sublimate [5]
44. 2054 Q.No. 30(a) Purification of mercury. [5]

18.4. IRON

Very Short Answer Questions [2 marks]

1. 2076 GIE Set A Q.No. 22 Write the compositions of (i) Stainless steel (ii) Speigeleisen [1+1]
   Ans: Na_2CO_3
2. 2076 GIE Set B Q.No. 22 Write the formula and one use of each: [1+1]
   i. Green vitriol
   ii. Mohr's salt
3. 2076 Set B Q.No. 22 2076 Set C Q.No. 22 What is meant by (i) quenching of steel, (ii) annealing of steel? [1+1]
4. 2075 GIE Q.No. 22 Give the composition and uses of wrought iron. [1+1]
5. 2076 Set A Q.No. 22 Give the compositions and important use of cast iron. [1+1]
6. 2074 Supp. Q.No. 21 Distinguish between quenching and tempering of steel. [1+1]
7. 2074 Set A Q.No. 21 What is the composition of stainless steel? Give an important use of such steel. [1+1]
8. 2074 Set B Q.No. 21 Distinguish between quenching and tempering of steel. [1+1]
9. 2073 Supp Q.No. 22 Name any two important ores of iron. Which parts of Nepal are these ores mainly found? [1+1]
10. 2073 Set C Q.No. 22 Name any two important ores of iron. Which parts of Nepal are these ores mainly found? [1+1]
11. 2073 Set D Q.No. 22 Write down chemical reactions that occur in zone of reduction of blast furnace during extraction of iron. [2]
12. 2072 Supp. Q.No. 20 What is meant by Thomas Slag? Write its one use. [1+1]
13. 2072 Set D Q.No. 22 Write chemical reactions involved in zone of reduction of blast furnace during extraction of iron. [2]
14. 2072 Set E Q.No. 22 2071 Supp. Q.No. 20 What is the composition of stainless steel? Write its uses. [1+1]
15. 2071 Set C Q.No. 20 What is the composition of spiegeleisen? Write its one use. [1+1]
16. 2071 Set D Q.No. 20 What is meant by quenching of steel? [2]
17. 2070 Supp. Q.No. 20 What is the composition of steel? Write its one use. [1+1]
18. 2070 Set C Q.No. 20 Differentiate between cast iron and wrought iron. [2]
19. 2070 Set D Q.No. 22 Why is open-hearth process more advantageous than Bessemer process of manufacture of steel? [2]
20. 2069 Set A Q.No. 22 Write the molecular formula of:
    i. Mohr's salt ii. Green vitriol [1+1]
21. 2069 Set B Q.No. 20 iii Write the molecular formula of: Mohr's salt [1]
22. 2069 Set B Q.No. 22 Write chemical reaction occurring in zone of reduction in the extraction of iron. [2]
23. 2068 Q.No. 19 What is meant by tempering of steel? Mention one important use of tempered steel. [1+1]
24. 2067 Q.No. 20 What reaction occurs in the combustion zone in the blast furnace during extraction of iron? [2]
25. 2066 Q. No. 20 Mention the function of Spiegeleisen in the manufacture of Steel. [2]
26. 2066 Q. No. 18 ii Name one important ore of each of the followings: Iron [2]
27. 2065 Q.No. 19 Define Rusting of iron. [2]
28. 2063 Q.No. 19a What happens when: Few drops of potassium ferrocyanide is added to aqueous solution of $FeCl_3$. [2]
29. 2062 Q.No. 20 iv Write an important use of each of the following substances: Wrought iron [2]
30. 2061 Q.No. 19 Write two methods by which rusting of iron can be prevented. [2]

31. 2060 Q.No. 19 What is tempering of steel? [2]
32. 2059 Q.No. 19 What is stainless steel? [2]
33. 2057 Q.No. 19 Write two methods of prevention of corrosion. [2]
34. 2056 Q.No. 13 What is the function of limestone in the smelting of iron? [2]
35. 2055 Q.No. 10 Give two ways to prevent corrosion. [2]
36. 2054 Q.No. 9 What is a transition element? Mention two of its important characteristics. [2]
37. 2053 Q.No. 17 Give two methods for preventing rusting of iron. [2]
38. 2053 Q.No. 18 Write the principle involved in manufacture of steel by Open Hearth process. [2]

Short Answer Questions [5 marks]

39. 2077 Set V Q.No. 8 2075 GIE Q.No. 26 2075 Set A Q.No. 26 How is steel manufactured by Open-hearth process? [5]
40. 2076 GIE Set A Q.No. 26 Write down the chemistry of rusting theory of iron. [5]
41. 2075 Set B Q.No. 26 How is steel manufactured by Open-Hearth process? Write the composition of stainless steel. [4+1]
42. 2071 Set C Q.No. 28 2071 Set D Q.No. 26 How is cast iron extracted from Iron pyrites? [5]
43. 2067 Q.No. 31 iii Write short notes on manufacture of steel by Open Hearth process. [5]
44. 2065 Q.No. 31 iii Describe the Manufacture of steel by Open-Hearth Process [5]
45. 2064 Q.No. 27 Draw a neat labelled sketch of blast furnace for the extraction of pig iron and write down the chemical reactions involved at different zones. [3+2]
46. 2063 Q.No. 27 How is steel manufactured by Open Hearth process? What is quenching of steel? [5]
47. 2059 Q.No. 27 What is rusting? Describe electrochemical theory of rusting of iron. List any two methods of prevention of rusting. [0.5+3+1.5]
48. 2056 Q.No. 23 How is steel manufactured by Open Hearth process? Mention its advantage over Bessemer process. [5]
49. 2052 Q.No. 21 Explain any four methods for preventing rusting of iron. [5]

Long Answer Questions [10 marks]

50. 2055 Q.No. 29 Describe the extraction of Iron from its principle ores, giving a neat sketch of the furnace used and the probable reactions occurring their in. [5]
51. 2054 Q.No. 29 How is cast iron produced from iron ore? Discuss the reactions involved. [5]

Write short notes on [5 marks]

52. 2077 Set P Q.No. 12i 2076 GIE Set B Q.No. 33iii Manufacture of steel by open hearth process. [5]
53. 2076 Set B Q.No. 33i 2076 Set C Q.No. 33i 2073 Set D Q.No. 33ii 2072 Set C Q.No. 33a 2072 Set D Q.No. 33b 2070 Set D Q.No.33b 069 Set A Q.No.33a 066 Q. No. 31c 060 Q.No. 31c 058 Q.No.31c Chemistry of rusting theory of iron [5]
54. 2074 Supp. Q.No. 33(iii) 2074 Set A Q.No. 33a 2074 Set [illegible] Q.No. 33a 2070 Set C Q.No. 33 a or Theory of corrosion [illegible] iron
55. 2073 Supp Q.No. 33ii 2069 Set B Q.No. 33c 2061 Q.No. 31i Manufacture of steel by Bassemer's process.
56. 2073 Set C Q.No. 33ii 2072 Set E Q.No. 33i 2070 Supp. Q.No. 33d 2069 Supp. Set B Q.No. 33 a 2072 Supp. Q.No. 33ii Manufacture/ Chemistry of steel by Open-hearth process.
57. 2068 Q.No. 31ii Rusting of iron and its prevention.
58. 2055 Q.No. 31(b) Definition and general properties of Transition elements.

18.5. SILVER

Short Answer Questions

1. 2077 Set V Q.No. 5 2077 Set W Q.No. 7 What is meant by frosting of silver? [2]
2. 2076 GIE Set A Q.No. 21 Why is silver nitrate solution used for staining fingers of voters during election? [2]
3. 2076 GIE Set B Q.No. 21 Why is silver nitrate solution protected from sunlight? [2]
4. 2076 Set B Q.No. 21 2076 Set C Q.No. 21 Why is silver nitrate solution used for staining fingers of voters during election? [2]
5. 2075 GIE Q.No. 21 2075 Set A Q.No. 21 What is meant by 'Spongy Silver'? [2]
6. 2075 Set B Q.No. 21 Silver nitrate solution is widely used for staining fingers of voters during electron. Give reason. [2]
7. 2072 Set C Q.No. 21(i) Give reason: Silver nitrate produces permanent black stain on the skin. [1]
8. 2072 Set D Q.No. 21 Why does silver nitrate produces permanent black stain on the skin? Write an important use of silver nitrate. [1+1]
9. 2064 Q.No. 18 Why does Silver nitrate solution produce black-stain on the skin in presence of sun light? [2]
10. 2062 Q.No. 18 What is the action of heat on silver nitrate? [2]
11. 2061 Q.No. 9 (f) What do you mean by noble metals? Give any two examples. [2]
12. 2058 Q.No. 12 What happens when $AgNO_3$ is heated at 450°C. [2]
13. 2055 Q.No.20 Give two uses of silver nitrate. [2]
14. 2053 Q.No. 19 Group A How is presence of halide ions are tested with silver nitrate solution? [2]
15. 2053 Q.No. 22 Group A Why silver ores are leached with metal cyanides for the extraction of silver? [2]
16. 2053 Q.No. 25 What do you mean by noble metals? Name at least three noble metals you know. [2]

Long Answer Questions

17. 2054 Q.No. 25 Give the various steps involved in the extraction of silver from silver glance. [5]

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2077 (Set P)

Time: 1:30 hrs. Full Marks (Condense): 30

Group 'A'

Attempt any five questions. [5×2=10]

1. Illustrate the formation of peptide bond with an example. [2]
2. State Hess's law of constant heat summation. [2]
3. What is the pH of 10^{-9}M HCl? [2]
4. What is the mode of hybridization of B in BF_3. Predict the geometry of such molecule. [1+1]
5. What happens when ZnO is,
   i. dissolved in excess caustic alkali
   ii. heated with cobalt nitrate
6. Write an example of [1+1]
   i. Cannizzaro's reaction
   ii. DNP-test.
7. What happens when zinc white is [1+1]
   i. dissolved in excess caustic alkali?
   ii. heated with cobalt-nitrate?

Group 'B'

Attempt any two questions. [2×5=10]

8. Give the laboratory method of preparation of trichloromethane from ethanol. Why does trichloromethane not give white ppt. with silver nitrate solution? [4+1]
9. Define the terms
   i. Equivalent conductance
   ii. Standard electrode potential.
   The cost of electricity required to deposit 1 g of Mg is Rs. 6. How much would it cost to deposit 10 g of Al? (At. wt of Al = 27) [2+3]
10. Write down the chemistry of corrosive sublimate. [5]

Group 'C'

Attempt any one question. [1×10=10]

11. Define
    i. activation energy
    ii. rate law
    iii. zero-order reaction
    iv. half life of reaction.
    How does surface area and concentration of reactants affect the rate of chemical reaction?
    The experimental data for the reaction $2A + B_2 \longrightarrow 2AB$, are as below:

Expt. no.	(A) molL^{-1}	(B) molL^{-1}	Rate molL^{-1}sec^{-1}
1	0.50	0.50	1.6×10^{-4}
2	0.50	1.00	3.2×10^{-4}
3	1.00	1.00	3.2×10^{-4}

    Calculate the rate of formation of AB when the initial concentrations of (A) and (B) are 2.00 molL^{-1} and 4.00 molL^{-1} respectively. [6+4]
12. Write short notes on any two: [2×5]
    i. Manufacture of steel by open hearth process.
    ii. Gibb's free energy change and prediction for spontaneity of reaction.
    iii. Chemistry of blue vitriol.
    iv. Laboratory method of preparation of anhydrous formic acid.

2077 (Set V)

Time: 1:30 hrs. Full Marks (Condense): 30

Group 'A'

Attempt any five questions. [5×2=10]

1. Write an example of a molecule having trigonal pyramidal geometry. What is the mode of hybridization on central atom of the molecule? [1+1]
2. Calculate the enthalpy of formation in the following reactions:
   i. $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$, $\Delta H = -136$ Kcal
   ii. $H_2(g) + I_2(g) \longrightarrow 2HI(g)$, $\Delta H = -24.8$ Kcal. [1+1]
3. What volume of water should be added to 50 mL of semi normal NaOH solution to make it exactly deci-normal. [2]
4. Give a chemical test to distinguish ethanamine from N-methyl methanamine. [2]
5. What is meant by frosting of silver? [2]
6. Write an example of
   i. Rosennmund's reaction
   ii. Coupling reaction. [1+1]
7. Give structural formula and a major use of an antipyretics drug. [1+1]

Group 'B'

Attempt any two questions. [2×5=10]

8. How is steel manufactured by Open-hearth process? [5]
9. Point out the limitation of Ostwald's dilution law. The solubility product of $BaSO_4$ is 1×10^{-11}. Will precipitate occur or not if equal volume of 2×10^{-3} M $BaCl_2$ solution and 2×10^{-4} M Na_2SO_4 solution are mixed? [1+4]
10. Write down the laboratory method preparation of trichloromethane from ethanol. What product would you obtain when trichloromethane is treated with acetone? [4+1]

Group 'C'

Attempt any one question. [1×10=10]

11. i. How is primary, secondary and tertiary amines separated from their mixture by Hoffmann's method?
    ii. An aliphatic haloalkane Ⓐ gives compound Ⓑ when heated with alc.NaOH. The compound Ⓑ reacts with HBr to give major product Ⓒ. On heating the compound Ⓒ with sodium in presence of dry ether yields 2,3-dimethylbutane. What product would you expect when the compound Ⓑ is subjected to ozonolysis? [5+4+1]
12. Define the terms:
    i. half-life period of reaction ii. rate law
    iii. instantaneous rate iv. zero-order reaction
    How do surface area of reactant and catalyst affect the rate of chemical reaction?
    The experimental data for the reaction $2A + B_2 \rightarrow 2AB$, are as below:

Expt. no.	(A) molL^{-1}	(B) molL^{-1}	Rate molL^{-1}sec^{-1}
1	0.50	0.50	1.6×10^{-4}
2	0.50	1.00	3.2×10^{-4}
3	1.00	1.00	3.2×10^{-4}

    Find overall order of reaction and rate constant. [4+2+4]

2077 (Set W)

Time: 1:30 hrs. **Full Marks (Condense): 30**

Group 'A'

Attempt any five questions. **[5×2=10]**

1. Why has ammonia got trigonal pyramidal geometry though nitrogen shows sp^3 hybridization? [2]
2. How does chloroform react with (i) acetone (ii) silver powder [1+1]
3. What is meant by molar entropy? Write its unit. [1+1
4. What products would you expect at cathode and anode when aqueous NaCl is electrolysed using platinum electrode? [2]
5. Calculate the pH of 1×10^{-3}M KOH. [2]
6. Distinguish between essential and non-essential amino acid. [2]
7. What is meant by frosting of silver? [2]

Group 'B'

Attempt any two questions. **[2×5=10]**

8. How is blister copper extracted from its pyrite ore? [5]
9. Define molality of solution. Calculate molality of one liter of 93% H_2SO_4 solution (weight by volume). The density of the solution is 1.84 g mL^{-1}. [1+4]
10. Write an example of each of the followings: [5]
    i. DNP test
    ii. Rosenmund's reduction
    iii. Aldol condensation
    iv. Tollen's test
    v. Cannizzaro's reaction

Group 'C'

Attempt any one question. **[1×10=10]**

11. a. What are the oxidation products of primary, secondary and tertiary alcohols?
    b. How is pure nitro benzene prepared in the laboratory? [5+5]
12. Define the terms:
    i. activation energy
    ii. half life of a reaction
    iii. rate law
    iv. molecularity of reaction
    v. effective collision
    vi. order of reaction.

    99% of first order reaction is completed in 32 minutes. What time will it take to complete 99.9% of reaction?

    [1+1+1+1+1+1+4]

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Biology
NEW SYLLABUS

Full marks: 100 (75T + 25 P) Pass Marks: 27T + 8P

Course Contents

SECTION A (BOTANY)

Lecture hour: 75 Full marks : 37.5

Unit 1: Anatomy and Physiology of Organisms — LH 27

- **Plant anatomy:** Types of tissues, meristematic and permanent tissues; Internal structure of dicot and monocot root, stem and leaf; Secondary growth of dicot stem.
- **Plant physiology:**
  i. **Water relation:** Osmosis, diffusion, ascent of sap and transpiration.
  ii. **Photosynthesis:** Site of photosynthesis, mechanism and factors affecting photosynthesis.
  iii. **Respiration:** Types of respiration, mechanism and factors affecting respiration.
  iv. **Growth:** Plant growth hormones: Auxins, Gibberellin, Cytokinin.
  v. **Plant movement:** Concept of growth and turgor movement.

Unit 2: Genetics — LH 32

Elements of heredity and variation; Genetic material (DNA and RNA), Genetic code, Gene pool, Genetic expression and its regulation; Basis of Mendelian genetics, Mendel's laws of inheritance, Concept of incomplete dominance and co-dominance, Multiple gene, Linkages, Crossing over, Mutation and its types and polyploidy. Sex-linked inheritance (X-linked gene for eye colour of Drosophila and colour-blindness in man)

Unit 3: Developmental Biology — LH 10

Reproduction and development of angiosperms - Asexual reproduction, Pollination, Development of male and female gametophyte, Fertilization and development of embryo (dicot and monocot)

Unit 4: Application of Biology — LH 6

- Introduction to biotechnology, tissue culture, concept of breeding technique, Disease resistant plants, green manures.
- Genetic engineering and its application
- Fermentation technology: alcoholic and an

tibiotic fermentation.

Unit wise weightage for Botany Grade XII

Title	Teaching hours	Marks		Very short questions (1 mark)	Short questions (3 marks)	Long questions (7.5 or 8 mark)
1. Anatomy and Physiology of Organisms	27	13.5		3	1 or 1 opt	1 or 1 opt (7.5 marks)
2. Genetics	32	16		1 or 1 opt	2 or 1 opt	1 (8 marks)
3. Developmental Biology	10	5		2 or 1 opt	1	×
4. Application of Biology	8	4		1 or 1 opt	1	×
	75	37.5		7 ques×1 mark	5 ques × 3 marks	2 ques × 7.5 marks
		Total		**7 marks**	**15 marks**	**15.5 marks**

SECTION B (ZOOLOGY)

Lecture hours: 75 Full marks : 37.5

Unit 1: Animal tissues — LH 8

Epithelial, connective, muscular and nervous tissues.

Unit 2: Developmental Biology — LH 6

i. Development of frog: Fertilization, cleavage, morulation, blastulation, gastrulation, formation of germinal layers, coelom and tissue formation.
ii. Gametogeneisis in animal.

Unit 3: Human Biology and Health — LH 50

- **Nutrition;** digestive organs and digestion of food.
- Respiratory organs and mechanism.
- **Circulation:** Blood, heart and its action, arterial and venous systems (Major arteries and veins), Blood groups, Rh-factor, Blood pressure and lymph (definition).
- **Excretion:** Excretory organs, mechanism of urine formation, osmoregulation and homeostatic mechanism (temperature regulation, kidney and liver control system).
- **Nervous co-ordination:** Types of nervous system, structure and function of brain, Transmission of nerve impulse.
- **Endocrinology:** Structures, functions and disorders of pituitary, thyroid, parathyroid, pancreas and adrenal glands.

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- **Sense organs:** Structure and function of eye and ear.
- **Reproduction:** Reproductive organs.
- **Human population:** Growth, problem and control strategies.
- **Human Diseases:**
  a. **Socially significant:** Drug abuse, alcoholism and smoking
  b. **Communicable:** Typhoid, Tuberculosis, Ascariasis and AIDS.
  c. **Non - communicable:** Cancer.
  d Concept of kalazar and hepatitis.

Unit 4: Application of Biology LH 11

- Antibiotics Vaccines (Type and application)
- Tissue and organs transplantation
- Test-tube baby
- Amniocentesis
- Introduction to poultry farming and fish farming.

Unit wise weightage for Zoology Grade XII

Title	Teaching hours	Marks		Very short questions (1 mark)	Short questions (3 marks)	Long questions (7.5 or 8 mark)
1. Animal tissues	8	4		1	1	×
2. Developmental Biology	6	3		× or 1 opt	1	×
3. Human Biology and Health	50	24.5		3 or 2 opt	2 or 1 opt	1 (8 marks) or 1 (7.5 marks) or 1 opt
4. Application of Biology	11	6		3	1	×
	75	37.5		7 ques×1 mark	5 ques × 3 marks	2 ques × 7.5 marks
		Total		**7 marks**	**15 marks**	**15.5 marks**

Note: Long question from Development Biology can be asked by reducing the marks from the unit of Human Biology and Health.

Practical

BOTANY

1. **Experiments on plant physiology**
   a. Experiment to demonstrate the process of osmosis.
   b. Experiment to demonstrate the process of ascent of sap.
   c. Experiment to demonstrate the unequal transpiration from two surfaces of dorsiventral leaf.
   d. Experiment to demonstrate the rate of transpiration by Ganong's potometer.
   e. Experiment to demonstrate that the chlorophyll is essential for photosynthesis.
   f. Experiment to demonstrate that the carbon dioxide is essential for photosynthesis.
   g. Experiment to demonstrate the process of evolution of Oxygen during photosynthesis.
   h. Experiment to demonstrate the aerobic and anaerobic respiration.
   i. Study on effect of growth hormones on germination and shoot elongation.
   j. Demonstration of plant tissue culture.
   k. Demonstration of yeast culture.
   l. Preparation of DNA model.
2. **Demonstration of Mendalian genetics using maize cob:**
   i. To demonstrate segregation of characters in a monohybrid cross.
   ii. To demonstrate independent assortment of characters in a dihyrid cross.
3. **Study the permanent slides of different types of simple, permanent and complex plant tissues.**
4. **Demonstration of vegetative propagation.**
5. **Study the permanent slides of:**
   (i) T.S of anther, (ii) L.S of ovule of dicot plant, (iii) Structure of embryo.
6. **Preparation of temporary slide of following plant materials:**
   (i) T.S of dicot root, stem and leaf, (ii) T.S. of monocot root, stem and leaf.

ZOOLOGY

1. **Experiments of biochemistry**
   a. Experiment to demonstrate the action of saliva on starch.
   b. Experiment to detect the presence of starch in a given solution.

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c. Experiment to detect the presence of sugar in urine.
d. Experiment to detect the presence of protein in a given solution (hen's albumen).
e. Study the effect of temperature, ethyl alcohol, and pH on enzymatic action of saliva.
f. Measurement of human blood-pressure with sphygmomanometer.

2. **Study the permanent slides of different types of animal tissues:** Squamous, columnar, cuboidal, areolar, adipose, hyaline and bone.
3. **Study the permanent slides of following histological organs of mammal:** Skin, stomach, intestine, liver, pancreas, kidney, lung, testis and ovary
4. **Study of embryological permanent slides of frog:** Cleavage, blastula and gastrula.
5. **Study the bones of rabbit (articulate and disarticulate) or models of human bones.**
6. **Dissection of a mammal so as to expose its:**
   i. General anatomy;
   ii. Alimentary canal;
   iii. Arterial and venous systems;
   iv. Brain
   v. Reproductive organs

MODEL QUESTION PAPER

Time : 3 hrs. **Full marks: 75** **Pass marks: 27**

Section A (Botany)

1. **Answer any seven questions in very short** **[7×1=7]**
   a. Write the function of xylem?
   b. Name the components of a nucleotide?
   c. Give one example of polygenic inheritance.
   d. Define genetic code.
   e. What is polyploidy?
   f. Mention two importance of vegetative propagation.
   g. Give two examples of entomophilus plants.
   h. Define genetic engineering.
   i. Define tissue culture.
   j. What is the main source of green manures?
2. **Answer any five questions in brief.** **[5×3=15]**
   a. Give the well-labelled diagram of monocot embryo Description is not required.
   b. What are the differences between dicot stem and monocot stem?
   b. Explain the types of transpiration in plants.
   c. Differentiate between phenotype and genotype.
   d. What did you understand by Mendel's 9:3:3:1 ratio?
   e. Differentiate between self and cross fertilization.
   f. Show with the diagrams the development of dicot embryo no description..
   g. Mention the applications of genetic engineering.
3. What is secondary growth? Discuss the activity of cambium in secondary growth of dicot stem. [7.5]

   OR

   Describe the light dependent steps of photosynthesis.
4. "DNA is the hereditary material", explain it with an experiment. [8]

Section B (Zoology)

1. **Answer any seven questions in very short** **[7×1=7]**
   a. In which kind of animal tissue you find the mast cells?
   b. Name the two sexes linked diseases in human.
   c. Define gametogenesis.
   d. Name any two enzymes which are responsible for protein digestion.
   e. Define the term 'deamination'.
   f. Which part of human brain is the centre of intelligence?
   g. Name the causative agent of typhoid fever.
   h. What does ISD cause?
   i. What is the role of surrogate mother in test tube baby?
   j. Differentiate heterograft and autograft.
2. **Answer any five questions in brief.** **[5×3=15]**
   a. Describe the structure of aerolar fissure.
   b. If a red-eyed male Drosophila is mated with a white-eyed female, what will be the pheno type of male and female in F1 progeny?
   c. How is the notochord formed in the embryo of frog?
   d. What is vitamin? Mention functions of fat - soluble vitamins.
   e. Draw a labeled sketch of internal structure of human kidney.
   f. What will be the problems of over human population? Suggest some measures to control over population.
   g. Define amniocentesis. Mention its negative & positive effects?
3. Explain the structure and function of human brain. [8]

   OR

   Explain the respiratory organs of human being.
4. What are communicable diseases? Discuss the causative agents, symptoms, effects and control measures of any one communicable disease you have studied. [7.5]

CHAPTER BASED QUESTIONS

SECTION A (BOTANY)

UNIT 1: ANATOMY AND PHYSIOLOGY OF ORGANISMS

A. Anatomy of Organisms

Very Short Answer Questions [1 mark]

1. 2077 Set R Q.No. 1a Define anatomy. [1]
2. 2076 GIE Set A Q.No. 1a Give the two names of complex permanent tissue. [1]
3. 2076 Set B Q.No. 1f Define tissue. [1]
4. 2076 Set C Q.No. 1a What is apical meristem? [1]
5. 2075 GIE Q.No. 1a Give any two names of xylem elements. [1]
6. 2075 Set A Q.No. 1b Mention the function of sclerenchyma. [1]
7. 2075 Set A Q.No. 1h What is function of lenticel? [1]
8. 2075 Set B Q.No. 1a Define meristematic tissue. [1]
9. 2074 Supp Q.No. 1a Define phloem. [1]
10. 2074 Set A Q.No. 1a What is sclereids? [1]
11. 2074 Set B Q.No. 1a What is the function of xylem? [1]
12. 2073 Supp Q.No. 1a Mention the two names of permanent tissue. [1]
13. 2073 Supp Q.No. 1b Define the role of cambium. [1]
14. 2073 Set C Q.No. 1a What is permanent tissue? [1]
15. 2073 Set D Q.No. 1a Define meristematic tissue. [1]
16. 2072 Supp. Q.No. 1a Mention two elements of xylem. [1]
17. 2072 Set C Q.No. 1a What is apical meristem? [1]
18. 2072 Set D Q.No. 1a What is the role of sclerenchymatous tissue? [1]
19. 2072 Set E Q.No. 1a What is the function of phloem? [1]
20. 2071 Supp. Q.No. 1b Function of collenchyma? [1]
21. 2071 Supp. Q.No. 1f What is callus? [1]
22. 2071 (Set C) Q.No. 1 a Mention two elements of phloem. [1]
23. 2071 (Set D) Q.No. 1 a Define chlorenchyma. [1]
24. 2071 (Set D) Q.No. 1 c Define secondary growth. [1]
25. 2070 Supp. Q.No. 1 a What does it mean by meristematic tissue? [1]
26. 2070 Set C Q.No. 1 a What do you mean by chlorenchyma? [1]
27. 2070 Set D Q.No. 1 a What is sclereids? [1]
28. 2069 Q.No. 1a Define permanent tissue. [1]
29. 2069 Q.No. 1b Mention the role of cuticle? [1]
30. 2068 Q.No. 1a Define sclerenchyma [1]
31. 2067 Q.No. 1a What is sclerenchyma? [1]
32. 2066 Q.No. 1 a What are annual rings? [1]
33. 2065 Q.No. 1 a Name thin walled cells with chloroplast. [1]
34. 2065 Q.No. 1 d Define cambium. [1]
35. 2064 Q.No. 1a Name two elements of xylem bundle. [1]
36. 2064 Q.No. 1b What is semipermeable membrane? [1]
37. 2062 Q.No. 1a Name two complex permanent tissues. [1]
38. 2062 Q.No. 1c What is the role of chlorenchyma? [1]
39. 2062 Q.No. 1e Write full form of T.S. and L.S. [1]
40. 2061 Q.No. 1a Name two elements of phloem bundle. [1]
41. 2061 Q.No. 1c What is the function of cortex? [1]
42. 2060 Q.No. 1h What do you mean by apical meristem? [1]
43. 2059 Q.No. 1a Name any one plant with exarch xylem. [1]
44. 2058 Q.No. 1a Give one example of stem with conjoint and collateral vascular bundle. [1]
45. 2057 Q.No. 1a Give one example with scattered vascular bundle in the stem. [1]

Answer in brief [3 marks]

46. 2077 Set K Q.No. 2a Structure and function of collenchyma. [3]
47. 2077 Set R Q.No. 2a Differentiate between the xylem and phloem tissues. [3]
48. 2076 GIE Set A Q.No. 2a Structure and function of hydathode. [3]
49. 2076 GIE Set B Q.No. 2a Structure and function of cholorenchymatous tissue. [3]
50. 2076 Set B Q.No. 2b Describe the tunica and corpus theory. [3]
51. 2076 Set C Q.No. 2a Structure and function of sclerenchyma. [3]
52. 2076 Set C Q.No. 2b Collateral vascular bundle. [3]
53. 2075 GIE Q.No. 2a Structure and function of chlorenchyma. [3]
54. 2075 Set A Q.No. 2d Complex permanent tissues. [3]
55. 2075 Set A Q.No. 2g Structural and functional aspects of stomata. [3]
56. 2075 Set B Q.No. 2a Structure and function of stomata. [3]
57. 2074 Supp Q.No. 2a Structure and function of sclerenchyma. [3]
58. 2074 Set A Q.No. 2a Structure and function of parenchyma. [3]
59. 2074 Set B Q.No. 2a Structure and function of collenchyma. [3]
60. 2073 Set C Q.No. 2a Structure and function of conjoint vascular bundle. [3]
61. 2072 Supp. Q.No. 2a Structure and function of aerenchyma. [3]
62. 2072 Set C Q.No. 2a Structure and function of stomata. [3]
63. 2072 Set D Q.No. 2a Structure and function of conjoint vascular bundle. [3]
64. 2072 Set E Q.No. 2a Write short notes on sclerenchyma tissue. [3]
65. 2071 Supp. Q.No. 2a Describe complex tissue and its function. [3]
66. 2071 Set C Q.No. 2 a Structure and function of collenchyma. [3]
67. 2071 (Set D) Q.No. 2 a Structure and function of phloem tissue. [3]
68. 2070 Set C Q.No. 2 a Structure and function of parenchyma [3]
69. 2070 Set D Q.No. 2 a Differentiate between spongy and palisade parenchyma. [3]
70. 2069 Q.No. 2b Structure and function of sclerenchymatous tissue. [3]

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1. 2068 Q.No. 2a Structure and function of collenchymatous tissue. [3]
2. 2067 Q.No. 2a Describe in detail about the types and functions of parenchymatous tissue. [3]
3. 2065 Q.No.2 a Differentiate between xylem and phloem tissues. [3]
4. 2064 Q.No.2a Differentiate between the collenchyma and sclerenchyma. [3]
5. 2062 Q.No.2d What are the roles of meristem? [3]
6. 2062 Q.No.2h How xylem differs from phloem? Discuss. [3]
7. 2061 Q.No.2c What is simple permanent tissue of plants? [3]
8. 2060 Q.No. 1i What cell controls the opening and closing of stomata? [3]
9. 2059 Q.No.2a Give the meaning of secondary growth with one example. [3]
10. 2058 Q.No.2j Write about the permanent tissues of plant. [3]

Long Answer Questions

81. 2076 Set B Q.No. 3 Describe the anatomical structure of dicot root and compare it with monocot root. [7.5]
82. 2075 GIE Q.No. 3 Define tissue and describe in detail about structure and function of complex permanent tissues with suitable diagrams. [7.5]
83. 2075 Set B Q.No. 3 Define permanent tissue and discuss the structure and function of simple permanent tissues in detail. [7.5]
84. 2074 Set A Q.No. 3 Define Secondary growth and discuss how meristems are responsible for increase in thickness of dicot stem. [7.5]
85. 2074 Set B Q.No. 3 Define secondary growth and describe the process involved in dicot stem with figure. [7.5]
86. 2073 Supp Q.No. 3 OR Describe the T.S. of monocot and dicot leaf with necessary diagrams. [7.5]
87. 2073 Set C Q.No. 3 Describe and compare the anatomical structure of dicot and monocot stem with neat and clean diagrams. [7.5]
88. 2073 Set D Q.No. 3 Describe and compare anatomical structure of dicot and monocot root with neat and clean diagrams. [7.5]
89. 2072 Set C Q.No. 3 Describe the T.S. of dicot stem with well labelled diagrams and compare it with monocot stem also. [7.5]
90. 2072 Set D Q.No. 3 What is secondary growth? Describe the process involved in dicot stem with necessary diagrams. [7.5]
91. 2072 Set E Q.No. 3 What is secondary growth? Describe the process of secondary growth in dicot stem.. [7.5]
92. 2071 Supp. Q.No. 3or Explain with well labelled figure of T.S. of monocot stem and discuss why secondary growth does not take place in monocot plants. [7.5]
93. 2071 (Set C) Q.No. 3 OR Describe the T.S. of monocot and dicot leaf with necessary diagram. [7.5]
94. 2071 (Set D) Q.No. 3 Draw a well labeled diagram of T.S. of monocot stem and point out its differences with dicot stem. [7.5]
95. 2070 Supp. Q.No. 3 Describe the T.S. of monocot stem with well labeled diagram and point out its differences with that of dioct stem. [7.5]
96. 2070 Set C Q.No. 3 Describe the T.S. of monocot stem with well labelled diagram and point out its differences with that of dicot stem. [7.5]
97. 2070 Set D Q.No. 3 or Describe the T.S. of monocot stem with well labelled diagram and point out its differences with that of dicot stem. [7.5]
98. 2069 Q.No. 3 Define secondary growth and describe its processes involved in dicot stem with necessary figures. [7.5]
99. 2068 Q.No. 3 Draw a well labeled diagram of T.S. of dicot stem and point out its differences with monocot stem. [7.5]
100. 2067 Q.No. 3a Draw a well labelled diagram of T.S. of dicot root and point out its differences with that of monocot root. [7.5]
101. 2066 Q.No. 3 Describe the internal structure of the monocot stem with the help of a well labelled diagram. [7.5]
102. 2065 Q.No. 4 Draw a neat, well labelled diagram of T.S. of dicot stem and point out its differences with that of monocot stem. [8]
103. 2064 Q.No. 3 What is secondary growth? Describe the process of secondary growth in dicot stem. [7.5]
104. 2063 Q.No. 3 OR What is secondary growth? How the meristems are responsible for secondary growth? Discuss. [7.5]
105. 2062 Q.No. 3 Describe and compare the anatomical structures of dicot and monocot roots. [7.5]
106. 2061 Q.No. 3 Discuss the anatomical structure of dicot stem. [7.5]
107. 2060 Q.No. 3 Discuss the anatomical structure of dicot root. Point out the nature of its vascular bundle. [7.5]
108. 2059 Q.No. 3 Discuss anatomical features of a typical dicot stem and point out any four important differences with the monocot type. [5+2]
109. 2057 Q.No. 3 What do you mean by permanent plant tissues? Discuss the structure and functions of simple permanent tissues. [1+3+3]

B. Physiology of Organisms

Very Short Answer Questions [1 mark]

1. 2077 Set J Q.No. 1a Define cross pollination. [1]
2. 2077 Set K Q.No. 1a Define guttation. [1]
3. 2077 Set R Q.No. 1c Define photo phosphorylation. [1]
4. 2076 GIE Set A Q.No. 1b Define epidermis. [1]
5. 2076 GIE Set A Q.No. 1c What is geotropism? [1]
6. 2076 GIE Set B Q.No. 1b Define thigmotropism. [1]
7. 2076 GIE Set B Q.No. 1c What does it mean by hydathode? [1]
8. 2076 Set B Q.No. 1a What is the major product of C_3 cycle? [1]
9. 2076 Set B Q.No. 1j Define turgor pressure. [1]
10. 2076 Set C Q.No. 1b Define plasmolysis. [1]
11. 2076 Set C Q.No. 1c Where does auxin synthesize? [1]
12. 2075 GIE Q.No. 1b Define diffusion. [1]
13. 2075 GIE Q.No. 1c What is geotropism? [1]
14. 2075 Set A Q.No. 1a Define transcription. [1]
15. 2075 Set A Q.No. 1c What is imbibition? [1]
16. 2075 Set B Q.No. 1b What is imbibition? [1]

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17. 2075 Set B Q.No. 1c Mention the two names of plant hormone. [1]
18. 2074 Supp Q.No. 1b What is phosphorylation? [1]
19. 2074 Supp Q.No. 1c Mention about auxin. [1]
20. 2074 Set A Q.No. 1b Define ATP? [1]
21. 2074 Set A Q.No. 1c What dose it mean by photoperiodism? [1]
22. 2074 Set B Q.No. 1b Define glycolysis. [1]
23. 2074 Set B Q.No. 1c What do you mean by phototropism? [1]
24. 2073 Supp Q.No. 1c What do you mean by phototropism? [1]
25. 2073 Supp Q.No. 2a Structure and function of Hydathode. [3]
26. 2073 Set C Q.No. 1b Define transpiration. [1]
27. 2073 Set C Q.No. 1c What is the role of hormone? [1]
28. 2073 Set D Q.No. 1b What is turgidity? [1]
29. 2073 Set D Q.No. 1c Give two names of plant hormone. [1]
30. 2072 Supp. Q.No. 1b Define aerobic respiration. [1]
31. 2072 Supp. Q.No. 1c What do you mean by chemotropism? [1]
32. 2072 Set C Q.No. 1b Define phototropism. [1]
33. 2072 Set C Q.No. 1c What does it mean by deplasmolysis? [1]
34. 2072 Set D Q.No. 1b Define geotropism. [1]
35. 2072 Set D Q.No. 1c What does it mean by plasmolysis? [1]
36. 2072 Set E Q.No. 1b What is ascent of sap? [1]
37. 2071 Supp. Q.No. 1d What is osmosis? [1]
38. 2071 Supp. Q.No. 1a What is light reaction? [1]
39. 2071 (Set C) Q.No. 1 b Define transpiration. [1]
40. 2071 (Set C) Q.No. 1 c What do you mean by hydrotropism? [1]
41. 2071 (Set D) Q.No. 1 b What is diffusion? [1]
42. 2070 Supp. Q.No. 1 b Define turgidity. [1]
43. 2070 Supp. Q.No. 1 c Mention two plant hormones. [1]
44. 2070 Set C Q.No. 1 b Define osmotic pressure. [1]
45. 2070 Set C Q.No. 1 c What is hormone? [1]
46. 2070 Set D Q.No. 1 b Define ascent of sap. [1]
47. 2070 Set D Q.No. 1 c Mention two plant hormones. [1]
48. 2069 Q.No. 1c What does it mean by plasmolysis? [1]
49. 2068 Q.No. 1b What is osmosis? [1]
50. 2068 Q.No. 1c What is the function of hydathode? [1]
51. 2067 Q.No. 1b Define the term diffusion? [1]
52. 2067 Q.No. 1c What is phototropism? [1]
53. 2066 Q.No. 1 b Define phototropism. [1]
54. 2066 Q.No. 1 e Write full form of NADP. [1]
55. 2065 Q.No. 1 b What happens when a turgid cell is placed in hypertonic solution? [1]
56. 2065 Q.No. 1 c What are different types of photosynthetic pigments? [1]
57. 2064 Q.No. 1c Write full form of ATP. [1]
58. 2064 Q.No. 1d What is parthenocarpic fruit? [1]
59. 2062 Q.No. 1b What is the role of ethylene? [1]
60. 2062 Q.No. 1o What is the role of guard cell? [1]
61. 2061 Q.No. 1 b What is apical dominance? [1]
62. 2061 Q.No. 1o What is the role of hydathode? [1]
63. 2060 Q.No. 1i What is photophosphorylation? [1]
64. 2060 Q.No. 1j Where do auxins are synthesized? [1]
65. 2060 Q.No.2i How does transpiration differ from guttation? [1]
66. 2058 Q.No. 1c Name the plant hormone affecting seed germination. [1]
67. 2058 Q.No. 1h Mention the function of lateral meristem. [1]
68. 2057 Q.No. 1c Which plant hormone promotes leaf and fruit fall? [1]

Answer all in brief [3 marks]

69. 2077 Set J Q.No. 2a Describe the physiological effects of auxin on plants. [3]
70. 2076 GIE Set A Q.No. 2b Internal factors of photosynthesis. [3]
71. 2076 GIE Set B Q.No. 2b Importance of auxins. [3]
72. 2076 Set B Q.No. 2a Significances of respiration. [3]
73. 2075 GIE Q.No. 2b Factors affecting respiration. [3]
74. 2075 Set A Q.No. 2e Stomatal transpiration. [3]
75. 2075 Set B Q.No. 2b Kinds of transpiration. [3]
76. 2074 Supp Q.No. 2b Anaerobic respiration. [3]
77. 2074 Set A Q.No. 2b Factors affecting transpiration. [3]
78. 2074 Set B Q.No. 2b Stomata and its functions. [3]
79. 2073 Supp Q.No. 2b Characteristics of C_3 plants with examples. [3]
80. 2073 Set C Q.No. 2b Significance of photosynthesis. [3]
81. 2073 Set D Q.No. 2a Structure and function of stomata. [3]
82. 2073 Set D Q.No. 2b External factors of transpiration. [3]
83. 2072 Supp. Q.No. 2b Differentiate between osmosis and diffusion. [3]
84. 2072 Set C Q.No. 2b Light reaction. [3]
85. 2072 Set D Q.No. 2b Anaerobic respiration. [3]
86. 2072 Set E Q.No. 2b Discuss the physiological significance of auxins. [3]
87. 2071 Supp. Q.No. 2b What is the function of Gibberellin in plant? [3]
88. 2071 (Set C) Q.No. 2 b Characteristics of C_4 plants with examples. [3]
89. 2071 (Set D) Q.No. 2 b Describe the use of cytokinins. [3]
90. 2071 (Set D) Q.No. 2 c Differentiate between DNA and RNA. [3]
91. 2070 Supp. Q.No. 2 a Structure of stomata and its mechanism. [3]
92. 2070 Supp. Q.No. 2 b Steps of dark reaction. [3]
93. 2070 Supp. Q.No. 2 c An artificial respiration. [3]
94. 2070 Set D Q.No. 2 b Process of glycolysis. [3]
95. 2069 Q.No. 2c External factors affecting the photosynthesis. [3]
96. 2068 Q.No. 2b Describe the anaerobic respiration. [3]
97. 2067 Q.No. 2b Describe the uses of cytokinin. [3]
98. 2066 Q.No. 1 d Highlight the importance of osmosis. [3]
99. 2065 Q.No.2 b Cyclic phosphorylation. [3]
100. 2064 Q.No.2b What are the differences between transpiration and guttation. [3]

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101. 2064 Q.No.2d Draw a L.S. of well labelled diagram of typical ovule. (No description). [3]
102. 2064 Q.No.2h Differentiate between active absorption and passive absorption. [3]
103. 2062 Q.No.2c Elaborate about glycolysis. [3]
104. 2062 Q.No.2f Discuss an experiment to demonstrate the root pressure. [3]
105. 2062 Q.No.2i Differentiate between transpiration and guttation. [3]
106. 2062 Q.No.2h Explain the process of grafting with its importance. [3]
107. 2061 Q.No.2b How pyruvic acid is formed in glycolysis? [3]
108. 2060 Q.No.2g Describe how auxins are related with bending of shoots towards light. [3]
109. 2059 Q.No.2b Mention the physiological effects of gibberellins in plant growth. [3]
110. 2058 Q.No.2a Describe biological role of gibberallic acid in plants. [3]
111. 2058 Q.No.2d Describe an experiment showing Oxygen is evolved during photosynthesis. [3]
112. 2058 Q.No.2i Explain the significance of carboxylation in Calvin cycle. [3]
113. 2057 Q.No.2b What are the physiological effects of cytokinins on plants? [3]
114. 2057 Q.No.2a Discuss the role of light in photosynthesis. [3]
115. 2053 Q.No.2c Name any three plant hormones. [3]

Mark (√) the correct choice [1 mark]

116. 2056 Q.No. 1c Rooting hormones are-
(i) Auxins (ii) Gibberllins (iii) Kinetins (iv) Ethylene [1]
117. 2055 Q.No. 1b Falling of leaves from plants is due to:
(i) Excess of auxins in the leaf
(ii) High concentration of ABA in the leaf
(iii) Due to cytokinins
(iv) Due to gibberellin [1]
118. 2054 Q.No. 1a Growth inhibiting hormone in plant is:
☐ Abscisic acid ☐ Auxin
☐ Cytokinin ☐ Ethane [1]

Differentiate between the following pair of words [2 marks]

119. 2056 Q.No. 4f Auxins and gibberlins. [2]
120. 2055 Q.No. 4 a Auxins and cytokinins [2]

Short Answer Questions [2 marks]

121. 2053 Q.No. 3c What is plant growth inhibitor? Why is it necessary in plants? [2]
122. 2052 Q.No. 3e Name any four growth hormones found in plant. [2]

Long Answer Question

123. 2076 GIE Set A Q.No. 3OR What is transpiration? Describe the experiment to demonstrate the unequal transpiration. [7.5]
124. 2076 Set B Q.No. 3 OR Describe an experiment to demonstrate light is necessary for the process of photosynthesis with clean diagram. [7.5]
125. 2076 Set C Q.No. 3 Describe the various factors that influences the photosynthesis in plants. [7.5]
126. 2076 Set C Q.No. 3 OR Describe the various factors that affects the process of respiration in plants. [7.5]
127. 2075 GIE Q.No. 3OR Define respiration and describe the various steps involved in Kreb's cycle. [7.5]
128. 2075 Set A Q.No. 3 OR Describe various steps of light reaction of photosynthesis. [7.5]
129. 2075 Set B Q.No. 3 OR Describe the experiment to demonstrate that light is necessary for the process of photosynthesis. [7.5]
130. 2074 Set A Q.No. 3OR What is photosynthesis? Discuss the experiment to demonstrate that CO_2 is necessary for photosynthesis. [7.5]
131. 2074 Set B Q.No. 3OR What is transpiration? Discuss the process of transpiration by bell jar method. [7.5]
132. 2073 Supp Q.No. 3 Describe an experiment to show the O_2 is evolved during photosynthesis with clear diagrams. [7.5]
133. 2073 Set C Q.No. 3 OR What is respiration? Describe the various steps involved in Kreb's cycle.
134. 2073 Set D Q.No. 3 OR What is ascent of sap? Discuss the various theories involved in this phenomenon. [7.5]
135. 2072 Supp. Q.No. 3 What is transpiration? Describe an experiment to show the unequal rate of transpiration with clear diagrams. [7.5]
136. 2072 Set C Q.No. 3 or Define respiration and explain the experiment to demonstrate the aerobic respiration with well labelled diagrams. [7.5]
137. 2072 Set D Q.No. 3 or Define photosynthesis and describe the experiment to demonstrate that CO_2 is necessary for photosynthesis (Moll's apparatus). [7.5]
138. 2072 Set E Q.No. 3 or Describe in brief about the various factors that influence the photosynthesis in plants. [7.5]
139. 2071 Supp. Q.No. 3 What is photosynthesis? Describe an experiment to show the process by Moll's apparatus method. [7.5]
140. 2071 (Set C) Q.No. 3 Define photosynthesis and describe any experiment regarding the photosynthesis studied by you. [7.5]
141. 2071 (Set D) Q.No. 3 OR Define transpiration, and describe an experiment to show the rate of transpiration by Ganong's photometer. [7.5]
142. 2070 Supp. Q.No. 3 OR Define respiration. Describe in detail the experiment to demonstrate the aerobic respiration with clean diagrams. [7.5]
143. 2070 Set C Q.No. 3 or Define respiration. Describe in detail the experiment to demonstrate the anaerobic respiration with clean diagram. [7.5]
144. 2070 Set D Q.No. 3 What is transpiration? Discuss the experiment in detail to demonstrate the unequal transpiration with clean diagram. [3]
145. 2069 Q.No. 3OR Describe the experiment (Moll's apparatus) in detail showing the necessity of carbon dioxide during photosynthesis. [7.5]

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146. 2068 Q.No. 3 OR What is transpiration? Describe an experiment to show the rate of transpiration by Ganong's potometer. [7.5]
147. 2067 Q.No. 3a OR What is transpiration? Describe an experiment to show the unequal transpiration. [7.5]
148. 2066 Q.No. 3 OR Define aerobic respiration and highlight major steps of this process. [7.5]
149. 2065 Q.No. 4 OR Give an experiment to show that CO_2 is essential for photosynthesis. [8]
150. 2064 Q.No. 3 OR Describe briefly the various influencing factors of photosynthesis. [7.5]
151. 2063 Q.No. 3 Give an account of the structure of stomata and its working mechanism during transpiration. [7.5]
152. 2062 Q.No. 3 OR What is respiration? Discuss the mechanism of anaerobic respiration. [7.5]
153. 2061 Q.No. 3 OR What is transpiration? Describe an experiment to show an unequal transpiration. [7.5]
154. 2060 Q.No. 3 OR Discuss cohesion-tension theory for the uptake of water. [7.5]
155. 2059 Q.No. 3 OR Describe the light dependent steps of photosynthesis. How are they linked to the dark reaction? Discuss. [5+2]
156. 2057 Q.No. 3 OR What are the types of transpiration? Explain the factors affecting the rate of transpiration. [1.5+5.5]

UNIT 2: GENETICS

Very Short Answer Questions [1 marks]

1. 2077 Set J Q.No. 1b Name two plants in which vegetative propagation takes place by modified root. [1]
2. 2077 Set K Q.No. 1b What is criss-cross inheritance? [1]
3. 2076 GIE Set A Q.No. 1d What does it mean by heterozygous? [1]
4. 2076 GIE Set A Q.No. 1e State about dominance. [1]
5. 2076 GIE Set B Q.No. 1d What is heterozygous? [1]
6. 2076 GIE Set B Q.No. 1e Define dominance. [1]
7. 2076 Set B Q.No. 1b What do you mean by master strand? [1]
8. 2076 Set B Q.No. 1c Write the name of purine bases. [1]
9. 2076 Set C Q.No. 1d Mention about dominant allele. [1]
10. 2076 Set C Q.No. 1e Define heredity. [1]
11. 2075 GIE Q.No. 1e Illustrate about recessive. [1]
12. 2075 Set A Q.No. 1d What do you mean by genotype? [1]
13. 2075 Set A Q.No. 1i What do you understand by multiple allelism? [1]
14. 2075 Set A Q.No. 1j Give significance of linkage. [1]
15. 2075 Set B Q.No. 1d What do you mean by gene pool? [1]
16. 2075 Set B Q.No. 1e Elaborate offspring. [1]
17. 2074 Supp Q.No. 1d What do you mean by genetic material? [1]
18. 2074 Supp Q.No. 1e Elaborate backcross. [1]
19. 2074 Set A Q.No. 1d State about synapsis. [1]
20. 2074 Set A Q.No. 1e What do you mean by gene pool? [1]
21. 2074 Set B Q.No. 1d What does it mean by heredity? [1]
22. 2074 Set B Q.No. 1e What is genotype? [1]
23. 2073 Supp Q.No. 1d What does it mean by allele? [1]
24. 2073 Supp Q.No. 1e Illustrate about DNA. [1]
25. 2073 Set C Q.No. 1d What does it mean by monohybrid cross? [1]
26. 2073 Set C Q.No. 1e Write the full form of t RNA and m RNA. [1]
27. 2073 Set D Q.No. 1d What does it mean by gene? [1]
28. 2073 Set D Q.No. 1e Elaborate test cross. [1]
29. 2072 Supp. Q.No. 1d What does it mean by heterozygote? [1]
30. 2072 Supp. Q.No. 1e Illustrate about F_1 generation. [1]
31. 2072 Set C Q.No. 1d What is genetic material? [1]
32. 2072 Set C Q.No. 1e Define offspring. [1]
33. 2072 Set D Q.No. 1d What is homozygous? [1]
34. 2072 Set D Q.No. 1e Define recessiveness. [1]
35. 2072 Set E Q.No. 1c Differentiate dominance and epistasis. [1]
36. 2072 Set E Q.No. 1j State law of independent assortment. [1]
37. 2072 Set E Q.No. 1d Define gene mutation. [1]
38. 2071 Supp. Q.No. 1c Define phenotype? [1]
39. 2071 Supp. Q.No. 1e Define trait. [1]
40. 2071 (Set C) Q.No. 1 d What does it mean by trait? [1]
41. 2071 (Set C) Q.No. 1 e Illustrate about RNA. [1]
42. 2071 (Set D) Q.No. 1 d What does it mean by muton? [1]
43. 2071 (Set D) Q.No. 1 e Define homozygous. [1]
44. 2070 Supp. Q.No. 1 d What is genetic material? [1]
45. 2070 Supp. Q.No. 1 e What do you mean by dominance? [1]
46. 2070 Supp. Q.No. 1 j What does it mean by genetic engineering? [1]
47. 2070 Set C Q.No. 1 d What does it mean by homozyous? [1]
48. 2070 Set C Q.No. 1 e Elaborate the offspring. [1]
49. 2070 Set D Q.No. 1 d What does it mean by homozygous? [1]
50. 2070 Set D Q.No. 1 e What do you mean by recessive? [1]
51. 2069 Q.No. 1d Define polyploidy. [1]
52. 2069 Q.No. 1e What do you mean by test cross? [1]
53. 2068 Q.No. 1d Define inheritance. [1]
54. 2068 Q.No. 1e What is variation? [1]
55. 2067 Q.No. 1d What is heredity? [1]
56. 2067 Q.No. 1e What is homozygous? [1]
57. 2066 Q.No. 1 c What is a heterozygous organism? [1]
58. 2065 Q.No. 1 e What is a backcross? [1]
59. 2065 Q.No. 1 f Write chemical differences between DNA and RNA. [1]
60. 2065 Q.No. 1 g Define polyploidy [1]
61. 2063 Q.No. 1n What do you understand by the term allele? [1]
62. 2063 Q.No. 1c What do you mean by the term anemophily? [1]
63. 2063 Q.No. 1o Define gene-pool. [1]
64. 2062 Q.No. 1d What does it mean by monohybrid cross? [1]
65. 2061 Q.No. 1d What does it mean by genotype? [1]
66. 2061 Q.No. 1e Write full form of t RNA and m RNA. [1]
67. 2060 Q.No. 1g What is polyploidy? [1]
68. 2060 Q.No. 1m What is a regulator gene? [1]
69. 2059 Q.No. 1c Give one example of co-dominance. [1]

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70. 2059 Q.No. 1d Mention the nitrogen bases present in pyrimidine. [1]
71. 2058 Q.No. 1d Write two examples of polyploidy. [1]
72. 2058 Q.No. 1e What is punnett square? [1]
73. 2058 Q.No. 1i Define linkage. [1]
74. 2058 Q.No. 1m Give the significance of polygenic trait. [1]
75. 2057 Q.No. 1e Define allele. [1]
76. 2057 Q.No. 1g Give one example of polygenic inheritance. [1]
77. 2057 Q.No. 1n Define genetic code. [1]
78. 2053 Q.No. 3e Why is the phenotypic ratio 3 : 6 : 3 : 1 : 2 : 1 obtained? [1]
79. 2052 Q.No.2d List the characters of identification of genetic disorder. [1]

Answer all in brief [3 marks]

80. 2077 Set J Q.No. 2b Describe the double helical structure of Watson and Crick model of DNA. [3]
81. 2077 Set K Q.No. 2b Explain the Mendel's law of dominance with chart. [3]
82. 2077 Set R Q.No. 2b Describe the types of RNA. [3]
83. 2076 GIE Set A Q.No. 2c Reasons of choosing Drosophila for research. [3]
84. 2076 GIE Set A Q.No. 2d Characteristics of genetic code. [3]
85. 2076 GIE Set A Q.No. 2e Semi-conservative method of DNA replication. [3]
86. 2076 GIE Set B Q.No. 2c Structure and function of RNA. [3]
87. 2076 GIE Set B Q.No. 2d Semi-conservative method of DNA replication. [3]
88. 2076 GIE Set B Q.No. 2e Differentiate between incomplete and codominance. [3]
89. 2076 GIE Set B Q.No. 2f Development of female gametophyte. [3]
90. 2076 Set B Q.No. 2c Structure of RNA. [3]
91. 2076 Set B Q.No. 2d Mechanism of crossing over. [3]
92. 2076 Set B Q.No. 2g Describe the co-dominance with suitable example. [3]
93. 2076 Set C Q.No. 2c Difference between homozygous and heterozygous. [3]
94. 2076 Set C Q.No. 2d Structure of RNA. [3]
95. 2076 Set C Q.No. 2e Process of translation. [3]
96. 2075 GIE Q.No. 2c Significance of crossing over. [3]
97. 2075 GIE Q.No. 2d Characteristic features of genetic code. [3]
98. 2075 GIE Q.No. 2e Chromosomal aberration. [3]
99. 2075 Set A Q.No. 2a Differentiate between RNA and DNA. [3]
100. 2075 Set A Q.No. 2c Law of independent assortment. [3]
101. 2075 Set A Q.No. 2f Describe the properties of genetic code. [3]
102. 2075 Set B Q.No. 2c Law of dominance. [3]
103. 2075 Set B Q.No. 2d Semi conservative method of DNA replication. [3]
104. 2075 Set B Q.No. 2e Incomplete dominance. [3]
105. 2074 Supp Q.No. 2c Monohybrid cross with chart. [3]
106. 2074 Supp Q.No. 2d Chromosomal aberration. [3]
107. 2074 Supp Q.No. 2e Structure of RNA and its types. [3]
108. 2074 Set A Q.No. 2c Dihybird cross with chart. [3]
109. 2074 Set A Q.No. 2d Gene mutation. [3]
110. 2074 Set A Q.No. 2e Nucleoside and nucleotide. [3]
111. 2074 Set B Q.No. 2c Reasons of choosing pea plants in Mendel experiment. [3]
112. 2074 Set B Q.No. 2d Significance of polyploidy. [3]
113. 2074 Set B Q.No. 2e Structure of DNA. [3]
114. 2073 Supp Q.No. 2c Cause of selecting Drosophila in experiments. [3]
115. 2073 Supp Q.No. 2d Significance of mutation. [3]
116. 2073 Supp Q.No. 2e Differentiate between incomplete and codominance. [3]
117. 2073 Set C Q.No. 2c Mechanism of crossing over. [3]
118. 2073 Set C Q.No. 2d Codominance [3]
119. 2073 Set C Q.No. 2e Characteristic of genetic code. [3]
120. 2073 Set C Q.No. 2g Advantages of polyploidy. [3]
121. 2073 Set D Q.No. 2c Law of segregation. [3]
122. 2073 Set D Q.No. 2d Characteristics of genetic code. [3]
123. 2073 Set D Q.No. 2e Incomplete dominance with examples. [3]
124. 2072 Supp. Q.No. 2c Law of segregation. [3]
125. 2072 Supp. Q.No. 2d Significance of polyploidy with examples. [3]
126. 2072 Supp. Q.No. 2e Criss-cross inheritance with its importance. [3]
127. 2072 Set C Q.No. 2c Process of crossing over [3]
128. 2072 Set C Q.No. 2d Reason of pea plant selection for Mendel's experiments. [3]
129. 2072 Set C Q.No. 2e Law of dominance. [3]
130. 2072 Set D Q.No. 2c Law of segregation. [3]
131. 2072 Set D Q.No. 2d Importance of polyploidy. [3]
132. 2072 Set D Q.No. 2e Chromosomal aberration. [3]
133. 2072 Set E Q.No. 2c Differentiate genotypes and phenotypes. [3]
134. 2072 Set E Q.No. 2d Describe about the process of crossing over. [3]
135. 2072 Set E Q.No. 2e Explain sex-linked inheritance of colour blindness in man. [3]
136. 2071 Supp. Q.No. 2c Explain the chromosomal mutation. [3]
137. 2071 Supp. Q.No. 2d Discuss the crossing over. [3]
138. 2071 Supp. Q.No. 2e Describe the law of dominance. [3]
139. 2071 (Set C) Q.No. 2 c Law of independent assortment. [3]
140. 2071 Set C Q.No. 2d Significance of polyploidy with examples. [3]
141. 2071 (Set C) Q.No. 2 e Difference between incomplete and codominace. [3]
142. 2071 (Set D) Q.No. 2 d Describe the law of dominance. [3]

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143. 2071 (Set D) Q.No. 2 e Describe in detail about chromosomal mutations. [3]
144. 2070 Supp. Q.No. 2 c Types of DNA and its function. [3]
145. 2070 Supp. Q.No. 2 d Law of dominance with examples. [3]
146. 2070 Supp. Q.No. 2 e Semiconservative method of DNA replication [3]
147. 2070 Set C Q.No. 2 c Structure and function of RNA. [3]
148. 2070 Set C Q.No. 2 d Law of segregation. [3]
149. 2070 Set C Q.No. 2 e Semi-conservative method of DNA replication. [3]
150. 2070 Set D Q.No. 2 c Types of RNA and its functions. [3]
151. 2070 Set D Q.No. 2 d Reasons for the selection of pea plant on the Mendal's experiment. [3]
152. 2070 Set D Q.No. 2 e Semi-conservative method of DNA replication. [3]
153. 2069 Q.No. 2d Characteristics of genetic code. [3]
154. 2069 Q.No. 2e Process of crossing over. [3]
155. 2069 Q.No. 2f Mendel's dihybrid cross. [3]
156. 2068 Q.No. 2c Describe the structure of DNA. [3]
157. 2068 Q.No. 2d Discuss the incomplete dominance with examples. [3]
158. 2068 Q.No. 2e Describe the types of mutations. [3]
159. 2067 Q.No. 2c Describe the structure of DNA. [3]
160. 2067 Q.No. 2d Describe in detail about the incomplete dominance with examples. [3]
161. 2067 Q.No. 2e Describe the types of mutation. [3]
162. 2066 Q.No. 1a Explain the Mendel's law of segregation. [3]
163. 2066 Q.No. 1 b Describe the significance of polyploidy. [3]
164. 2065 Q.No.2 c Incomplete linkage in maize. [3]
165. 2064 Q.No.2c Show the dihybrid cross on Punnett Square Method. [3]
166. 2063 Q.No.2i Discuss the relationship between variation and heredity. [3]
167. 2063 Q.No.2j What are the causes and roles of mutation? [3]
168. 2062 Q.No.2a Elaborate about the incomplete dominance. [3]
169. 2061 Q.No.2a Describe semi-conservative mode of replication of DNA. [3]
170. 2061 Q.No.2e Discuss about sex-linked inheritance in Drosophila. [3]
171. 2061 Q.No.2f Elaborate about the dominance. [3]
172. 2060 Q.No.2h How is the wheat variety developed? [3]
173. 2059 Q.No.2d Differentiate between genotype and phenotype. [3]
174. 2059 Q.No.2e Write a short account of crossing over. [3]
175. 2058 Q.No.2e Why is a man unable to pass on a sex-linked gene to his son? [3]
176. 2058 Q.No.2h Write the semi-conservative mode of replication of DNA. [3]
177. 2057 Q.No.2c What do you understand by Mendel's 9:3:3:1 ratio? [3]
178. 2057 Q.No.2d Define mutation. What is the result of mutation? [3]
179. 2054 Q.No. 3a Prove 9 : 3 : 3 : 1 phenotypic ratio of dihybrid cross. [3]
180. 2054 Q.No. 3e Define mutation theory. [3]
181. 2053 Q.No. 3e Why is the phenotypic ratio 3 : 6 : 3 : 1 : 2 : 1 obtained? [3]
182. 2053 Q.No.2f What is dihybrid cross? [3]
183. 2052 Q.No.2b What is the basis of mendelian genetics? Explain the law of segregation of characters. [3]

Mark (√) the correct choice [1 mark]

184. 2056 Q.No. 1d The probability of appearance of tall characters on pea plants in F_2 generation of a Mendelian experiment is- (i) 100% (ii) 50% (iii) 75% (iv) 25% [1]
185. 2055 Q.No. 1d Agents that cause mutations are called: (i) Mutagens (ii) Mutants (iii) Chromosomes (iv) Genes [1]
186. 2053 Q.No. 1a Genetic make up of an individual is called ... [1]
- ☐ Phenotype
- ☐ Genotype
- ☐ Recessive
- ☐ None

187. 2053 Q.No. 1e The mutation theory was proposed by .... [1]
- ☐ Devries
- ☐ Charles Darwin
- ☐ Lamark
- ☐ A.R. Wallace

188. 2052 Q.No. 1ii An organism having similar genes is called: a. Genotype b. Dihybrid c. Homozygous d. Linkage [1]
189. 2052 Q.No. 1iii The theory of mutation was given by: a. Darwin b. Cuvier c. Devries d. Lamarck [1]

Differentiate between the following terms [3 marks]

190. 2056 Q.No. 4d Phenotype and genotype. [3]
191. 2055 Q.No. 4c Dominant and recessive characters [3]
192. 2053 Q.No. 4a Euploidy and Aneuploidy. [3]
193. 2053 Q.No. 4b Dominance and Recessive [3]
194. 2052 Q.No. 4a Heterozygous and Homozygous [3]
195. 2052 Q.No. 4b Phenotype and genotype [3]

Long Questions

196. 2077 Set J Q.No. 3 OR Describe semi-conservative method of DNA replication. [7]
197. 2077 Set K Q.No. 3 OR Describe the Griffith's Bacterial transformation experiment to show that DNA is a genetic material. [7]
198. 2077 Set R Q.No. 3 OR What is mutation? Describe its types and their role in evolution. [7]
199. 2076 GIE Set A Q.No. 4 What is crossing over? Describe its mechanism and significance with necessary diagrams. [8]
200. 2076 GIE Set B Q.No. 4 Describe in detail about Mendal's law of independent assortment up to F_2 generation. [8]
201. 2076 Set B Q.No. 4 What is DNA? Describe the process of semi conservative method of DNA replication with good diagrams. [8]
202. 2076 Set C Q.No. 4 Define genetic material and describe the process involved in semi-conservative method of DNA replication with neat and clean diagram. [8]

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203. 2075 GIE Q.No. 4 Define crossing over and describe its mechanism and significance with necessary diagrams. [8]
204. 2075 Set A Q.No. 4 What is sex-linked inheritance? Explain it with reference to eye colour of *Drosophilla*. (Fruit fly). [8]
205. 2075 Set B Q.No. 4 Describe in detail about Mendel's law of independent assortment up to F_2 generation. [8]
206. 2074 Supp Q.No. 4 What is DNA and describe the process of DNA replication found in semi-conservative method with neat and clean diagrams. [8]
207. 2074 Set A Q.No. 4 Define sex linked inheritance and describe the process found in fruit fly. [8]
208. 2074 Set B Q.No. 4 What is sex linked inheritance? Discuss it with special reference to eye colour of fruit fly. [8]
209. 2073 Supp Q.No. 4 Define crossing over and describe its mechanism with necessary diagrams along with its significance. [8]
210. 2073 Set C Q.No. 4 What is genetic material? Describe the structure and function of DNA. [8]
211. 2073 Set D Q.No. 4 Define genetic material and describe the process of semi-conservation mode of replication of DNA with neat and clean diagrams. [8]
212. 2072 Supp. Q.No. 4 Define crossing over and describe its mechanism with necessary diagrams along with its significance. [8]
213. 2072 Set C Q.No. 4 Define sex-linked inheritance and discuss it with special reference to eye colour of Drosophila melanogaster (fruit fly). [8]
214. 2072 Set D Q.No. 4 Define DNA and describe the process involved in the semi-conservative mode of replication of DNA with necessary neat and clean diagrams. [8]
215. 2072 Set E Q.No. 4 What are genetic materials? Discuss the double helical structure of Watson and Crick's model of DNA with necessary diagrams. [8]
216. 2071 Supp. Q.No. 4 What is dihybrid cross? Mention diagrammatic account of dihybrid cross of Mendel's experiment and discuss. [8]
217. 2071 (Set C) Q.No. 4 Define crossing over and describe its mechanism with necessary diagrams along with its significance. [8]
218. 2071 (Set D) Q.No. 4 Describe the process of crossing over and its significances. [8]
219. 2070 Supp. Q.No. 4 What is Mutation? Describe its various types and its significance. [8]
220. 2070 Set C Q.No. 4 Describe the sex linked inheritance with special examples to the eye colour of Drosophila melanogaster (fruit fly). [8]
221. 2070 Set D Q.No. 4 Describe the sex linked inheritance with special reference to the eye colour of Drosophila melanogaster (fruit fly). [8]
222. 2069 Q.No. 4 What is mutation? Describe its various types and its significance. [8]
223. 2068 Q.No. 4 What is criss-cross inheritance? Discuss about the sex-linked inheritance with special reference to the eye colour of Drosophila. [8]
224. 2067 Q.No. 4 Describe the six linked inheritance with the reference of Drosophila (fruit fly) [8]
225. 2066 Q.No. 4 What do you mean by linkage? Describe its types with examples. [8]
226. 2065 Q.No. 3 Explain the mechanism of DNA replication and mention its significance. [7.5]
227. 2064 Q.No. 5 Describe in detail about the process of semi-conservative method of DNA replication. [7]
228. 2063 Q.No. 4 Discuss the mechanism of DNA replication and state its functions. [7]
229. 2062 Q.No. 5 What is criss-cross inheritance? Discuss about the sex-linked inheritance with special reference to the eye colour of Drosophila. [7]
230. 2061 Q.No. 5 Describe the double helical structure of Watson & Crick's model of DNA. [7]
231. 2060 Q.No. 5 What is mutation? Explain gene mutation in brief. [7]
232. 2059 Q.No. 5 What are genetic materials? Describe the structure and function of DNA. [1+4+2]
233. 2058 Q.No. 4 Describe the Mendel's Law of inheritance. [10]
234. 2057 Q.No. 5 Discuss the mechanism of DNA replication. [7]
235. 2053 Q.No. 6 Discuss the Law of Independent Assortment. [10]

UNIT 3: DEVELOPMENTAL BIOLOGY

Answer all in very short [1 mark]

1. 2077 Set K Q.No. 1c Define hybridization. [1]
2. 2076 GIE Set A Q.No. 1f What do you mean by grafting? [1]
3. 2076 GIE Set A Q.No. 1g Mention about angiosperm. [1]
4. 2076 GIE Set A Q.No. 1h Define anemophily. [1]
5. 2076 GIE Set B Q.No. 1g What is exine? [1]
6. 2076 GIE Set B Q.No. 1h Illustrate about anemophily. [1]
7. 2076 Set B Q.No. 1d What do you mean by scion and stock? [1]
8. 2076 Set B Q.No. 1h Define megasporogenesis. [1]
9. 2076 Set B Q.No. 1i What do you mean by chiropterophily? [1]
10. 2076 Set C Q.No. 1f What does it mean by scion? [1]
11. 2076 Set C Q.No. 1g What is microspores? [1]
12. 2076 Set C Q.No. 1h State about cleistogamy. [1]
13. 2075 GIE Q.No. 1d What do you mean by genotype? [1]
14. 2075 GIE Q.No. 1f Mention about vegetative propagation. [1]
15. 2075 GIE Q.No. 1g What is pollen tube? [1]
16. 2075 GIE Q.No. 1h Define autogamy. [1]
17. 2075 Set A Q.No. 1e What is the advantage of cross pollination? [1]
18. 2075 Set B Q.No. 1g What does it mean by microsporogenesis? [1]
19. 2075 Set B Q.No. 1h Define anemophily. [1]
20. 2074 Supp Q.No. 1g State about angiosperm. [1]
21. 2074 Supp Q.No. 1h Define hydrophilly. [1]
22. 2074 Supp Q.No. 1i What is hybridization? [1]
23. 2074 Set A Q.No. 1f What is tuber? [1]
24. 2074 Set A Q.No. 1g Mention about pollen grains. [1]
25. 2074 Set A Q.No. 1h Define fertilization. [1]
26. 2074 Set B Q.No. 1f State about cutting. [1]

27. 2074 Set B Q.No. 1g Mention about gymnosperm. [1]
28. 2074 Set B Q.No. 1h Elaborate entomophilly. [1]
29. 2073 Supp Q.No. 1f Define grafting. [1]
30. 2073 Supp Q.No. 1g Elaborate megasporogenesis. [1]
31. 2073 Supp Q.No. 1h What is pollination? [1]
32. 2073 Set C Q.No. 1f Define the role of rhizome. [1]
33. 2073 Set C Q.No. 1g State about microgametogenesis. [1]
34. 2073 Set C Q.No. 1h What is pollen tube? [1]
35. 2073 Set D Q.No. 1f Define vegetative propagation. [1]
36. 2073 Set D Q.No. 1g Mention about anther. [1]
37. 2073 Set D Q.No. 1h State about double fertilization. [1]
38. 2072 Supp. Q.No. 1f Define gootee. [1]
39. 2072 Supp. Q.No. 1g Elaborate gametogenesis. [1]
40. 2072 Supp. Q.No. 1h What is double fertilization? [1]
41. 2072 Set C Q.No. 1g What is pollen tube? [1]
42. 2072 Set C Q.No. 1h Illustrate about entomophily. [1]
43. 2072 Set D Q.No. 1g What is entine? [1]
44. 2072 Set D Q.No. 1h Illustrate about megagametogenesis. [1]
45. 2072 Set E Q.No. 1e Define embryo sac. [1]
46. 2072 Set E Q.No. 1f Write any two advantages of vegetative propagation. [1]
47. 2071 Supp. Q.No. 1g Define megasporogenesis? [1]
48. 2071 Supp. Q.No. 1h What is cross pollination? [1]
49. 2071 (Set C) Q.No. 1 f Define vegetative propagation. [1]
50. 2071 (Set C) Q.No. 1 g Elaborate microsporogenesis. [1]
51. 2071 (Set C) Q.No. 1 h What is fertilization? [1]
52. 2071 (Set D) Q.No. 1 g Define megasporogenesis. [1]
53. 2071 (Set D) Q.No. 1 h What is self pollination? [1]
54. 2070 Supp. Q.No. 1 g Elaborate about angiosperm. [1]
55. 2070 Supp. Q.No. 1 h Define the benefit of pollination. [1]
56. 2070 Set C Q.No. 1 f Define asexual reproduction. [1]
57. 2070 Set C Q.No. 1 g Mention about male gametophyte. [1]
58. 2070 Set C Q.No. 1 h Point out fertilization. [1]
59. 2070 Set D Q.No. 1 f Define sexual reproduction. [1]
60. 2070 Set D Q.No. 1 g Elaborate about female gametophyte. [1]
61. 2070 Set D Q.No. 1 h Point out about anemophily. [1]
62. 2069 Q.No. 1f What do you understand by the asexual reproduction? [1]
63. 2069 Q.No. 1g What is exine? [1]
64. 2069 Q.No. 1h Write the meaning of anemophily. [1]
65. 2068 Q.No. 1f What does it mean by vegetative reproduction? [1]
66. 2068 Q.No. 1g Define megasporogenesis? [1]
67. 2068 Q.No. 1h What is entomophilly? [1]
68. 2067 Q.No. 1f What is vegetative reproduction? [1]
69. 2067 Q.No. 1g Define microsporogenesis? [1]
70. 2067 Q.No. 1h What is self pollination? [1]
71. 2066 Q.No. 1 f Where are the microspore mother cells found in an angiospermic plant. [1]
72. 2064 Q.No. 1f What is vegetative reproduction? [1]
73. 2063 Q.No. 1a Define vegetative reproduction. [1]

Very Short Answer Questions [2 marks]

74. 2062 Q.No. 1f What do you mean by fertilization? [2]
75. 2061 Q.No. 1f What is the role of fragrance in pollination? [2]
76. 2057 Q.No. 1d Give two examples of entomophilus plants. [2]
77. 2054 Q.No.2e What is double fertilization? Give example. [2]
78. 2052 Q.No. 3a How does endosperm in Angiosperms become triploid? [2]

Describe in brief [3 marks]

79. 2077 Set K Q.No. 2c Mention the importances of vegetative propagation with examples. [3]
80. 2076 GIE Set A Q.No. 2f Development of embryo. [3]
81. 2076 Set B Q.No. 2f Process of male gametogenesis. [3]
82. 2076 Set C Q.No. 2f Development of monocot embryo. [3]
83. 2075 GIE Q.No. 2f Double fertilization. [3]
84. 2075 Set A Q.No. 2b The development of monocot embryo. [3]
85. 2074 Supp Q.No. 2f Megagametogenesis. [3]
86. 2074 Set A Q.No. 2f Microgametogenesis. [3]
87. 2074 Set B Q.No. 2g Double fertilization. [3]
88. 2073 Supp Q.No. 2f Development of dicot embryo. [3]
89. 2073 Set C Q.No. 2f Process of fertilization. [3]
90. 2073 Set D Q.No. 2f Monocot embryo. [3]
91. 2072 Supp. Q.No. 2f Anemophilous pollination and its concerned plant's characteristics. [3]
92. 2072 Set C Q.No. 2f Process of microsporogenesis. [3]
93. 2072 Set D Q.No. 2f Development of male gametophyte. [3]
94. 2072 Set E Q.No. 2f What is anemophily? Describe the features of anemophilous flowers. [3]
95. 2071 Supp. Q.No. 2f Elaborate the development of dicot embryo. [3]
96. 2071 (Set C) Q.No. 2f Development of monocot embryo. [3]
97. 2071 (Set D) Q.No. 2 f Describe the development of dicot embryo. [3]
98. 2070 Set C Q.No. 2 f Development of male gametophyte. [3]
99. 2070 Set D Q.No. 2 f Development of female gametophyte. [3]
100. 2069 Q.No. 2a Advantages of vegetative propagation. [3]
101. 2068 Q.No. 2f Elaborate the double fertilization. [3]
102. 2067 Q.No. 2f Discuss the process of double fertilization with necessary figures. [3]

Differentiate between the following [3 marks]

103. 2057 Q.No.2e Differentiate between self and cross fertilization? [3]
104. 2053 Q.No. 4e Autogamy and Allogamy [3]

Long Answer Questions

105. 2077 Set J Q.No. 3 What is transpiration? Give an account of the structure of stomata and its working mechanism during transpiration. [7]
106. 2077 Set K Q.No. 3 Describe the anatomy of monocot stem with its salient features and compare it with dicot stem. [7]

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107. 2077 Set R Q.No. 3 Describe the internal structure of dicot stem with its salient features and compare it with monocot stem. [7]
108. 2076 GIE Set A Q.No. 3 Describe and compare the anatomical structure of dicot and monocot leaf with neat and clean diagrams. [7.5]
109. 2076 GIE Set B Q.No. 3 Describe the T.S. of dicot root with well labelled diagrams and compare it with monocot root also. [7.5]
110. 2076 GIE Set B Q.No. 3 OR Define transpiration and explain the experiment to demonstrate the unequal transpiration with well labelled diagrams. [7.5]
111. 2075 Set A Q.No. 3 Define secondary growth. Explain the process of secondary growth in dicot stem with necessary diagrams. [7.5]
112. 2074 Supp Q.No. 3 Describe the process of secondary growth in dicot stem with necessary diagrams. [7.5]
113. 2074 Supp Q.No. 3 OR Define transpiration and discuss the process of unequal transpiration in dicot leaf. [7.5]
114. 2072 Supp. Q.No. 3 OR Describe T.S. of monocot and dicot leaf with necessary diagrams. [7.5]
115. 2059 Q.No. 6 Define pollination and discuss different agencies of plant pollination. [1+5]

UNIT 4: APPLICATION OF BIOLOGY

Answer all in very short [1 mark]

1. 2077 Set J Q.No. 1c What is farmyard manure? [1]
2. 2077 Set R Q.No. 1b What is callus? [1]
3. 2076 GIE Set A Q.No. 1i Elaborate green manure. [1]
4. 2076 GIE Set A Q.No. 1j What is genetic engineering? [1]
5. 2076 GIE Set B Q.No. 1f Mention about grafting. [1]
6. 2076 GIE Set B Q.No. 1i Define fermentation technology. [1]
7. 2076 GIE Set B Q.No. 1j Elaborate about green manuring. [1]
8. 2076 Set B Q.No. 1e Define biofertilizer. [1]
9. 2076 Set B Q.No. 1g What is callus culture? [1]
10. 2076 Set C Q.No. 1i Illustrate about callus culture. [1]
11. 2076 Set C Q.No. 1j Define biotechnology. [1]
12. 2075 GIE Q.No. 1i Illustrate about tissue culture. [1]
13. 2075 GIE Q.No. 1j What does it mean by farmyard manure? [1]
14. 2075 Set A Q.No. 1f Give two scientific names of plant that are used as green manure. [1]
15. 2075 Set A Q.No. 1g Define tissue culture. [1]
16. 2075 Set B Q.No. 1f What is grafting? [1]
17. 2075 Set B Q.No. 1i Mention about green manure. [1]
18. 2075 Set B Q.No. 1j Illustrate about vaccine. [1]
19. 2074 Supp Q.No. 1f What does it mean by layering? [1]
20. 2074 Supp Q.No. 1j Illustrate the importance of yeast. [1]
21. 2074 Set A Q.No. 1i Illustrate GMO. [1]
22. 2074 Set A Q.No. 1j State about genetic engineering. [1]
23. 2074 Set B Q.No. 1i Define biofertilizer. [1]
24. 2074 Set B Q.No. 1j What is the role of yeast? [1]
25. 2073 Supp Q.No. 1i What do you mean by shoot culture? [1]
26. 2073 Supp Q.No. 1j Mention about green manure. [1]
27. 2073 Set C Q.No. 1i What do you mean by biotechnology? [1]
28. 2073 Set C Q.No. 1j Mention about biofertilizer. [1]
29. 2073 Set D Q.No. 1i What is callus culture? [1]
30. 2073 Set D Q.No. 1j What do you mean by fermentation? [1]
31. 2072 Supp. Q.No. 1i What do you mean by embryo culture? [1]
32. 2072 Supp. Q.No. 1j Mention about farmyard manure. [1]
33. 2072 Set C Q.No. 1f Mention about gootee. [1]
34. 2072 Set C Q.No. 1i Define tissue culture. [1]
35. 2072 Set C Q.No. 1j Elaborate about bio-fertilizer. [1]
36. 2072 Set D Q.No. 1f Write about cutting. [1]
37. 2072 Set D Q.No. 1i Define biotechnology. [1]
38. 2072 Set D Q.No. 1j Elaborate about farmyard manure. [1]
39. 2072 Set E Q.No. 1g What is the difference between stock and scion? [1]
40. 2072 Set E Q.No. 1h Define fermentation. [1]
41. 2072 Set E Q.No. 1i What do you mean by biofertilizer? [1]
42. 2071 Supp. Q.No. 1i Define the function of green manure? [1]
43. 2071 Supp. Q.No. 1 j What is the role of insecticides? [1]
44. 2071 (Set C) Q.No. 1i What do you mean by callus culture? [1]
45. 2071 (Set C) Q.No. 1 j Mention about bio-fertilizer. [1]
46. 2071 (Set D) Q.No. 1 f What is grafting? [1]
47. 2071 (Set D) Q.No. 1 i What is tissue culture? [1]
48. 2071 (Set D) Q.No. 1 j Define vaccines. [1]
49. 2070 Supp. Q.No. 1 i Point out the concept of disease resistant plants. [1]
50. 2070 Supp. Q.No. 1 f Elaborate the benefit of vegetative propagation. [1]
51. 2070 Set C Q.No. 1 i Elaborate the concept of disease resistant plant. [1]
52. 2070 Set C Q.No. 1 j What do you mean by genetic engineering? [1]
53. 2070 Set D Q.No. 1 i Significance of green manure. [1]
54. 2070 Set D Q.No. 1 j Mention about genetic engineering. [1]
55. 2069 Q.No. 1i Mention the fields of biotechnology. [1]
56. 2069 Q.No. 1j State the meaning of tissue culture. [1]
57. 2068 Q.No. 1i Define biotechnology? [1]
58. 2068 Q.No. 1j What is vaccine? [1]
59. 2067 Q.No. 1i Define tissue culture ? [1]
60. 2067 Q.No. 1j What is antibiotics? [1]
61. 2066 Q.No. 1 g Define a callus. [1]
62. 2064 Q.No. 1e What is hybridization? [1]
63. 2064 Q.No. 1g What is biofertilizer? [1]
64. 2064 Q.No. 1o What is herbal therapy? [1]
65. 2063 Q.No. 1f What is callus? [1]
66. 2063 Q.No. 1h Define inbreeding. [1]
67. 2063 Q.No. 1j What is grafting? [1]
68. 2063 Q.No. 1k Define fermentation. [1]
69. 2062 Q.No. 1g What is farmyard manure? [1]

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70. 2062 Q.No. 1n How alcohol is formed? [1]
71. 2061 Q.No. 1j What are vaccines? [1]
72. 2061 Q.No. 1g What is the role of root nodules? [1]
73. 2060 Q.No. 1k Which is callus? [1]
74. 2060 Q.No. 1n Define fermentation. [1]
75. 2059 Q.No. 1j Name any two plants which are of manure value. [1]
76. 2059 Q.No. 1c Give two applications of genetic engineering. [1]
77. 2058 Q.No. 1k Name two types of fermentation processes. [1]
78. 2058 Q.No. 1l Define genetic engineering. [1]
79. 2057 Q.No. 1j Give any two plant names which are used as green manures. [1]
80. 2057 Q.No. 1o Which organisms cause fermentation for alcohol? [1]

Answer all in brief. [3 marks]

81. 2077 Set J Q.No. 2c Describe the application of fermentation technology in industries. [3]
82. 2077 Set R Q.No. 2c Describe the application of genetic engineering in agriculture. [3]
83. 2076 GIE Set A Q.No. 2g Significance of fermentation technology. [3]
84. 2076 GIE Set B Q.No. 2g Application of biotechnology in medical sciences. [3]
85. 2076 Set B Q.No. 2e Application of plant tissue culture. [3]
86. 2076 Set C Q.No. 2g Possible danger of genetic engineering. [3]
87. 2075 GIE Q.No. 2g Application of biotechnology. [3]
88. 2075 Set B Q.No. 2f Significance of fermentation technology. [3]
89. 2075 Set B Q.No. 2g Application of genetic engineering in agriculture. [3]
90. 2074 Supp Q.No. 2g Possible danger of genetic engineering. [3]
91. 2074 Set A Q.No. 2g Application of plant tissue culture. [3]
92. 2074 Set B Q.No. 2f Importance of genetic engineering in medicine. [3]
93. 2073 Supp Q.No. 2g Application of genetic engineering in agriculture. [3]
94. 2073 Set D Q.No. 2g Application of genetic engineering in agriculture. [3]
95. 2072 Supp. Q.No. 2g Genetic engineering and its possible danger. [3]
96. 2072 Set C Q.No. 2g Possible dangers of genetic engineering. [3]
97. 2072 Set D Q.No. 2g Application of biotechnology in agricultural sciences. [3]
98. 2072 Set E Q.No. 2g Discuss the importance of biotechnology. [3]
99. 2071 Supp. Q.No. 2f Discuss the biofertilizer and its application. [3]
100. 2071 (Set C) Q.No. 2 g Application of genetic engineering in medicine. [3]
101. 2071 Set D Q.No. 2g Elaborate the fermentation technology and its application. [3]
102. 2070 Supp. Q.No. 2 f Process of fertilization. [3]
103. 2070 Supp. Q.No. 2 g Benefit of fermentation technology. [3]
104. 2070 Set C Q.No. 2 g Tissue culture and its application. [3]
105. 2070 Set D Q.No. 2 g Fermentation technology and its significances. [3]
106. 2069 Q.No. 2g Genetic engineering and its application. [3]
107. 2068 Q.No. 2g Discuss the green manure and its application. [3]
108. 2067 Q.No. 2g Discuss green manure and its application in agriculture. [3]
109. 2066 Q.No. 1c Write the advantages of vegetative reproduction. [3]
110. 2066 Q.No. 1e Discuss the industrial application of fermentation technology. [3]
111. 2065 Q.No.2d Application of micropropagation in agriculture. [3]
112. 2065 Q.No.2 e Advantages of green manure over chemical fertilizers. [3]
113. 2064 Q.No.2e Mention briefly about the importance of plant tissue culture in agriculture. [3]
114. 2063 Q.No.2d Write down the applications of biotechnology. [3]
115. 2062 Q.No.2b Explain about the green manure with examples. [3]
116. 2061 Q.No.2d Discuss the significance of biotechnology. [3]
117. 2061 Q.No.2g Write down the prospects of genetic engineering. [3]
118. 2060 Q.No.2a What are the objectives of plants breeding? Explain. [3]
119. 2060 Q.No.2b What is the importance of manures in agriculture? [3]
120. 2060 Q.No.2d Discuss in brief the methods of plant tissue culture. [3]
121. 2059 Q.No.2i State the advantages and disadvantages of outbreeding. [3]
122. 2059 Q.No.2j Explain the principles of fermentation technology. [3]
123. 2057 Q.No.2j What are the advantages of green manures over chemical fertilizers? [3]
124. 2055 Q.No. 6 Discuss the basic concept of genetic engineering. Explain its practical applications. [3]
125. 2052 Q.No. 7 OR Discuss briefly about the alcoholic fermentation. [3]

Write short notes on the following [4 marks]

126. 2056 Q.No.2f Genetic engineering [4]

Discuss the following [4 marks]

127. 2056 Q.No.2b Monoclonal antibody [4]
128. 2055 Q.No.2b The advantages of out-breeding [4]

Attempt the following questions [2 marks]

129. 2054 Q.No. 3b What is green manuring? Give example. [2]

Differentiate between the following pair of words [2 marks]

130. 2055 Q.No. 4f Inbreeding and outbreeding [2]

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SECTION B (ZOOLOGY)

UNIT 1: ANIMAL TISSUES

Very Short Answer Questions [1 mark]

1. 2077 Set K Q.No. 1a Name sensory cranial nerves. [1]
2. 2076 GIE Set A Q.No. 1a Name tissue that undergoes cell division throughout life. [1]
3. 2076 GIE Set B Q.No. 1a What is secretary tissue? [1]
4. 2076 Set C Q.No. 1a Name main component of matrix. [1]
5. 2075 GIE Q.No. 1g Mention the functions of the lymph. [1]
6. 2075 Set A Q.No. 1a What is the plastic epithelium? [1]
7. 2075 Set B Q.No. 1b Mention the total amount of blood in an average person. [1]
8. 2073 Supp Q.No. 1a Which epithelium lines the blood vessel? [1]
9. 2073 Set C Q.No. 1a Which protein is present in white fiber? [1]
10. 2073 Set D Q.No. 1a Write the functions of heparin and histamine. [1]
11. 2072 Supp. Q.No. 1a Why are bones brittle in old age? [1]
12. 2072 Set C Q.No. 1a What is matrix? [1]
13. 2072 Set D Q.No. 1f Squamous epithelium is called pavement tissue. Why? [1]
14. 2072 Set E Q.No. 1a Write down the role of mast cell. [1]
15. 2071 Supp. Q.No. 1a Mention the basic function of epithelial tissue. [1]
16. 2071 (Set C) Q.No. 1 a Name the tissue whose cells divide throughout the life. [1]
17. 2071 (Set D) Q.No. 1a Where does the mast cells are located? [1]
18. 2070 Supp. Q.No. 1 a Name the tissue that connect bones with bone and muscle. [1]
19. 2070 Set C Q.No. 1 a Name the tissue that connects muscles with the bone. [1]
20. 2070 Set D Q.No. 1 a What is ligament ? [1]
21. 2069 Q.No. 1a What is periosteum? [1]
22. 2067 Q.No. 1h What is keratoplasty? [1]
23. 2066 Q.No. 1 a What is mast cell? [1]
24. 2065 Q.No. 1 a Define a ligament. [1]
25. 2062 Q.No. 1l What is Osteocyte? [1]
26. 2062 Q.No. 1m Which cell is the longest cell of the body? [1]
27. 2060 Q.No. 1a Which is the hardest tissue in the body? [1]
28. 2059 Q.No. 1b Mention the human body parts where you find unstriated muscles. [1]

Answer all in brief [3 marks]

29. 2077 Set K Q.No. 2a Differentiate between ligament and tendon. [3]
30. 2076 GIE Set B Q.No. 2a Describe the structure of calcified cartilage. [3]
31. 2076 Set B Q.No. 2a Cardiac muscle. [3]
32. 2076 Set C Q.No. 2a Write short note on lymph. [3]
33. 2075 GIE Q.No. 2a Write a short note on Haversian canal. [3]
34. 2075 Set A Q.No. 2a The structure and functions of columnar epithelial tissue. [3]
35. 2075 Set B Q.No. 2a Give an account of areolar tissue. [3]
36. 2074 Supp Q.No. 2b Write short note on WBC. [3]
37. 2074 Set A Q.No. 2b Explain the types and functions of connective tissue. [3]
38. 2074 Set B Q.No. 2a Differentiate between striated and unstriated muscles. [3]
39. 2073 Supp Q.No. 2a Describe Haversian Canal System. [3]
40. 2073 Set C Q.No. 2a Differentiate between cartilage and bone. [3]
41. 2073 Set D Q.No. 2a Describe Haversian Canal System. [3]
42. 2072 Set C Q.No. 2a Describe Adipose tissue. [3]
43. 2071 Supp. Q.No. 2a How striated muscle differ's from unstriated muscle. [3]
44. 2071 Set D Q.No. 2a Describe the structure of areolar tissue. [3]
45. 2071 Set C Q.No. 2a Mention the types and functions of connective tissue. [3]
46. 2070 Supp. Q.No. 2a Functions of connective tissue. [3]
47. 2069 Q.No. 2e Functions of epithelial tissue. [3]
48. 2068 Q.No. 2a The structure of bone. [3]
49. 2067 Q.No. 2a Differentiate between simple and compound epithelium. [3]
50. 2066 Q.No. 2 a Describe the Adipose tissue. [3]
51. 2065 Q.No.2 a Internal structure of bone [3]
52. 2060 Q.No.2j How is oxygen transported in the blood and released in the tissue? [3]

Long Answer Questions

53. 2067 Q.No. 4 Give an account of structure and functions of a nephron in human being. [8]

UNIT 2: DEVELOPMENTAL BIOLOGY

Very Short Answer Questions [2 marks]

1. 2077 Set K Q.No. 1c What do you understand by carrying capacity? [1]
2. 2077 Set R Q.No. 1b What is the function of sympathetic nervous system? [1]
3. 2076 GIE Set A Q.No. 1b What does the second polar body in the frog denote? [1]
4. 2076 GIE Set B Q.No. 1b Define gastrulation. [1]
5. 2076 Set B Q.No. 1g What is a fingerling? [1]
6. 2076 Set B Q.No. 1h What are pullets? [1]
7. 2076 Set C Q.No. 1b What is organogenesis? [1]
8. 2076 Set C Q.No. 1j What are pullets? [1]
9. 2075 Set A Q.No. 1b Mention the role of acrosome during fertilization. [1]
10. 2074 Supp Q.No. 1a What is the function of acrosome? [1]
11. 2074 Supp Q.No. 1b Define holoblastic cleavage. [1]
12. 2074 Set A Q.No. 1i Differentiate between spermatogenesis and oogenesis. [1]
13. 2074 Set B Q.No. 1h Which stage of egg is laid by frog? [1]

14. 2073 Supp Q.No. 1b Define spermatogenesis. [1]
15. 2073 Set C Q.No. 1b Mention the role of acrosome. [1]
16. 2073 Set D Q.No. 1b Define gametogenesis. [1]
17. 2072 Supp. Q.No. 1b Define cleavage. [1]
18. 2072 Set C Q.No. 1b Define gastrulation. [1]
19. 2071 Supp. Q.No. 1b What is yolkplug? [1]
20. 2071 (Set C) Q.No. 1 b Differentiate between animal pole and vegetal pole of Frog's egg. [1]
21. 2071 (Set D) Q.No. 1 b Define spermiogenesis. [1]
22. 2070 Supp. Q.No. 1 b Define epiboly. [1]
23. 2070 Set C Q.No. 1 b What is cleavage? [1]
24. 2070 Set D Q.No. 1 g What is sperm lysin? [1]
25. 2068 Q.No. 1b What is spermiogenesis? [1]
26. 2065 Q.No. 1 d What is the function of acrosome found is sperm cell? [1]
27. 2065 Q.No. 1 e Define the term blastulation. [1]
28. 2064 Q.No. 1i What is cleavage? [1]
29. 2063 Q.No. 1d What is holoblastic cleavage? [1]
30. 2061 Q.No. 1m Define cleavage. [1]
31. 2059 Q.No. 1e Give reason why micromere cells in frog's embryo are fast dividing. [1]

Answer all in very short [3 marks]

32. 2077 Set J Q.No. 2a Discuss the process of fertilization in frog. [3]
33. 2076 GIE Set A Q.No. 2b Discuss the process of fertilization in frog. [3]
34. 2076 GIE Set B Q.No. 2b Write about blastula. [3]
35. 2076 Set B Q.No. 2b The process of neurulation. [3]
36. 2076 Set C Q.No. 2b Write down the fate of mesoderm. [3]
37. 2075 GIE Q.No. 2b How coelom is formed during development of frog? [3]
38. 2075 Set A Q.No. 2b The formation of coelom in the embryo of frog. [3]
39. 2075 Set B Q.No. 2b How is gastrula formed during the development of frog? [3]
40. 2074 Supp Q.No. 2a What is spermatogenesis? Elaborate it. [3]
41. 2074 Set A Q.No. 2a Describe the formation of nervecord in the embryology of frog. [3]
42. 2074 Set B Q.No. 2d What is gastrulation? Discuss the process of gastrulation during the development of frog with diagrams. [3]
43. 2073 Supp Q.No. 2b Explain about the formation of notochord in the embryo of frog. [3]
44. 2073 Set C Q.No. 2b Discuss Gastrulation in Frog. [3]
45. 2073 Set D Q.No. 2b Explain briefly about the coelom formation in frog. [3]
46. 2072 Supp. Q.No. 2g Describe the formation of notochord in the embryo of frog. [3]
47. 2072 Set C Q.No. 2b Discuss the formation of coelom in the embryo of frog. [3]
48. 2072 Set D Q.No. 2f The coelom formation in frog. [3]
49. 2072 Set E Q.No. 2g The neurulation process in frog's embryo. [3]
50. 2071 Supp. Q.No. 1b The cleavage in the fertilized egg of frog. [3]
51. 2071 (Set D) Q.No. 2 b How is the notochord formed in embryo of frog? [3]
52. 2071 (Set C) Q.No. 2 b Explain the process of neurulation. [3]
53. 2070 Supp. Q.No. 2 b Morula and blastula stage of frog. [3]
54. 2070 Set C Q.No. 2 e Give an account of the formation of coelom in the embryo of frog. [3]
55. 2070 Set D Q.No. 2 g Blastula formation of frog. [3]
56. 2069 Q.No. 2a Formation of nervecord. [3]
57. 2068 Q.No. 2b About the coelom formation in frog. [3]
58. 2067 Q.No. 2b Discuss the fate of ectoderm. [3]
59. 2059 Q.No.2c Describe the structure of frog's gastrula. [3]
60. 2052 Q.No.2f List the process of segmentation of the egg of frog. [3]

Mark (√) the correct choice [1 mark]

61. 2052 Q.No. 1i Cleavage in frog is:
    a. Holoblastic and unequal
    b. Holoblastic and equal
    c. Centrolecithal
    d. None of them [1]

Long Questions

62. 2066 Q.No. 3 Describe the formation of coelome during the development of frog. [7.5]
63. 2065 Q.No. 3 Describe the changes taking place during gastrulation in frog. [7.5]
64. 2064 Q.No. 6 What are germinal layers? How they are formed in the embryo of frog? [6]
65. 2063 Q.No. 6 Describe embryonic development of frog up to formation of blastula stage. [6]
66. 2062 Q.No. 6 How does fertilization take place in frog? Describe its development up to the formation of gastrula. [6]
67. 2061 Q.No. 6 What is coelome? Describe its formation in the development of frog. [6]
68. 2060 Q.No. 6 Describe the development of frog upto the formation of 3 germinal layers. [6]
69. 2058 Q.No. 6 What is coelom? How is it formed in the development of frog? [1+3+2]
70. 2057 Q.No. 6 What are germinal layers? How they are formed in frog's embryo? [1+5]

UNIT 3: HUMAN BIOLOGY AND HEALTH

A. Anatomy and Physiology

Very Short Answer Questions [1 mark]

1. 2077 Set J Q.No. 1a Write one important character of cardiac muscle. [1]
2. 2077 Set J Q.No. 1b What is collip's hormone? [1]
3. 2077 Set R Q.No. 1a When is the first heart sound produced? [1]

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4. 2076 GIE Set A Q.No. 1c Mention the role of ear ossicles. [1]
5. 2076 GIE Set A Q.No. 1d Who is the father of Endocrinology? [1]
6. 2076 GIE Set A Q.No. 1e What is portal system? [1]
7. 2076 GIE Set A Q.No. 1f What are the photo receptor cells present in human eye? [1]
8. 2076 GIE Set A Q.No. 1g What causes emphysema in human beings? [1]
9. 2076 GIE Set B Q.No. 1c What materials are responsible for making bones hard and strong? [1]
10. 2076 Set B Q.No. 1d Define nerve impulse. [1]
11. 2076 Set B Q.No. 1a Name the place where actual exchange of gases takes place inside the lung. [1]
12. 2076 Set B Q.No. 1b What is double circulation? [1]
13. 2076 Set B Q.No. 1c Which hormone controls osmoregulation? [1]
14. 2076 Set C Q.No. 1c What is meant by dead space? [1]
15. 2076 Set C Q.No. 1d Why is ultra filtration called so? [1]
16. 2076 Set C Q.No. 1e In which part of oviduct fertilization occurs? [1]
17. 2075 GIE Q.No. 1a Name the muscles involved in breathing. [1]
18. 2075 GIE Q.No. 1b Why the ventricles have thicker wall than that of auricle? [1]
19. 2075 GIE Q.No. 1d Name the fluid present inside the internal ear. [1]
20. 2075 GIE Q.No. 1e What is the term for one contraction phase and one relaxation phase of heart? [1]
21. 2075 GIE Q.No. 1f Name the part of retina where sharp image is formed. [1]
22. 2075 Set A Q.No. 1c Define natural pace-maker. [1]
23. 2075 Set A Q.No. 1d Mention the function of pons-varolii. [1]
24. 2075 Set A Q.No. 1f What is antigen? [1]
25. 2075 Set B Q.No. 1a Name the covering of lungs. [1]
26. 2075 Set B Q.No. 1c What do you mean by auditory meatus? [1]
27. 2075 Set B Q.No. 1d What is PEM? [1]
28. 2075 Set B Q.No. 1e Which structure is called pace maker of the heart? [1]
29. 2075 Set B Q.No. 1f Which pigment enables us to see in the dark? [1]
30. 2075 Set B Q.No. 1g Mention the importance of Rh factor. [1]
31. 2074 Supp Q.No. 1c Define vital capacity. [1]
32. 2074 Supp Q.No. 1d Name the HCl secreting cells of stomach. [1]
33. 2074 Supp Q.No. 1e Name two neurotransmitter. [1]
34. 2074 Supp Q.No. 1f Which minerals are required for development of bone and teeth? [1]
35. 2074 Supp Q.No. 1g Which hormone is called birth hormone? [1]
36. 2074 Supp Q.No. 1j Define Rh-factor. [1]
37. 2074 Set A Q.No. 1a Which pigment is responsible for night vision? [1]
38. 2074 Set B Q.No. 1d What is barr-body? [1]
39. 2074 Set A Q.No. 1h What are neurotransmitters? Give an example. [1]
40. 2074 Set A Q.No. 1j Define ultrafiltration. [1]
41. 2074 Set B Q.No. 1a Differentiate between chyme and chyle. [1]
42. 2074 Set B Q.No. 1b What is Hamburger shift? [1]
43. 2074 Set B Q.No. 1c Define Rh-factor? [1]
44. 2074 Set B Q.No. 1e Give the name of one mixed and motor nerves. [1]
45. 2074 Set B Q.No. 1f Write the possible blood groups of children when parents blood group are A and AB. [1]
46. 2074 Set B Q.No. 1g What causes the characteristic smell of urine? [1]
47. 2074 Set B Q.No. 1i Define the term deamination. [1]
48. 2074 Set B Q.No. 1j Give the Dental formula of an adult man. [1]
49. 2073 Supp Q.No. 1c What are two diseases caused by the deficiency of vitamin A? [1]
50. 2073 Supp Q.No. 1d What is the most toxic excretory product produced in the body? [1]
51. 2073 Supp Q.No. 1f What is chloride shift? [1]
52. 2073 Supp Q.No. 1g Where is the location of bicuspid valve? [1]
53. 2073 Set C Q.No. 1c What do you understand by yellow spot? [1]
54. 2073 Set C Q.No. 1d State Ionic Theory. [1]
55. 2073 Set C Q.No. 1e Write the meaning of arteriosclerosis. [1]
56. 2073 Set C Q.No. 1f Which hormone is called emergency hormone and why? [1]
57. 2073 Set D Q.No. 1c Name two enzymes responsible for protein digestion. [1]
58. 2073 Set D Q.No. 1d What is deamination? [1]
59. 2073 Set D Q.No. 1f What are the essential enzymes to digest oil? [1]
60. 2073 Set D Q.No. 1g Where lies the organ of corti? [1]
61. 2072 Supp. Q.No. 1d When does menopause occur? [1]
62. 2072 Supp. Q.No. 1e What is safe period? [1]
63. 2072 Supp. Q.No. 1h Name the endocrine part of pancreas. [1]
64. 2072 Set C Q.No. 1c What do you mean by dead space? [1]
65. 2072 Set C Q.No. 1d Write the full form of FSH and LH. [1]
66. 2072 Set D Q.No. 1a Why blind spot of retina cannot form image? [1]
67. 2072 Set D Q.No. 1c Write down the function of somatostatin. [1]
68. 2072 Set D Q.No. 1d Name sensory cranial nerves. [1]
69. 2072 Set D Q.No. 1i Mention the role of acrosome during fertilization. [1]
70. 2072 Set E Q.No. 1b Name the minerals needed for proper growth of teeth and bone. [1]
71. 2072 Set E Q.No. 1c What are Haemopoitic organs? [1]
72. 2072 Set E Q.No. 1d What do you mean by deamination? [1]
73. 2072 Set E Q.No. 1e What is the role of eustachian tube? [1]

74. 2072 Set E Q.No. 1j What is gluconeogenesis? [1]
75. 2071 Supp. Q.No. 1c Define reabsorption. [1]
76. 2071 Supp. Q.No. 1d What do you mean by synapse? [1]
77. 2071 (Set C) Q.No. 1 c Define the term peristalsis. [1]
78. 2071 (Set C) Q.No. 1 d What is chloride shift? [1]
79. 2071 (Set C) Q.No. 1 e Name the fluid in which the membranous labyrinth floats. [1]
80. 2071 (Set C) Q.No. 1 f Which pigment enables us to see in dark? [1]
81. 2071 (Set D) Q.No. 1 c Mention any two enzymes for protein digestion. [1]
82. 2071 (Set D) Q.No. 1 d Define the term deamination. [1]
83. 2071 (Set D) Q.No. 1 h Name three auditory ossicles. [1]
84. 2070 Supp. Q.No. 1 e What is homeostasis? [1]
85. 2070 Supp. Q.No. 1 f Define synaptic vessicle. [1]
86. 2070 Supp. Q.No. 1 h Define interferon. [1]
87. 2070 Set C Q.No. 1 i What are narcotics? [1]
88. 2070 Set C Q.No. 1 c Which mineral is required for the growth of bone and teeth? [1]
89. 2070 Set C Q.No. 1 e Differentiate between hormones of enzymes. [1]
90. 2070 Set D Q.No. 1 b Name the pigments found in bile. [1]
91. 2070 Set D Q.No. 1 c What is the location of Adam's apple? [1]
92. 2070 Set D Q.No. 1 d Which hormone is useful for retaining salt in body? [1]
93. 2070 Set D Q.No. 1 e Name two neurotransmitters. [1]
94. 2070 Set D Q.No. 1 f Which system of body is affected by Tuberculosis? [1]
95. 2070 Set D Q.No. 1 h Why is ultra filtration called so? [1]
96. 2070 Set D Q.No. 1 i What is glycogenolysis? [1]
97. 2069 Q.No. 1b Name the main steps of nutrition. [1]
98. 2069 Q.No. 1c What do you mean by myogenic heart? [1]
99. 2069 Q.No. 1d Which part of the retina has only cones? [1]
100. 2069 Q.No. 1f Name the endocrine part of pancreas. [1]
101. 2069 Q.No. 1g Write the effects of increased secretion of sex corticoids in women. [1]
102. 2069 Q.No. 1h What is antibody? [1]
103. 2069 Q.No. 1j Define the term sexing. [1]
104. 2068 Q.No. 1a In what form is oxygen transported to tissues? [1]
105. 2068 Q.No. 1c Define the carrying capacity of the environment. [1]
106. 2068 Q.No. 1d What is most toxic excretory product produced in the body? [1]
107. 2068 Q.No. 1e Name the harmone secreted by corpus luteum. [1]
108. 2068 Q.No. 1f What are narcotics? [1]
109. 2068 Q.No. 1g What do you understand by Rh-factor? [1]
110. 2067 Q.No. 1a Mention the location and important feature of cardiac muscle. [1]
111. 2067 Q.No. 1b What is Hamburger's phenomenon? [1]
112. 2067 Q.No. 1c Why blood group A person can not donate blood to Blood group B person? [1]
113. 2067 Q.No. 1d Name the pigment needed for vision in dim light. [1]
114. 2067 Q.No. 1e Mention the functions of human ear. [1]
115. 2066 Q.No. 1 b Which pigment is responsible for night vision? [1]
116. 2066 Q.No. 1 c What do you understand by stroke volume? [1]
117. 2066 Q.No. 1 d Mention the role of hemoglobin. [1]
118. 2066 Q.No. 1 e What is chloride shift? [1]
119. 2065 Q.No. 1 b What are the vitamins produced in human colon with the help of bacteria? [1]
120. 2065 Q.No. 1 c Mention the function of hypothalamus. [1]
121. 2064 Q.No. 1h What is the function of lung? [1]
122. 2064 Q.No. 1j What is malnutrition? [1]
123. 2064 Q.No. 1k Mention the role of molars. [1]
124. 2064 Q.No. 1l What do you mean by capillaries? [1]
125. 2064 Q.No. 1m What is middle ear? [1]
126. 2063 Q.No. 1b Mention the role of acrosome. [1]
127. 2063 Q.No. 1e Name the enzyme which curdles milk. [1]
128. 2063 Q.No. 1g What do you mean by Rh factor? [1]
129. 2063 Q.No. 1i What are neurotransmitters? [1]
130. 2062 Q.No. 1h What is the function of liver? [1]
131. 2062 Q.No. 1i What is ventricle? [1]
132. 2062 Q.No. 1j What is pulmonary respiration? [1]
133. 2062 Q.No. 1m What is the role of veins? [1]
134. 2061 Q.No. 1h What is the function of kidney? [1]
135. 2061 Q.No. 1j What is the role of arteries? [1]
136. 2061 Q.No. 1k Mention the types of respirations. [1]
137. 2061 Q.No. 1n Define permanent teeth. [1]
138. 2060 Q.No. 1c Define the term 'deamination'. [1]
139. 2060 Q.No. 1d Which pigment gives colour to urine? [1]
140. 2060 Q.No. 1e What do you mean by uterus? [1]
141. 2060 Q.No. 1f Which pigment enable us to see in the dark? [1]
142. 2059 Q.No. 1g Name the thoracic muscles involving in inspiration process of man. [1]
143. 2059 Q.No. 1h Mention the hormone when abnormally secreted results simple goiter. [1]
144. 2059 Q.No. 1i Write the dental formula of adult man. [1]
145. 2059 Q.No. 1j Define ultrafiltration. [1]
146. 2059 Q.No. 1k Name the photoreceptor cells in the human eye. [1]
147. 2058 Q.No. 1b Define 'atrial systole'. [1]
148. 2058 Q.No. 1g What is grey matter? [1]
149. 2058 Q.No. 1n Give the role of ACT hormone. [1]
150. 2058 Q.No. 1o Name two proteolytic enzymes present in the intestinal juice. [1]
151. 2057 Q.No. 1b Where do you find "Adam's apple"? [1]
152. 2057 Q.No. 1f What is the structure of lens in human eye? [1]
153. 2057 Q.No. 1h Which artery supplies the blood to the shoulder? [1]
154. 2057 Q.No. 1i Mention the function of bile. [1]

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165. 2057 Q.No. 1k Which hormone results the growth of human body? [1]
166. 2057 Q.No. 1m Which part of human brain is the centre of intelligence? [1]

Mark (√) the correct choice [1 mark]

167. 2056 Q.No. 1a Nitrogen is the constituent of- (i) Carbohydrate (ii) Lipid (iii) Protein (iv) Organic acid [1]
168. 2054 Q.No. 1c Both exocrine and endocrine secretion is found in the gland:
☐ Parathyroid ☐ Thymus
☐ Pancreas ☐ Adrenal [1]
169. 2052 Q.No. 1iv Pancreas is: a. Exocrine b. Endocrine c. Gonads d. None of them [1]

Answer in very Brief [3 marks]

160. 2077 Set J Q.No. 2b Describe artificial pace maker and its importance. [3]
161. 2077 Set R Q.No. 2a Differentiate between compact bone and spongy bone. [3]
162. 2076 GIE Set A Q.No. 2a Write short note on formed elements. [3]
163. 2076 Set B Q.No. 2c The role of vitamins. [3]
164. 2076 Set B Q.No. 2d The role of bile in the fat digestion. [3]
165. 2076 Set B Q.No. 2e Distinguish between endocrine and exocrine glands. [3]
166. 2076 Set C Q.No. 2c Discuss CO_2 transport. [3]
167. 2076 Set C Q.No. 2d Explain working of Heart. [3]
168. 2076 Set C Q.No. 2e Differentiate between sympathetic and para sympathetic nervous system. [3]
169. 2075 GIE Q.No. 2c Significance of ovarian cycle? [3]
170. 2075 GIE Q.No. 2d Write about neuro transmitters used by sympathetic and parasympathetic nervous system. [3]
171. 2075 GIE Q.No. 2e How the foods are digested in human intestine? [3]
172. 2075 Set A Q.No. 2c The function of pituitary gland. [3]
173. 2075 Set A Q.No. 2d The phenomenon of chloride shift. [3]
174. 2075 Set A Q.No. 2e Draw a well labelled diagram of a neuron (No description is required). [3]
175. 2075 Set B Q.No. 2c How carbohydrate is digested in human digestive tract? [3]
176. 2075 Set B Q.No. 2d The role of graafian follicle. [3]
177. 2075 Set B Q.No. 2e How impulse transmitted through a nerve fibre? [3]
178. 2074 Supp Q.No. 2c Define portal vein. Describe hepatic portal system with its significance. [3]
179. 2074 Supp Q.No. 2d What is micturition? Describe its process. [3]
180. 2074 Supp Q.No. 2e Enlist about ear ossicles and their roles. [3]
181. 2074 Set A Q.No. 2e Explain the protein digestion in human alimentary canal. [3]
182. 2074 Set A Q.No. 2f Draw a well labelled diagram of human ear. Discuss the physiology of hearing. [3]
183. 2074 Set A Q.No. 2g Describe the structure and functions of thyroid gland in brief. [3]
184. 2074 Set B Q.No. 2b Discuss about the hormones secreted by thyroid gland. [3]
185. 2074 Set B Q.No. 2g Write down the differences between sympathetic and parasympathetic nervous system. [3]
186. 2073 Supp Q.No. 2c Give a brief account of the action of different proteolytic enzymes. [3]
187. 2073 Supp Q.No. 2d Explain the functions of medulla oblongata. [3]
188. 2073 Set C Q.No. 2c Write short note on Natural Pacemaker. [3]
189. 2073 Set C Q.No. 2d Explain ovarian cycle. [3]
190. 2073 Set D Q.No. 2c Draw a neatly labelled diagram of a neuron. [3]
191. 2073 Set D Q.No. 2d Differentiate between Hyperthyroidism and Hypothyroidism. [3]
192. 2072 Supp. Q.No. 2a Describe Haversian Canal System. [3]
193. 2072 Supp. Q.No. 2b Discuss the action of proteolytic enzymes. [3]
194. 2072 Supp. Q.No. 2e Draw a neat and labelled diagram of section of eye (No. description is required) [3]
195. 2072 Set C Q.No. 2d Describe the structure and function of cochlea. [3]
196. 2072 Set C Q.No. 2e Mention the functions of fat soluble vitamins. [3]
197. 2072 Set C Q.No. 2f Draw a neatly labelled sketch of a nephron. (No description required) [3]
198. 2072 Set D Q.No. 2a Mechanism of hearing. [3]
199. 2072 Set D Q.No. 2c The sources and functions of vitamin A. [3]
200. 2072 Set D Q.No. 2d The pancreas as Heterocrine gland. [3]
201. 2072 Set D Q.No. 2e Differentiate between sympathetic and parasympathetic nervous system. [3]
202. 2072 Set E Q.No. 2a Role of fats in body. [3]
203. 2072 Set E Q.No. 2b Types of neurons. [3]
204. 2072 Set E Q.No. 2e The pancreas as compound gland. [3]
205. 2072 Set E Q.No. 2f The menstrual cycle. [3]
206. 2071 Supp. Q.No. 1c Role of diaphragm in respiration. [3]
207. 2071 Supp. Q.No. 1d What are islets of Langerhan's, name the cells involved with them and give their functions. [3]
208. 2071 Supp. Q.No. 1e Ear ossicles and their roles. [3]
209. 2071 Supp. Q.No. 1f About the leydig cells. [3]
210. 2071 (Set C) Q.No. 2 c Write the effects of hypothyroidism. [3]
211. 2071 (Set C) Q.No. 2 e Describe kidney as a homeostatic organ. [3]
212. 2071 (Set D) Q.No. 2 c What is vitamin? Mention the functions of fat soluble vitamins. [3]
213. 2071 (Set D) Q.No. 2 d Draw a well labelled diagram of internal structure of kidney. [3]

214. 2070 Supp. Q.No. 2 c An artificial respiration. [3]
215. 2070 Supp. Q.No. 2 d Antagonistic effects of insulin and glucagon. [3]
216. 2070 Supp. Q.No. 2 e The role of iris in image formation. [3]
217. 2070 Supp. Q.No.2 f About menopause. [3]
218. 2070 Set C Q.No. 2 d Draw a neatly labelled sketch of human ear (No description is required). [3]
219. 2070 Set C Q.No. 2 a Describe the structure of a neuron. [3]
220. 2070 Set D Q.No. 2 a Working mechanism of human eye. [3]
221. 2070 Set D Q.No. 2 c Differentiate between inspiration and expiration. [3]
222. 2070 Set D Q.No. 2 e Natural pacemaker. [3]
223. 2069 Q.No. 2b Importance of vitamins. [3]
224. 2069 Q.No. 2c The role of graafian follicle. [3]
225. 2069 Q.No. 2d Exchange of gases in the lung. [3]
226. 2068 Q.No. 2c Action of different proteolytic enzymes. [3]
227. 2068 Q.No. 2d Give an account of adrenal cortex. [3]
228. 2068 Q.No. 2g Differentiate between sympathetic and parasympathetic nerves. [3]
229. 2067 Q.No. 2d Describe the function of liver. [3]
230. 2067 Q.No. 2g Describe the role of pituitary gland in Endocrinology. [3]
231. 2066 Q.No.2 c List the hormones required for proper functioning of male and female reproductive organs. [3]
232. 2066 Q.No.2 d Draw a neatly labelled diagram of a nephron. (No description is required.) [3]
233. 2065 Q.No. 2 b Structure and function of cochlea. [3]
234. 2065 Q.No. 2 c Symptoms and causes of anemia [3]
235. 2064 Q.No. 2f Describe briefly about the importance of microelements. [3]
236. 2064 Q.No.2g Sketch the well labelled diagram of L.S. of human kidney. [3]
237. 2063 Q.No.2a What are vitamins? Why they are essential? [3]
238. 2063 Q.No.2b Write a note on an artificial pacemaker. [3]
239. 2063 Q.No.2e Describe structure and function of adrenal gland. [3]
240. 2062 Q.No.2f Show the internal structure of human heart (diagrammatically). [3]
241. 2061 Q.No.2i Draw a labeled V.S. of human eyes. [3]
242. 2061 Q.No.2j What is the function of endocrine glands? [3]
243. 2060 Q.No.2e Draw a labeled L.S. of human kidney. [3]
244. 2060 Q.No.2f What are heart sounds? How are they produced? [3]
245. 2059 Q.No.2f Discuss the histological structure of human pancreas. [3]
246. 2059 Q.No.2g Draw a labelled sketch of internal ear of man. [3]
247. 2059 Q.No.2h Name the hormones produced by adrenal gland and state their functions. [3]
248. 2058 Q.No.2b Explain the phenomenon of reflex action. [3]
249. 2058 Q.No.2c List the functions of human kidney. [3]
250. 2058 Q.No.2f Distinguish between antigen and antibody. [3]
251. 2057 Q.No.2f How human heart beating starts? [3]
252. 2057 Q.No.2h What is the structure of adrenal gland? Name the hormones it produces. [3]
253. 2054 Q.No.2b Mention the function of pituitaries. [3]
254. 2053 Q.No. 3a Justify pancreas as exocrine and endocrine gland. [3]
255. 2053 Q.No. 3b Mention the function of male sex hormone. [3]
256. 2052 Q.No. 3c What is endocrine gland? Give the list of major endocrine glands. [3]

Differentiate between following [3 marks]

257. 2056 Q.No. 3f Thyroxine hormone triggers the rate of metamorphosis. [4]
258. 2054 Q.No. 4d Thyroid gland and Thymus gland [3]

Discuss the following [4 marks]

259. 2056 Q.No. 3f Thyroxine hormone triggers the rate of metamorphosis. [4]
260. 2055 Q.No.2a Structure of the Thyroid gland. [4]

Explain the following, each one in a short paragraph [4 marks]

261. 2055 Q.No. 3a Pituitary gland is referred to as "Master Gland". Why? [4]

Long Answer Questions

262. 2077 Set J Q.No. 3 Describe pituitary gland and various hormones produced by it with their functions. [7]
263. 2077 Set K Q.No. 3 Discuss the physiology of respiration in human beings. [7]
264. 2076 GIE Set A Q.No. 3 Describe the alimentary canal of human with well labeled diagram. [7.5]
265. 2076 GIE Set A Q.No. 4 Discuss the physiology of urine formation in human beings with composition of urine. [8]
266. 2076 Set B Q.No. 3 Describe the structure and functions of different parts of human brain. [7.5]
267. 2076 Set B Q.No. 3 OR Give an account of the process of urine formation in human being. [7.5]
268. 2076 Set C Q.No. 3 Describe the structure and function of uriniferous tubule with labeled diagram. [7.5]
269. 2076 Set C Q.No. 3 OR Describe the structure of female reproductive organs with menstrual cycle in human being. [7.5]
270. 2075 GIE Q.No. 3 Describe the structure and functions of pituitary gland. [7.5]
271. 2075 GIE Q.No. 3OR Give an account of the process of urine formation in human being. [7.5]
272. 2075 Set A Q.No. 3 Define homeostasis. Explain the mechanism of urine formation in human body. [7.5]
273. 2075 Set A Q.No. 3 OR Give a detailed account of male reproductive organ of man. [7.5]
274. 2075 Set B Q.No. 3 Describe the structure and functions of an adrenal gland. [7.5]
275. 2075 Set B Q.No. 3 OR Describe the structure of a nephron giving its working mechanism. [7.5]
276. 2074 Supp Q.No. 3 Give an account on human alimentary canal. [7.5]

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277. 2074 Supp Q.No. 4 Describe the physiology of respiration. [8]
278. 2074 Set A Q.No. 3 Define aerobic respiration. Explain the mechanism of respiration in human being. [7.5]
279. 2074 Set A Q.No. 3OR What is myogenic heart? Describe the internal structure of human heart with labelled diagram. [7.5]
280. 2074 Set B Q.No. 3 Describe the origin and conduction of heart beat with necessary diagram. [7.5]
281. 2074 Set B Q.No. 3OR Describe the structure of human eye with well labelled diagram. [7.5]
282. 2073 Supp Q.No. 3 Give an account of the structure and function of human ear. [7.5]
283. 2073 Supp Q.No. 3OR Describe female reproductive system in human being. [7.5]
284. 2073 Set C Q.No. 3 What is aerobic respiration? Describe pulmonary respiration in human with suitable diagram. [7.5]
285. 2073 Set C Q.No. 4 Describe the structure and function of human brain with well labelled diagram. [8]
286. 2073 Set D Q.No. 3 Describe the structure of human eye.[7.5]
287. 2073 Set D Q.No. 3 OR Describe female reproductive system in human. [7.5]
288. 2072 Supp. Q.No. 3 Explain the structure of human ear. [7.5]
289. 2072 Supp. Q.No. 3 OR Describe the structure and function of human heart. [7.5]
290. 2072 Set C Q.No. 3 Give a detailed account of male reproductive organs of man. [7.5]
291. 2072 Set C Q.No. 3 or What are myogenic hearts? Explain origin and conduction of heart beat in human being. [7.5]
292. 2072 Set D Q.No. 3 Describe the alimentary canal of Human with labelled diagram. [7.5]
293. 2072 Set D Q.No. 4 Discuss the transmission of nerve impulse with well labelled diagram. [8]
294. 2072 Set E Q.No. 3 Describe the structure and function of Human Heart with labelled diagram. [7.5]
295. 2072 Set E Q.No. 3 or Describe the physiology of digestion in Human being. [7.5]
296. 2071 Supp. Q.No. 3 Describe the process of food digestion in human beings. [7.5]
297. 2071 Supp. Q.No. 4 or Give the account of the structure and working mechanism of human heart. [8]
298. 2071 Set C Q.No. 3 OR Describe female reproductive system of human being. [7.5]
299. 2071 Set C Q.No. 4 Given the structure and working mechanism of human heart. [8]
300. 2071 Set D Q.No. 3 Describe the structure and functions of brain. [7.5]
301. 2071 Set D Q.No. 3 OR Discuss about the male reproductive organs of human being. [7.5]
302. 2070 Supp. Q.No. 3 Discuss about the structure and working of human heart. [7.5]
303. 2070 Supp. Q.No. 4 Give an account of digestive system of man. [8]
304. 2070 Set C Q.No. 3 Describe the respiratory organs of man[7.5]
305. 2070 Set C Q.No. 3 or Give an account of Alimentary canal of man. [7.5
306. 2070 Set D Q.No. 3 Describe the respiration in human beings with suitable diagrams. [7.5]
307. 2070 Set D Q.No. 4 Discuss the physiology of digestion in human beings. [8]
308. 2069 Q.No. 3 Describe the structure and functions of human brain. [7.5]
309. 2069 Q.No. 4 Give an account of the process of Urine formation in human being. [8]
310. 2068 Q.No. 3 Explain the course of blood circulation in the human heart with the help of neat and well labeled diagram. [7.5]
311. 2068 Q.No. 4 Give an account of the retina in human eye, and mention its working mechanism. [8]
312. 2067 Q.No. 3a Describe the pulmonary respiration and mechanism of breathing in human being. [7.5]
313. 2066 Q.No. 4 Give an account of the structure and function of human brain. [8]
314. 2065 Q.No. 4 Describe the digestive organs of man with the help of well labelled diagram. [8]
315. 2064 Q.No. 4 Explain the course of blood circulation in the human heart with well labelled diagram. [10]
316. 2063 Q.No. 4 Discuss the processes of urine formation in a nephron. [8]
317. 2063 Q.No. 4 OR Give an account of the structure and functions of human ear. [10]
318. 2062 Q.No. 4 Describe the human alimentary canal and process of digestion with neat diagram. [10]
319. 2061 Q.No. 4 What is respiration? Describe the respiratory system of human being. [10]
320. 2060 Q.No. 4 Write an account of the structure and working of human heart. [10]
321. 2059 Q.No. 4 Discuss the internal structure of human lung and mention its working mechanism. [5+2]
322. 2058 Q.No. 3 Describe the fertilization process in human beings. [7]
323. 2058 Q.No. 3 OR Write the basic features of digestive system in mammals. Draw a well labeled diagram of alimentary canal of man. [5+2]
324. 2058 Q.No. 5 Draw a well-labeled sketch of structure of human heart. [7]
325. 2057 Q.No. 4 Write an account of the structure of mammalian kidney. How it acts as homeostatic organ? [5+5]

B. Human Population

Very Short Answer Questions [1 mark]

1. 2077 Set K Q.No. 1b What does it mean by window period in AIDS? [1]
2. 2076 GIE Set B Q.No. 1d Which part of the brain functions as endocrine gland? [1]
3. 2076 GIE Set B Q.No. 1e What are psychedelic drugs? [1]
4. 2073 Set D Q.No. 1e How would you define psychotropic drugs? [1]
5. 2072 Set E Q.No. 1f Give full form of IUD. [1]
6. 2070 Set C Q.No. 1 d Define population. [1]
7. 2069 Q.No. 1e What do you understand by the term census?[1]

8. 2060 Q.No. 1c What do you mean by natality rate? [1]
9. 2058 Q.No. 1j What is demography? [1]

Answer all in brief [3 marks]

10. 2077 Set R Q.No. 2b Illustrate mechanism of hearing. [3]
11. 2076 GIE Set A Q.No. 2c Illustrate the mechanism of breathing in man. [3]
12. 2076 GIE Set B Q.No. 2c What disease is caused by the deficiency of iron? [3]
13. 2076 GIE Set B Q.No. 2f Write about Hepatities 'B'. [3]
14. 2076 Set B Q.No. 2g Population growth curves. [3]
15. 2075 GIE Q.No. 2f The problems of population explosion. [3]
16. 2075 Set B Q.No. 2f Various problems of over population. [3]
17. 2074 Set A Q.No. 2c Enlist the control measures of human population growth. [3]
18. 2074 Set B Q.No. 2c What is Malthus theory of human population? Discuss the consequences of overpopulation. [3]
19. 2073 Supp Q.No. 2g Describe the measures of family planning. [3]
20. 2072 Supp. Q.No. 2d Write down the causes of population growth. [3]
21. 2073 Set C Q.No. 2f Discuss methods of control of over population. [3]
22. 2071 Supp. Q.No. 1g Malthus theory of population growth. [3]
23. 2071 (Set D) Q.No. 2 e Discuss on problems of over human population. [3]
24. 2070 Supp. Q.No. 2 g The various factors controlling population growth. [3]
25. 2070 Set C Q.No. 2 c Discuss the control measures of over population. [3]
26. 2069 Q.No. 2g The trends of human population growth. [3]
27. 2067 Q.No. 2c Write short note on control measures of human population growth. [3]
28. 2066 Q.No.2 b Write the consequences of overpopulation. [3]
29. 2065 Q.No.2 e Meaning of carrying capacity and causes of population growth. [3]
30. 2064 Q.No.2i Differentiate between J-shaped and S-shaped curves. [3]
31. 2062 Q.No.2g What are the disadvantages of over population? [3]
32. 2061 Q.No.2g Discuss about the over population of human beings. [3]
33. 2057 Q.No.2g Discuss the consequences of over human population. [3]

Long Questions

34. 2077 Set J Q.No. 3 OR Describe the causative agent, mode of transmission, symptoms, control and preventive measures of AIDS. [7]
35. 2077 Set K Q.No. 3 OR Describe causative agents symptoms, mode of transmission and control of typhoid. [7]
36. 2077 Set R Q.No. 3 Describe the structure and function of human heart with its working mechanism. [7]
37. 2077 Set R Q.No. 3 OR Describe the various aspects of cancer with its control and preventive measures. [7]
38. 2076 GIE Set A Q.No. 3 OR Discuss the causative agent, mode of transmission, symptoms and control measures of AIDS in Nepal. [7.5]
39. 2076 GIE Set B Q.No. 3 Describe Alimentary Canal of man. [7.5]
40. 2076 GIE Set B Q.No. 3 OR Discuss the origin and conduction of heart beat. [7.5]
41. 2071 (Set C) Q.No. 3 Discuss about the human population growth, problems of over population and control strategies. [7.5]
42. 2060 Q.No. 4 OR Discuss the human population growth, problems of over population and control strategies. [7.5]

C. Disease

Very Short Answer Questions [1 mark]

1. 2076 GIE Set B Q.No. 1j How would you define pollution? [1]
2. 2076 Set B Q.No. 1i Why do drug addicts suffer from AIDS? [1]
3. 2076 Set B Q.No. 1j Hepatitis is more dangerous than AIDS, why? [1]
4. 2076 Set C Q.No. 1f Write full form of ELISA. [1]
5. 2076 Set C Q.No. 1g Why and when was TB declared as world emergency? [1]
6. 2075 GIE Q.No. 1c What is pellagra? [1]
7. 2075 GIE Q.No. 1i Give the meaning of "window period" in AIDS. [1]
8. 2075 Set A Q.No. 1e Define the term drug abuse. [1]
9. 2075 Set A Q.No. 1j Write the full form of LSD and COPD. [1]
10. 2074 Set A Q.No. 1f Which disease is caused due to deficiency of vitamin C? [1]
11. 2074 Set A Q.No. 1g Define passive smoking. [1]
12. 2073 Supp Q.No. 1e How would you define narcotics? [1]
13. 2073 Set C Q.No. 1g What is carcinogen? Give two examples. [1]
14. 2073 Set C Q.No. 1h What is vaccine? [1]
15. 2073 Set D Q.No. 1i What is pathogen? [1]
16. 2072 Supp. Q.No. 1c Give the causative agent of Typhoid fever. [1]
17. 2072 Supp. Q.No. 1f What are psychedelic drugs? [1]
18. 2072 Supp. Q.No. 1g Define immunosuppressant. [1]
19. 2072 Set C Q.No. 1f Mention the incubation period of Hepatitis 'B'. [1]
20. 2072 Set C Q.No. 1h How would you define drug? [1]
21. 2072 Set C Q.No. 1i Name a drug that gives boundless energy. [1]
22. 2072 Set D Q.No. 1b Which drugs are obtained from hemp plant? [1]
23. 2072 Set D Q.No. 1g Name carcinogen present in tobacco. [1]
24. 2072 Set E Q.No. 1g What is metastasis? [1]
25. 2071 Supp. Q.No. 1e Why a drunk person should not drive? [1]
26. 2071 (Set D) Q.No. 1 e Name the causative agent of typhoid. [1]
27. 2071 (Set D) Q.No. 1 i Give the cause of myopia. [1]
28. 2070 Supp. Q.No. 1 c Give the mode of transmission of hepatitis B. [1]

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2070 Set C Q.No. 1 g Define malignant tumor. [1]
2070 Set C Q.No. 1 h What is the incubation period of hepatitis 'A'? [1]
2066 Q.No. 1h Name two diseases caused by deficiency of vitamin A. [1]
2067 Q.No. 1i What is Toxoid? Give example. [1]
2067 Q.No. 1j Why in Hepatitis dangerous than AIDS. [1]
2064 Q.No. 1h What is the full form of AIDS? [1]
2062 Q.No. 1i What are the causative agents of tuberculosis? [1]
2061 Q.No. 1i What are the causative agents of typhoid? [1]
2058 Q.No. 1f What are psychotropic drugs? [1]

Answer in Brief [3 marks]

2076 Set C Q.No. 2g Write down the mode of the transmission of Hepatitis B. [3]
2074 Set A Q.No. 2d Discuss the reasons of drug abuse and control measures to prevent it. [3]
2074 Set B Q.No. 2f Define addiction. Discuss the different types of drugs and their effects. [3]
2073 Set C Q.No. 2e Write on control and prevention of smoking. [3]
2073 Set D Q.No. 2f Write a note on hepatitis. [3]
2072 Supp. Q.No. 2f Give a brief account of 'Kala-Azar'. [3]
2072 Set E Q.No. 2c The short and long term effects of use of tobacco. [3]
2071 (Set C) Q.No. 2 d Discuss different diseases caused by malnutrition. [3]
2071 (Set C) Q.No. 2 f Give the symptoms and control methods of tuberculosis. [3]
2071 (Set D) Q.No. 2 g Write notes on hepatitis B. [3]
2070 Set C Q.No. 2 g Mention the health hazards of tobacco smoke. [3]
2070 Set D Q.No. 2 b Ill effects of alcohol on health. [3]
2066 Q.No.2 e Write a note on smoking. [3]
2064 Q.No.2j Elaborate about the control of smoking. [3]
2063 Q.No.2c Differentiate between benign and malignant tumour. [3]
2062 Q.No.2j Elaborate about the causes of typhoid. [3]
2060 Q.No.2c "AIDS is very common among drug addicts." Discuss. [3]
2058 Q.No.2g Explain the major causes of cancer. [3]

Long Answer Questions

2076 GIE Set B Q.No. 4 What is socially significant disease? Discuss about alcoholism. [8]
2076 Set B Q.No. 4 What is addiction? Discuss the symptoms, effects and control measures of alcohol addiction in detail. [8]
2076 Set C Q.No. 4 Describe the causative agent, mode of transmission, symptoms, control and prevention of Typhoid. [8]
2075 GIE Q.No. 4 Explain sources and biological effects of different categories of drugs. [8]
2075 Set A Q.No. 4 Define AIDS? Mention its causative organism, mode of transmission, symptoms, diagnosis treatment and preventive measures. [8]
2075 Set B Q.No. 4 Explain the sources and effects of different types of drugs on health. [8]
2074 Supp Q.No. 3 OR What is cancer? Discuss the cause and treatment of cancer. [7.5]
2074 Set A Q.No. 4 What are communicable diseases? Discuss the causative agent, mode of transmission, incubation period, symptoms, diagnosis, control and preventive measures of tuberculosis. [8]
2074 Set B Q.No. 4 Discuss the different stages, causative agents, symptoms, treatment and types of cancer. [8]
2073 Supp Q.No. 4 Give a detailed account of any bacterial disease you have studied. [8]
2073 Set C Q.No. 3 OR Discuss the causative agent, mode of transmission, symptoms, control and prevention of Ascariasis in the context of Nepal. [7.5]
2073 Set D Q.No. 4 Discuss causative agent, symptoms, method of diagnosis, mode of infection and preventive and control measures of Tuberculosis. [8]
2072 Supp. Q.No. 4 What is cancer? Discuss its causes, types, symptoms, control measures, diagonosis and treatment. [8]
2072 Set C Q.No. 4 Discuss the causative agent, mode of transmission, symptoms, diagnosis and control measures of Tuberculosis. [8]
2072 Set D Q.No. 3 OR Describe Tuberculosis as world emergency with causative agent, mode of transmission, symptoms and control measures. [7.5]
2072 Set E Q.No. 4 Describe the causative agent, epidemiology, symptoms and control of Tuberculosis. [8]
2071 Supp. Q.No. 4 What is AIDS? Write what you know about the AIDS. [8]
2071 (Set D) Q.No. 4 What are communicable diseases? Describe the causative agents, symptoms, effects and control measures of any one communicable disease you have studied. [8]
2070 Supp. Q.No. 4 OR Describe the causes and symptoms of the following diseases: Typhoid, Tuberculosis, Cancer and AIDS. [8]
2070 Set C Q.No. 4 Discuss causative agent, incubation period, affected organs, mode of transmission, symptoms, prevention and control measures of AIDS. [8]
2070 Set D Q.No. 3 Or Write, what you know about the AIDS? [7.5]
2069 Q.No. 4OR Write an essay on socially significant diseases. [8]
2068 Q.No. 4 or What is cancer? Discuss its types, causes, symptoms, control measure, diagnosis and treatment. [8]
2067 Q.No. 3a Or Describe the causative agent, mode of transmission and control measure of typhoid. [4]

80. 2066 Q.No. 4 OR What is DOTS? Discuss the causative agent, symptoms, effect and control measures of tuberculosis. [8]
81. 2065 Q.No. 4 OR What is AIDS? Mention its causative organism, mode of transmission, symptoms, diagnosis, treatment and preventive measures. [8]
82. 2064 Q.No. 4 OR What are communicable diseases? Elaborate about the causative agents, symptoms, effects and controlling measures of tuberculosis. [10]
83. 2062 Q.No. 4 OR What is cancer? Discuss the causes and treatment of cancer and also mention one major cancer in man and woman each. [10]
84. 2061 Q.No. 4 OR Define AIDS, and elaborate about its origin, causative agents, mode of transmission and controlling measures. [10]
85. 2059 Q.No. 4 OR What is addiction? Discuss the symptoms, effects and control measures of alcohol addition. [10]
86. 2058 Q.No. 4 OR What is 'DOTS'? Describe causal organism, symptoms, transmission and preventive measures of tuberculosis. [1+1+2+2+4]
87. 2057 Q.No. 4 OR What are communicable diseases? Discuss the causative agents, symptoms, effects and control measures of any one communicable disease you have studied. [2+1+2+2+3]

UNIT 4: APPLICATION OF BIOLOGY

Very Short Answer Questions [1 mark]

1. 2077 Set J Q.No. 1c Why is fish farming suitable for Nepal? [1]
2. 2077 Set R Q.No. 1c How is psychedelic drug different from psychotropic drug? [1]
3. 2076 GIE Set A Q.No. 1h What and when was the first antibiotic invented? [1]
4. 2076 GIE Set A Q.No. 1i Keratoplasty is highly successful. Why? [1]
5. 2076 GIE Set A Q.No. 1j Mention the benefit of animal husbandry. [1]
6. 2076 GIE Set B Q.No. 1f What is immunity? [1]
7. 2076 GIE Set B Q.No. 1g Why is amniocentesis normally banned these days? [1]
8. 2076 GIE Set B Q.No. 1h What is fingerling? [1]
9. 2076 GIE Set B Q.No. 1i Who discovered first antibiotic? [1]
10. 2076 Set B Q.No. 1e What is vaccine? Name their types. [1]
11. 2076 Set B Q.No. 1f Give limitations of organ transplantation. [1]
12. 2076 Set C Q.No. 1h What do you mean by allograft? [1]
13. 2076 Set C Q.No. 1i Who invented the first Antibiotics? [1]
14. 2075 GIE Q.No. 1h Differentiate between vaccine and injection. [1]
15. 2075 GIE Q.No. 1j Define the term 'rejection'. [1]
16. 2075 Set A Q.No. 1g What is a Down's syndrome? [1]
17. 2075 Set A Q.No. 1h What do you mean by exotic fish? [1]
18. 2075 Set A Q.No. 1i Differentiate between autograft and isograft. [1]
19. 2075 Set B Q.No. 1h What is prophylaxis? [1]
20. 2075 Set B Q.No. 1i Give any two applications of vaccines. [1]
21. 2075 Set B Q.No. 1j What are immunosuppressants? [1]
22. 2074 Supp Q.No. 1h What is IVF technology? [1]
23. 2074 Supp Q.No. 1i What is meant by broad spectrum antibiotics? [1]
24. 2074 Set A Q.No. 1b Mention two main properties of antibiotics. [1]
25. 2074 Set A Q.No. 1c What is erythroblastosis fetails? [1]
26. 2074 Set A Q.No. 1d How is ammnicentesis misused? [1]
27. 2074 Set A Q.No. 1e Name any two indigenous fish of Nepal. [1]
28. 2073 Supp Q.No. 1h Give the meaning of surrogacy. [1]
29. 2073 Supp Q.No. 1i What do you mean by Antibiotics? [1]
30. 2073 Supp Q.No. 1j Name two commercially produced fish varieties. [1]
31. 2073 Set C Q.No. 1i What is xenograft? Mention its use. [1]
32. 2073 Set C Q.No. 1j What do you mean by poultry farming? [1]
33. 2073 Set D Q.No. 1h What do you mean by IVF Technology? [1]
34. 2073 Set D Q.No. 1j What are two popular varieties of fishes in Nepal? [1]
35. 2072 Supp. Q.No. 1i What is test tube baby? [1]
36. 2072 Supp. Q.No. 1j Define about the significance of poultry farming. [1]
37. 2072 Set C Q.No. 1e What is antibiotics? [1]
38. 2072 Set C Q.No. 1g Why is amniocentesis banned? [1]
39. 2072 Set C Q.No. 1j Define significance of poultry farming. [1]
40. 2072 Set D Q.No. 1e Which analysis is carried out to find the sex of unborn baby? [1]
41. 2072 Set D Q.No. 1h What is xenograft? [1]
42. 2072 Set D Q.No. 1j Why is surrogacy banned in some countries? [1]
43. 2072 Set E Q.No. 1h How is test tube baby different from normal baby? [1]
44. 2072 Set E Q.No. 1i Name two indigenous fishes found in Nepal. [1]
45. 2071 Supp. Q.No. 1f Give the reason to develop test-tube baby technique. [1]
46. 2071 Supp. Q.No. 1g Name the first antibiotic. [1]
47. 2071 Supp. Q.No. 1h Define second generation vaccines. [1]
48. 2071 Supp. Q.No. 1i Define xenograft with example. [1]
49. 2071 Supp. Q.No. 1j Give two advantages of amniocentesis technique. [1]
50. 2071 (Set C) Q.No. 1 g Who extracted penicillin for the first time? [1]
51. 2071 (Set C) Q.No. 1 h Define the term immunity. [1]
52. 2071 (Set C) Q.No. 1 i What do you mean by extensive fish farming? [1]
53. 2071 (Set C) Q.No. 1 j What are pullets? [1]

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64. 2071 (Set D) Q.No. 1 f Differentiate between autograft and heterograft. [1]
65. 2071 (Set D) Q.No. 1 g What is the role of Surrogate mother? [1]
66. 2071 (Set D) Q.No. 1 j What is integrated fish farming? [1]
67. 2070 Supp. Q.No. 1 d At what stage an embryo is implanted in the uterus to apply the test-tube baby technique. [1]
68. 2070 Supp. Q.No. 1 g Who discovered the first antibiotic? [1]
69. 2070 Supp. Q.No. 1 i Define allograft with example. [1]
70. 2070 Supp. Q.No. 1 j Name first test-tube baby with date. [1]
71. 2070 Set C Q.No. 1 f What is antigen? [1]
72. 2070 Set C Q.No. 1 j What do you mean by vaccination? [1]
73. 2070 Set D Q.No. 1 j What do you mean by vaccination? [1]
74. 2069 Q.No. 1i Define immunity. [1]
75. 2068 Q.No. 1i What is called brooding? [1]
76. 2068 Q.No. 1j What do you mean by surrogate mother? [1]
77. 2067 Q.No. 1f Who invented penicillin and when? [1]
78. 2067 Q.No. 1g What do you understand by poultry farming? [1]
79. 2067 Q.No. 2e Give brief account of antibiotics. [1]
70. 2067 Q.No. 2f Discuss the significance of Amniocentesis in brief. [1]
71. 2066 Q.No. 1 f At what period amniocentasis is done? [1]
72. 2066 Q.No. 1 g What is the role of immunosuppresant in organ transplantation? [1]
73. 2065 Q.No. 1 f What is ELISA test? [1]
74. 2065 Q.No. 1 g Write the meaning of surrogate mother. [1]
75. 2062 Q.No. 1k What is antigen? [1]
76. 2059 Q.No. 1m Give the meaning of amniocentesis. [1]
77. 2059 Q.No. 1n Mention any two chief properties of antibiotics. [1]
78. 2057 Q.No. 1l Mention any two chief uses of antibiotics. [1]

Answer all in brief. [3 marks]

79. 2077 Set J Q.No. 2c Why is poultry farming important for Nepalese society? [3]
80. 2077 Set K Q.No. 2b Discuss the artificial respiration and its importance. [3]
81. 2077 Set K Q.No. 2c IVF technology in boon for human being. Justify. [3]
82. 2077 Set R Q.No. 2c Discuss the scope of fish farming in Nepal. [3]
83. 2076 GIE Set A Q.No. 2d Write down the ill effects of alcohol on health. [3]
84. 2076 GIE Set A Q.No. 2e Mention the consequences of over population. [3]
85. 2076 GIE Set A Q.No. 2f Write short note on surrogacy. [3]
86. 2076 GIE Set A Q.No. 2g Give brief account on vaccines. [3]
87. 2076 GIE Set B Q.No. 2d List the types of fish ponds. [3]
88. 2076 GIE Set B Q.No. 2e Give a brief account of merits and demerits of pesticides. [3]
89. 2076 GIE Set B Q.No. 2g Give a brief account of organ transplantation. [3]
90. 2076 Set B Q.No. 2f The role of mother in a test tube baby. [3]
91. 2076 Set C Q.No. 2f Discuss significance of surrogacy. [3]
92. 2075 GIE Q.No. 2g The advantages of poultry farming. [3]
93. 2075 Set A Q.No. 2f Vaccine and their types. [3]
94. 2075 Set A Q.No. 2g Poultry farming in Nepal. [3]
95. 2075 Set B Q.No. 2g Advantages of fish farming. [3]
96. 2074 Supp Q.No. 2f Write note on poultry farming. [3]
97. 2074 Supp Q.No. 2g What is vaccination? Describe their types. [3]
98. 2074 Set B Q.No. 2e Define organ transplantation and discuss its different types. [3]
99. 2073 Supp Q.No. 2e Discuss the scope of fish farming in Nepal. [3]
100. 2073 Supp Q.No. 2f Write a short note on vaccines. [3]
101. 2073 Set C Q.No. 2g Explain advantages of fish farming in Nepal. [3]
102. 2073 Set D Q.No. 2e Give a short note on poultry farming in Nepal. [3]
103. 2073 Set D Q.No. 2g Discuss the merits and demerits of amniocentesis. [3]
104. 2072 Supp. Q.No. 2c Mention the scope of fish farming. [3]
105. 2072 Set C Q.No. 2c Explain the role of surrogate mother. [3]
106. 2072 Set C Q.No. 2g Discuss the advantages of fish farming. [3]
107. 2072 Set D Q.No. 2g The advantages of pisciculture in Nepal. [3]
108. 2072 Set E Q.No. 2d Note on vaccine. [3]
109. 2071 (Set D) Q.No. 2 f Define amniocentesis, mention its merits and demerits too. [3]
110. 2071 (Set C) Q.No. 2 g Discuss the advantages and drawbacks of test tube baby. [3]
111. 2070 Set C Q.No. 2 b Write a note on poultry farming. [3]
112. 2070 Set C Q.No. 2 f Discuss the benefit of organ transplantation. [3]
113. 2070 Set D Q.No. 2 d The importance of poultry farming in Nepal. [3]
114. 2070 Set D Q.No. 2 f Advantages of organ transplantation. [3]
115. 2069 Q.No. 2f Advantage and disadvantage of amniocentesis. [3]
116. 2068 Q.No. 2e What are vaccines? Describe their types. [3]
117. 2068 Q.No. 2f About the scope of fish farming in Nepal. [3]
118. 2065 Q.No.2 d Amniocentesis. [3]
119. 2062 Q.No.2e Write a note on amniocentesis. [3]
120. 2061 Q.No.2h What is the benefit of organ transplantation? [3]
121. 2057 Q.No.2f Write a note on organ transplantation. [3]

YEARWISE QUESTIONS

2077 (Set J)

Time: 1:30 hrs. **Full Marks (Condense): 30**

Group 'A'
Botany

Attempt all questions.

1. **Answer in short on any two.** [2×1=2]
   a. Define cross pollination.
   b. Name two plants in which vegetative propagation takes place by modified root.
   c. What is farmyard manure?
2. **Describe in brief on any two.** [2×3=6]
   a. Describe the physiological effects of auxin on plants.
   b. Describe the double helical structure of Watson and Crick model of DNA.
   c. Describe the application of fermentation technology in industries.
3. What is transpiration? Give an account of the structure of stomata and its working mechanism during transpiration. [7]
   OR
   Describe semi-conservative method of DNA replication.

Group 'B'
Zoology

Attempt all questions.

1. **Answer in short on any two.** [2×1=2]
   a. Write one important character of cardiac muscle.
   b. What is collip's hormone?
   c. Why is fish farming suitable for Nepal?
2. **Describe in brief on any two.** [2×3=6]
   a. Discuss the process of fertilization in frog.
   b. Describe artificial pace maker and its importance.
   c. Why is poultry farming important for Nepalese society?
3. Describe pituitary gland and various hormones produced by it with their functions. [7]
   OR
   Describe the causative agent, mode of transmission, symptoms, control and preventive measures of AIDS.

2077 (Set K)

Time: 1:30 hrs. **Full Marks (Condense): 30**

Group 'A'
Botany

Attempt all questions.

1. **Answer in short on any two.** [2×1=2]
   a. Define anatomy.
   b. What is callus?
   c. Define photo phosphorylation.
2. **Describe in brief on any two.** [2×3=6]
   a. Differentiate between the xylem and phloem tissues.
   b. Describe the types of RNA.
   c. Describe the application of genetic engineering in agriculture.
3. Describe the internal structure of dicot stem with its salient features and compare it with monocot stem. [7]
   OR
   What is mutation? Describe its types and their role in evolution.

Group 'B'
Zoology

Attempt all questions.

1. **Answer in short on any two.** [2×1=2]
   a. When is the first heart sound produced?
   b. What is the function of sympathetic nervous system?
   c. How is psychedelic drug different from psychotropic drug?
2. **Describe in brief on any two.** [2×3=6]
   a. Differentiate between compact bone and spongy bone.
   b. Illustrate mechanism of hearing.
   c. Discuss the scope of fish farming in Nepal.
3. Describe the structure and function of human heart with its working mechanism. [7]
   OR
   Describe the various aspects of cancer with its control and preventive measures.

2077 (Set R)

Time: 1:30 hrs. **Full Marks (Condense): 30**

Group 'A'
Botany

Attempt all questions.

1. **Answer in short on any two.** [2×1=2]
   a. Define guttation.
   b. What is criss-cross inheritance?
   c. Define hybridization.
2. **Describe in brief on any two.** [2×3=6]
   a. Structure and function of collenchyma.
   b. Explain the Mendel's law of dominance with chart.
   c. Mention the importances of vegetative propagation with examples.
3. Describe the anatomy of monocot stem with its salient features and compare it with dicot stem. [7]
   OR
   Describe the Griffith's Bacterial transformation experiment to show that DNA is a genetic material.

Group 'B'
Zoology

Attempt all questions.

1. **Answer in short on any two.** [2×1=2]
   a. Name sensory cranial nerves.
   b. What does it mean by window period in AIDS?
   c. What do you understand by carrying capacity?
2. **Describe in brief on any two.** [2×3=6]
   a. Differentiate between ligament and tendon.
   b. Discuss the artificial respiration and its importance.
   c. IVF technology in boon for human being. Justify.
3. Discuss the physiology of respiration in human beings. [7]
   OR
   Describe causative agents symptoms, mode of transmission and control of typhoid.

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Mathematics

NEW SYLLABUS

Full Marks: 100 **Teaching hours: 150**

I. Introduction:

This course is a continuation to the course of Grade XI. It further consolidates the concept learnt in Grade XI. For the completeness of the course it includes other areas in mathematics such as Mechanics, Group theory, Statistics and probability, Numerical methods.

Group (A) contains eleven units, and is compulsory while Group (B) and Group (C) each containing four units are optional. Students will be required to offer either Group (B) or Group (C).

II. Specific Objectives:

On completion of this course students will able to:

1. state basic principles of counting and find number of permutations and combinations of set of objects with various conditions;
2. prove binomial theorem for positive index, state exponential and logarithmic series, and apply them in solving problems;
3. understand group as algebraic structure and establish simple results on finite and infinite groups;
4. derive equations of parabola, ellipse and hyperbola and find tangent & normal to the parabola;
5. locate points in space and derive the equation of plane;
6. define product of vectors and give their geometrical meaning and use it to find various results of geometry and trigonometry;
7. establish the relation between continuity and differentiability of a function, compute, derivatives of exponential, logarithmic and hyperbolic and inverse circular functions, apply Hospital's rule;
8. determine standard integrals, use partial fractions of integrate rational function;
9. define differential equations and different forms of solutions and use them in application;
10. state measures of dispersion and find coefficient of correlation and equation of regression;
11. define probability, establish basic laws of probability;
12. define parallelogram of forces, composition and resolution of forces, triangle of forces, and prove Lami's theorem;
13. find resultant of like and unlike parallel forces, moment of a force and moment of couple of forces;
14. state and use Newton's laws of motion. Find Impulse, Work, Energy & Power, and acquaint with a projectile;
15. formulate linear programming problem, solve LPP graphically and by simplex method;
16. determine a root of equations by numerical methods; and
17. evaluate integrals by trapezoid and Simpson's rules.

III. Course Contents:

Group 'A'

Unit 1:Permutation and Combination. **10 hrs**

Basic principle of counting, Permutation of (a) set of objects all different (b) set of objects not all different (c) circular arrangement (d) repeated use of the same object. Combination of things all different, Properties of combination.

Unit 2:Binomial Theorem **10 hrs**

Binomial theorem for a positive integral index, general term. Binomial coefficients, Binomial theorem for any index (Without proof), Application to approximation, Euler's number. Expansion of e^x, a^x and log (1 + x) (without proof).

Unit 3:Elementary Group Theory **8 hrs**

Binary operation, Binary operation on sets of integers and their properties, Definition of a Group, Groups whose element are not numbers, Finite and infinite groups, Uniqueness of identity, Uniqueness of inverse, Cancellation law, Abelian Group.

Unit 4:Conic Sections **12 hrs**

Standard equation of parabola, Ellipse and Hyperbola, Equations of tangent and normal to a parabola at a given point.

Unit 5:Co-ordinates in Space **12 hrs**

Co-ordinate axes, Co-ordinate planes, The octants, Distance between two points, External and internal point of division. Direction cosines and ratios, fundamental relation between direction cosines, Projections, Angle between two lines. General equation of a plane, Equation of a plane in intercept and normal form, Plane through three given points, Plane through the intersection of two given planes, Parallel and perpendicular planes, angle between two planes distance of a point from a plane.

Unit 6:Vectors and its Applications **14 hrs**

Cartesian representation of vectors, Collinear and non-collinear vectors, Coplanar and non-Coplanar vectors, Linear combination of vectors.

Scalar product of two vectors, Angle between two vectors, Geometric interpretation of scalar product, Properties of Scalar Product, Condition of perpendicularity, Vector product of two vectors, Geometric interpretation of vector product, Properties of Vector Product, Application of product of vectors in plane trigonometry.

Unit 7:Derivative and its Application **14 hrs**

Derivative of inverse trigonometric, exponential and logarithmic functions by definition, Relationship between continuity and differentiability, Rules for differentiating hyperbolic function and inverse hyperbolic function, Composite function and function of the type $f(x)^{g(x)}$. L'Hospital's rule (for 0/0, ∞/∞), Differentials, Tangent and Normal, Geometric interpretation and application of Rolle's theorem and Mean value theorem.

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Unit 8:Antiderivatives 7 hrs

Antiderivatives, Standard integrals, Integrals reducible to standard forms, Integrals of rational functions.

Unit 9:Differential Equations and their Applications 7 hrs

Differential equation and its order and degree, Differential equations of first order and first degree: Differential equations with separable variables, homogeneous and exact differential equations.

Unit 10: Dispersion, Correlation and Regression 12 hrs

Dispersion. Measures of dispersion (Range, Semi interpqrtlle range, Mean deviation, Standard deviation) variance, Coefficient of variation, Skewness, Karl Pearson's and Bowley's Coefficient of Skewness, Bivariate distribution, Correlation, Nature of correlation, Correlation coefficient by Karl Pearson's method. Interpretation of correlation coefficient, Properties of correlation coefficient (Without proof) Regression equation, Regression line of *y* on x and x on *y*.

Unit 11: Probability 8 hrs

Random experiment, sample space, Event, Equally likely cases, Mutually exclusive events, Exhaustive cases, Favourable cases, Independent and dependent cases, Mathematical and empirical definition of probability, Two basic laws of probability, Conditional probability (without proof), Binomial distribution, Mean and Standard deviation of binomial distribution (without proof).

Group 'B'

Unit 12: Statics 9 hrs

Forces and resultant forces, Parallelogram of forces, Composition and resolution of forces, Resultant of coplanar forces acting at a point, Triangle of forces and Lami's theorem.

Unit 13: Statics (Continued) 9 hrs

Resultant of like and unlike parallel forces, Moment of a force, Varignon's theorem, Couple and its properties (without proof).

Unit 14: Dynamics 9hrs

Motion of particle in a straight line, Motion with uniform acceleration, Motion under gravity, Motion down a smooth inclined plane. The concepts and theorems be restated and formulated as application of calculus.

Unit 15: Dynamics (Continued) 9 hrs

Newton's laws of motion, Impulse, Work, Energy and Power, Projectiles.

Group 'C'

Unit 16: Linear Programming 11 hrs

Introduction of a linear programming problem (LPP), Graphical solution of LPP in two variables, Solution of LPP by simplex method (two variables).

Unit 17: Computational Method 9 hrs

Introduction to Numerical computing (Characteristics of Numerical computing Accuracy, Rate of Convergence, Numerical Stability, Efficiency); Number systems (Decimal, Binary, Octal & Hexadecimal system conversion of one system into another), Approximations and error in computing Roots of nonlinear equation, Algebraic, polynomial & transcendental equations and their solution by bisection and Newton - Raphson Methods,

Unit 18: Computational Method (Continued) 8 hrs

Solution of system of linear equations by Gauss elimination method, Gauss-Seidel method, Ill conditioned systems, Matrix inversion method.

Unit 19: Numerical Integration 8 hrs

Trapezoidal and Simpson's rules, estimation of errors.

V. Reference books:

1. Adhikari, D.B. and et.al. ***Element of Mathematics Part II.*** Himalaya Book Stall.
2. Bajracharya, D.R.; Shrestha, R.M. and et.al. ***Higher Secondary Level Basic Mathematics (For Grade XII).*** Kathmandu: Sukunda Pustak Bhawan.
3. Bajracharya, P.M. and Basnet, G. (2008). ***Fundamentals of Mathematics (For Grade XII).*** Kathmandu: Buddha Academic Publishers and Distributors P. Ltd.
4. Balagurusamy, E., ***Numerical Methods.*** India: Tata McGraw Hill.
5. Pant, S.R. and et.al. ***A Text-Book of Higher Secondary Mathematics (For Grade XII).*** Kathmandu: Buddha Academic Publishers and Distributors P. Ltd.
6. Ranganath, G.K. and Narayan, B.S. ***A Text-Book of Computer Oriented Numerical Methods and Linear Programming.***
7. Upadhyaya, M.P., ***An Introduction to Linear Programming.*** Kathmandu: Sukunda Pustak Bhawan.
8. Uprety, K.N. and Ghimire, K.P., ***Foundation of Mathematics, (For Grade XII).*** Pigeon Educational Publisher.
9. Sitaula, K., Sharma, B., Bhatta, C.R., ***Essential Mathematics***

Evaluation Scheme

Group	Question of 2 marks		Question of 4 marks			Question of 6marks			Total marks
	Number	Total marks	Number	OR-question	Total marks	Number	OR-question	Total marks	
A	12	24	8	3	32	3	1	18	74
B	3	6	2	1	8	2	1	12	26
C	3	6	2	1	8	2	1	12	26

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Remarks:
1. One question carrying 4 marks or 6 marks will be asked from each unit.
2. One question carrying 2 marks will be asked from each of the 11 units of group A.
3. One question carrying 2 marks will be asked from one of the 8 units of group A from which questions carrying 4 marks are asked
4. One question carrying 2 marks will be asked from each of any 2 units of group B from which questions carrying 4 marks are asked and one from each of any 2 units of group C from which questions carrying 4 marks are asked.
5. One question carrying 2 marks will be asked from one of any 2 units of group B and one from any two units of group C from which questions carrying 6 marks are asked.
6. OR-questions will be asked from the same unit.
7. The students are required to attempt all questions from Group A and all questions from Group B or C.

MODEL QUESTIONS

Grade: XII
Time: 3 hrs
Full Marks: 100
Pass Marks: 35

NEW MODEL QUESTIONS - 2068 (SET I)

Candidates are required to give their answer in their own words as far as practicable
The figures in the margin indicate full marks.
Attempt ALL questions of group A and group B or C.

Group A

1. a. It is required to seat 5 boys and 4 girls in a row so that the girls occupy the even places. How many such arrangements are possible? [2]
Ans: 2880 ways

b. Prove that: $\frac{1}{1.3}+\frac{1}{2.5}+\frac{1}{3.7}+\frac{1}{4.9}+\ldots = 2(1-\ln 2)$. [2]

c. Let $a * b = 3a + 2b$ for $a, b \in \mathbb{Z}$. Verify that * is a commutative binary operation on $\mathbb{Z}$. [2]

2. a. Find the equation of a hyperbola in standard position such that the length of transverse axis is 6 and it passes through (4, 2). [2]
Ans: $4x^2-7y^2=36$

b. Find the locus of points which are equidistant from the points (1, 2, 3) and (3, 2, –1). [2]
Ans: $x-2z=0$

c. Find the cosines of the angle between the vectors: $\vec{a} = (1,-2,-2)$, $\vec{b} = (2,1,-2)$. [2]
Ans: $\frac{4}{9}$

3. a. Find the derivative of $(\ln x)^{\sinh x}$. [2]
Ans: $(\ln x)^{\sinh x}\left[\frac{\sinh x}{x \ln x}+\cosh x \ln(\ln x)\right]$

b. Find the integral $\int \frac{dx}{1+2\sin x}$ [2]
Ans: $\frac{1}{\sqrt{3}}\ln\left|\frac{\tan x/2+2-\sqrt{3}}{\tan x/2+2+\sqrt{3}}\right|+C$

c. Find the integral $\int \frac{dx}{(x+7)\sqrt{2-x}}$ [2]
Ans: $\frac{1}{3}\ln\left|\frac{\sqrt{2-x}-3}{\sqrt{2-x}+3}\right|+C$

4. a. Solve the differential equation: $\frac{dy}{dx} = e^{x+y}+3x^2e^y$. [2]
Ans: $e^x+e^{-y}+x^3+C=0$

b. From the following data, calculate the expected value of Y when X = 25, and correlation coefficient r = 0.95. [2]

	X	Y
Average	5.6	12.5
Standard deviation	3.2	2.4

Ans: 26.3225

c. The average percentage of failures in a certain examination is 40. What is the probability that out of 5 candidates, at least 3 will be passed in the examination? [2]
Ans: 0.683

5. a. Show that the number of combinations of n different objects taken r at a time is given by

$$C(n, r) = \frac{n!}{(n-r)!\,r!}$$

Also, prove that $C(n, n-r) = C(n, r)$. [4]

OR

State the multiplication principle of counting. Prove that the number of circular permutations of n different objects taken all at a time is $(n-1)!$ [4]

b. What is a group? If a binary operation * is defined on a set S = {a, b, c} by the following Caley's table.

*	a	b	c
a	a	b	c
b	b	c	a
c	c	a	b

Show that (S, *) is a group. [4]

OR

Let a, b, c and x be elements of a group G. Solve for x if $axb = c$ and $x^2b = xa^{-1}c$. [4]

6. a. Find the integral $\int \frac{x}{x^3+1}dx$. [4]
Ans: $-\frac{1}{3}\ln|x+1|+\frac{1}{6}\ln|x^2-x+1|+\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2x-1}{\sqrt{3}}\right)+C$

b. What is a linear differential equation? Solve:

$(x^2+1)\frac{dy}{dx}+2xy = 3x^2$. [4]
Ans: $y(x^2+1) = x^3+C$

7. a. State the first mean value theorem of differential calculus and interpret it geometrically. Using it to $f(x) = \sin x$ on $[0, x]$, prove that $\sin x \le x$ for $x \ge 0$. [4]

b. An urn contains four white, eight black, six red and two green marbles. If three balls are drawn at random, find the probability of getting (i) all white marbles (ii) 2 red and 1 green marbles. [4]
Ans: (i) $\frac{1}{285}$ (ii) $\frac{1}{38}$

8. a. What is a conic section? Find the equation of the tangent to the parabola $y^2 = 8x$ which is parallel to the straight line $2x - 3y + 7 = 0$. Also find its point of contact. [4]

Ans: $2x - 3y + 9 = 0$ and (9/2, 6)

b. Define linearly independent vectors. Show that the following vectors are linearly dependent.

$2\vec{i} + \vec{j} - \vec{k}, 3\vec{i} - 2\vec{j} + \vec{k}, \vec{i} + 4\vec{j} - 3\vec{k}$ [4]

OR

Prove that if θ is the angle between the vectors $\vec{a}$ and $\vec{b}$, then $\vec{a} \cdot \vec{b} = ab \cos\theta$. [4]

9. For any positive integer n, prove that:

$(a + x)^n = C(n, 0)\, a^n + C(n, 1)\, a^{n-1} x + C(n, 2)\, a^{n-2} x^2 + \ldots + C(n, n)\, x^n$.

Find the term containing x^2, if any, in the expansion of $\left(\frac{2x}{3} - \frac{3}{2x}\right)^6$. [6]

Ans: 20/3

10. Find the direction cosines of two lines which are connected by the relations $2l + 2m - n = 0$, $mn + nl + lm = 0$. [6]

OR

Ans: $l = \frac{2}{3}, m = \frac{-1}{3}, n = \frac{2}{3}$ and $l = \frac{-1}{3}, m = \frac{2}{3}, n = \frac{2}{3}$

Prove that a plane through three points (x_1, y_1, z_1), (x_2, y_2, z_2) and (x_3, y_3, z_3) is given by

$$\begin{vmatrix} x-x_1 & y-y_1 & z-z_1 \\ x_2-x_1 & y_2-y_1 & z_2-z \\ x_3-x_1 & y_3-y_1 & z_3-z_1 \end{vmatrix} = 0$$

Also, find the angle between planes $2x - y + z = 6$ and $x + y + 2z = 3$. [6]

Ans: $\theta = \frac{\pi}{3}$

11. Lives of two models of refrigerators turned in for new models in a recent survey are

No. of years	No. of refrigerators	
	Model A	Model B
0 – 2	5	2
2 – 4	16	7
4 – 6	13	12
6 – 8	7	19
8 – 10	5	9
10 – 12	4	1

What is the average life of each model of these refrigerators? Which model has more uniformity? [6]

Ans: Average life of model: A = 5.12 years and B = 6.16 years and Model B [CV_A (54.88%) > CV_B (36.20%)]

Group B

12. a. Three forces P, Q and R acting on a particle are in equilibrium, the angle between the P and Q is 60° and that between Q and R is 150°. Find the ratios of the forces. [2]

Ans: $1:1:\sqrt{3}$

b. A uniform beam, 4 m long, is supported in a horizontal position by two props which are 3 m apart, so that the beam projects one meter beyond one of the props. Show that the force on one of the props is double of that on the other. [2]

c. A pump having a power of 392 W pumps water at the rate of 100 litres per minute. Find the height to which the water is raised. ($g = 9.8 m/s^2$, 1 litre of water = 1kg) [2]

Ans: 24 m

13. a. A body of weight w is suspended by strings of length 3 m and 4 m attached to two points in the same horizontal line whose distance apart is 5 m. Find the tensions along the strings. [4]

Ans: $T_1 = \frac{4}{5}w$ and $T_2 = \frac{3}{5}w$

b. A body of mass 49 kg is falling freely under gravity at the rate of 20 m/s. What is the uniform force that will stop it (i) in 2 sec (ii) in 50 cm? ($g = 9.8$ ms/²) [4]

Ans: (i) 99 kg.wt. (ii) 2049 kg.wt

OR

A bullet fired into a target losses half its velocity after penetrating 3 cm. How much further will it penetrate? [4]

Ans: 1 cm

14. a. The resultant of two like parallel forces P and Q acting on rigid body is a force of magnitude P + Q in the same direction as P and Q are. If A and B are any points on the lines of action of P and Q respectively, prove that the resultant divides line segment AB internally in the inverse ratio of the forces. [6]

OR

Define the moment of a force. Forces 1, 2, 4, 5 kg-wts act along the sides of a square taken in order. Prove that their resultant is parallel to a diagonal and find where it cuts the side along which the first force acts. [6]

Ans: 2:3

15. A man travels from A to B in 45 minutes. At C, somewhere between A and B, it attains its maximum velocity of 45 m per hr. If he travels with uniform acceleration from A to C and uniform retardation from C to B, find the distance between A and B, it being supposed that the man starts from rest at A and comes to rest at B. [6]

Ans: $16\frac{7}{8}$m

Group C

16. a. Determine graphically the solution set of the following system of inequalities:

$2x + y \geq 2, 3x + 2y \leq 4, x \geq 0, y \geq 0$ [2]

b. Write a short note on accuracy of a numerical method. [2]

c. Apply the Simpons's rule to approximate the value of $\int_1^4 e^x \ln x \, dx$ with n = 3. [2]

Ans: 58.9698

17. a. Using the simplex method, maximize $p = 6x - 9y$ subject to $2x - 3y \leq 6, x + y \leq 20, x \geq 0, y \geq 0$. [4]

Ans: Max. value p = 18 at (3, 0)

b. Use Bisection method to find solution accurate to within 10^{-2} for $x^3 - 7x^2 + 14x - 6 = 0$ on the interval [1, 3.2] [4]

Ans: 2.99375

OR

Write three methods for measuring error. Approximate $\sqrt{11}$ by Newton-Raphson's method with accuracy 0.00001. [4]

Ans: 3.31662

18. Find the approximate solution of the following system of equation by matrix inversion method:

$2x - y + z = -2, x + y - 2z = -9, x + 2y + z = 9$. [6]

Ans: (x, y, z) = (−2, 3, 5)

Derive the trapezoidal rule. The capacity of a battery is a measure of $\int i\,dt$, where i is the current. Estimate, using the Trapezium rule, the capacity of a battery whose current was measured over an eight hour period with the results shown below.

Time/hours	0	1	2	3	4	5	6	7	8
Current/Amps	25.2	29.0	31.8	36.5	33.7	31.2	29.6	27.3	28.6

Ans: 246

OR

Compute an approximate value of $\int_0^1 (1+x^2)^{-1}\,dx$ by using the composite trapezoid rule with three points. Then compare with the actual value of the integral. Next, determine the error formula and numerically verify an upper bound on it. [6]

Ans: 0.785; 0.01; 0.04167

NEW MODEL QUESTIONS - 2068 (SET II)

Grade: XII **Full Marks: 100**
Time: 3 hrs **Pass Marks: 35**

Candidates are required to give their answer in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt ALL questions of group A and group B or C.

Group A

1. a. In an examination paper containing 10 questions, a candidate has to answer 7 questions. If two questions are made compulsory, in how many ways can he choose 7 questions in all? [2]

Ans: 56 ways

b. Find the middle term in the expansion of $\left(2x+\frac{1}{3x^2}\right)^9$. [2]

Ans: $\frac{448}{9}\frac{1}{x^3}$ and $\frac{224}{27}\frac{1}{x^6}$

c. Let S = {– 1, 1} and * denote the usual operation of multiplication. Represent it by Cayley's table. Show that * is a binary operation on S. [2]

2. a. Find the eccentricity and the foci of the ellipse: $x^2+4y^2-4x+24y+24=0$. [2]

Ans: $\frac{\sqrt{3}}{2}$ and $(2\pm2\sqrt{3}, -3)$

b. Find the point where the line through the points (1, 2, 3) and (4, – 4, 9) meets the zx-plane. [2]

Ans: (2, 0, 5)

c. Are the three points with position vectors $\vec{i}+2\vec{j}+4\vec{k}$, $2\vec{i}+5\vec{j}-\vec{k}$ and $3\vec{i}+8\vec{j}-6\vec{k}$ collinear? Justify your answer. [2]

3. a. Using L'Hospital's rule, evaluate $\lim_{x\to0}\frac{e^x+e^{-x}-2\cos x}{\sin^2 x}$. [2]

Ans: 2

b. Evaluate: $\int\frac{dx}{\sqrt{(x-\alpha)(x-\beta)}}\ (\beta>\alpha)$. [2]

Ans: $2\ln\left|\sqrt{x-\alpha}+\sqrt{x-\beta}\right|+c$

c. If $\vec{a}=6\vec{i}+3\vec{j}-5\vec{k}$ and $\vec{b}=\vec{i}-4\vec{j}+2\vec{k}$ show that $\vec{a}\times\vec{b}$ is perpendicular to $\vec{a}$. [2]

4. a. Solve: $x\frac{dy}{dx}+y-1=0$. [2]

Ans: $x(y-1)=c$

b. If n = 10, $\Sigma X = 60$, $\Sigma Y = 60$, $\Sigma X^2 = 400$, $\Sigma Y^2 = 580$ and $\Sigma XY = 415$, find the correlation coefficient between the two variables. [2]

Ans: 0.59

c. Two dice are rolled once. What is the probability of getting a total of 9 or 6? [2]

Ans: $\frac{1}{4}$

5. a. In how many ways can the letters of the word "COMPUTER" be arranged so that
i. all the vowels are always together?
ii. the vowels may occupy only odd positions? [4]

Ans: (i) 4320 ways (ii) 2880 ways

b. Given the algebraic structure (G, *) with G = {1, ω, ω²} where ω represents an imaginary cube root of unity and * stands for the binary operation of multiplication, show that (G, *) is a group. [4]

6. a. Find the equation of the tangent to the parabola $y^2 = 4ax$ at the point (x_1, y_1). Express it in the slope form. [4]

OR

What is a conic section? Find the equation of the parabola in the standard form. [4]

b. Find the equation of plane through the point (2, 1, 4) and perpendicular to each of the planes. $9x-7y+6z+48=0$ and $x+y+z=0$. [4]

Ans: $13x+3y-16z+35=0$

7. a. Evaluate: $\int\frac{dx}{a+b\cos x}\ (a>b>0)$. [4]

Ans: $\frac{a-b}{|a-b|}\frac{2}{\sqrt{a^2-b^2}}\tan^{-1}\left(\sqrt{\frac{a-b}{a+b}}\tan\frac{x}{2}\right)+c$

b. Solve: $x^2\frac{dy}{dx}+y^2=xy$. [4]

Ans: $x = y(\log x + c)$

OR

Solve: $(1-x^2)\frac{dy}{dx}-xy=1$.

Ans: $y\sqrt{1-x^2}=\sin^{-1}x+c$

8. a. Find Karl Pearson's coefficient of skewness from the following distribution. [4]

Marks	Above 20	Above 30	Above 40	Above 50	Above 60
No. of students	50	46	30	24	8

Ans: – 0.41

b. The chance that A can solve a certain problem is $\frac{1}{4}$ and the chance that B can solve it is $\frac{2}{3}$. Find the chance that (i) the problem will be solved if they both try (ii) A solves but B cannot. [4]

Ans: (i) $\frac{3}{4}$ (ii) $\frac{1}{12}$

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OR

Suppose that in certain city 60% of all the recorded births are male. Suppose we select 5 birth records from population. What is the probability that

i. exactly three of them are male?

ii. 4 or more are male? [4]

Ans: (I) $\frac{216}{625}$ (II) $\frac{343}{3125}$

9. Show that: $\sum_{n=1}^{\infty} \frac{n^2}{(n+1)!} = e - 1.$ [6]

10. Define scalar product of two vectors. Find the geometrical interpretation of scalar product of two vectors. Prove vectorically that

$\cos(A + B) = \cos A \cos B - \sin A \sin B$ [6]

11. State Rolle's theorem. Interpret it geometrically. Verify Rolle's theorem for the function.

$f(x) = x(x-1)^2$ in $[0, 1]$

Also, find the point on the curve where the tangent is parallel to the x-axis. [6]

Ans: $1, \frac{1}{3}$

OR

Find from first principle the derivative of $\ln \cos^{-1} x$. [6]

Ans: $\frac{-1}{\sqrt{1-x^2}\cos^{-1} x}$

Group B

12. a. Forces equal to 7P, 5P and 8P acting on a particle are in equilibrium. Find the angle between the latter pair of forces. [2]

Ans: 120°

b. A body is projected vertically upwards with a velocity of 19.6 m/s. How long will it take to reach a point 294 m below the point of projection? (g = 9.8 m/s) [2]

Ans: 10 sec

c. A body of mass 50 kg falling from a certain height is brought to rest after striking the ground with a speed of 5 m/s. If the resistance force of the ground is 500 N, find the duration of the contract. [2]

Ans: 0.5 sec

13. a. P and Q are two like parallel forces acting at A and B. Show that if they interchange positions, the point of application of the resultant is displaced by a distance $\frac{P-Q}{P+Q}$ AB. [4]

OR

Forces 1 N, 2 N and 3 N act at a point in direction parallel to the sides of an equilateral triangle taken in order. Find their resultant. [4]

Ans: $\sqrt{3}$ N perpendicular to the second force

b. Prove that the sum of the kinetic and potential energies of a freely falling body remains constant throughout the motion. [4]

14. The horizontal and the vertical components of the initial velocity of a projectile are U and V respectively. If R be the horizontal range and H, the greatest height attained, prove that

i. $\frac{4H}{R} = \frac{V}{U}$ ii. $\left(\frac{R}{U}\right)^2 = \frac{8H}{g}$ [6]

OR

A cat seeing a mouse at a distance of 15 m before it, starts from rest with an acceleration of 2 m/s² and pursues it. If the mouse be moving uniformly with a velocity of 14 m/s, find when and where the cat will catch the mouse. [6]

Ans: 15 sec and 210 m

15. Define the moment of a force about a point and interpret its geometrical meaning. Prove that the algebraic sum of the moments of two intersecting forces about any point in their plane is equal to the moment of their resultant about the same point. [6]

Group C

16. a. If a man rides his car at 25 km/hr, he has to spend Rs. 2 per km on petrol. If he rides it at a faster speed of 40 km/hr, the petrol cost increases to Rs. 5 per km. He has Rs. 100 to spend on petrol and wishes to find the maximum distance he can travel within one hour. Formulate the above problem as a linear programming problem. [2]

Ans: $2x + 5y \le 100$; $8x + 5y \le 200$; $x \ge 0, y \ge 0$

b. Convert the decimal number 2011 into octal form. [2]

Ans: 3733_8

c. Is the following equations diagonally dominant: [2]

$12x + 3y - 5z = 1$ $x + 5y + 3z = 28$ $3x + 7y + 13z = 1$?

Ans: Yes

17. a. Using Gauss elimination method, solve the following system of equations: [4]

$x + 3y - z = -2$ $3x + 2y - z = 3$ $-6x - 4y - 2z = 18$

Ans: $(x, y, z) = (-24, 8, 2)$

OR

Solve the following equations using Gauss-seidal method: [4]

$2x_1 - x_2 = 8$; $3x_1 + 7x_2 = -5$

Ans: $x_1 = 3, x_2 = -2$

b. Evaluate the following integral using Simpson's rule:

$\int_0^1 \frac{dx}{1+x^2}$ taking 4 equal intervals (i.e. n = 4). [4]

Ans: 0.785

18. Using Simplex method, maximize $Z = 5x_1 + 7x_2$ subject to

$2x_1 + 3x_2 \le 13$ $3x_1 + 2x_2 \le 12$ $x_1, x_2 \ge 0$. [6]

Ans: Max. value of z is 31 at (2, 3)

19. Show that the equation $f(x) = x^3 - 18 = 0$ has only one positive root. Using bisection method, find the positive root correct to 3 places of decimal in the interval (2, 3). [6]

Ans: 2.621

OR

Use Newton-Raphson method to find the positive root of $x^3 + 3x - 5 = 0$ lying between 1 and 2 correct to three places of decimals. [6]

Ans: 1.154

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CHAPTER BASED QUESTIONS

PERMUTATION AND COMBINATION

PERMUTATION

FORMULAE

Factorial Notation

Factorial n, denoted by, n! or $\lfloor n$ is given by

$n! = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot n$

Also, $0! = 1$

The total number of permutations of a set of n objects taken r at a time is given by

$^nP_r = P(n, r) = \frac{n!}{(n-r)!}, n \geq r$

The total number of permutations of a set of n objects taken all at a time, when there are p objects of one kind, q objects are of the second kind and r objects are of third kind is $\frac{n!}{p!\,q!\,r!}$

Circular permutations of n objects = $(n-1)!$

The number of permutation of n objects taken r at a time with repetition = n^r.

Marks Questions

2076 GIE Set A Q.No. 1a In how many ways the letters of the word "EXCELLENT" can be arranged so that the vowels are always together? [2]
Ans: 30240

2076 GIE Set B Q.No. 1a How many even numbers of 3 digits can be formed of the digits 1, 2, 3, 4, 5, 6 when repetition of digits is allowed? [2]
Ans: 108

2076 Set B Q.No. 1a In how many ways the letters of the word ALGEBRA can be arranged so that repeated letter are never together? [2]
Ans: 1800

2076 Set C Q.No. 1a In how many ways the letters of the word CALCULUS can be arranged so that vowels are always together? [2]
Ans: 540

2075 GIE Q.No. 1a In how many ways the letters of the word PRECARIOUS can be arranged so that all the vowels are always together? [2]
Ans: 43200

2075 Set A Q.No. 1a In how many ways can eight people be seated in a row of eight seats so that two particular persons are always together? [2]
Ans: 10080

2074 Set B Q.No. 1a In how many ways the letters of the word COMPLETE can be arranged so that the repeated letters are always together? [2]
Ans: 5040

2073 Supp Q.No. 1a In how many ways the letters of the word HEXAGON can be arranged so that vowels are always together? [2]
Ans: 720

2073 Set C Q.No. 1 How many different numbers of five digits can be formed with the digits 0, 1, 2, 3, 4 ? [2]
Ans: 96

2072 Supp. Q.No. 1a How many numbers between 3000 and 4000 can be formed with the digits 2, 3, 4, 5, 6, 7? [2]
Ans: 60

2072 Set C Q.No. 1a In how many ways can 7 students be seated in a circle? [2]
Ans: 720

2072 Set D Q.No. 1a In how many ways the letters of the word ELEMENT can be arranged so that vowels are always together? [2]
Ans: 120

2072 Set E Q.No. 1a Find the number of ways in which 4 men and 3 women can be seated in a row having seven seats so that the men and the women must alternate. [2]
Ans: 144

2071 Supp. Q.No. 1a In how many ways can eight different coloured heads be made into a bracelet? [2]
Ans: 2520

2071 Old Q.No. 2 a How many permutations are there of the letters of the word "SAARC"? [2]
Ans: 60

2070 Supp. Q.No. 1 a Six children are to be seated on a bench. How many arrangements are possible if the youngest child sits at the left end of the bench? [2]
Ans: 120

2070 Set D Q.No. 1 a In how many ways can the letters of the word "ELEMENT" be arranged? [2]
Ans: 840

2070 (Old) Q.No. 1 b How many numbers of three different digits less than 500 can be formed from the integers 1, 2, 3, 4, 5, 6, 7? [2]
Ans: 120

2069 (Set A) Q.No. 1a In how many ways can four boys and three girls be seated in a row containing seven seats if they may sit any where? [2]
Ans: 5040

2068 Q.No. 2a How many license plates consisting of 3 different digits can be made out of given integers 3, 4, 5, 6, 7? [2]
Ans: 60

2067 Q.No. 2a In how many ways letters of the word PRECARIOUS can be arranged so that all the vowels are always together? [2]
Ans: 43,200

2066 C Q.No. 2 a How many four digits odd numbers can be formed using the digits 0, 1, 2, 3, 4, 5 no digit being repeated? [2]
Ans: 144

2065 Q.No 2 a How many numbers are there between 100 and 1000 such that every digit is either 2 or 9? [2]
Ans: 8

2063 Q.No. 2a How many numbers of three different digits less than 500 can be formed from the integers 1, 2, 3, 4, 5, 6? [2]
Ans: 80

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25. 2061 Q.No. 2 a In how many ways can 6 different beads be strung on a necklace? [2]
Ans: 60

26. 2060 Q.No. 2 a Find the numbers of permutation of the letters of the word 'MATHEMATICS'. [2]
Ans: 4989600

27. 2059 Q.No. 1 b How many permutations are there of the letters of the word 'mathematics' taken all together? [2]
Ans: 4989600

28. 2058 Q.No. 2 a In a certain election, there are three candidates for president, five for secretary and only two for the treasurer. Find in how many ways the election may turn out. [2]
Ans: 30 ways

4 Marks Questions

29. 2075 Set B Q.No. 5a How many words can be formed from the letters of the word 'ENGLISH'? How many of these do not begin with E? How many of these begin with E and do not end with H? [4]
Ans: 5040, 4320 and 600

30. 2074 Supp Q.No. 5a In how many ways can the letters of the world "ARRANGE" be arranged so that no two R's come together? [4]
Ans: 900

31. 2074 Set A Q.No. 5a Prove that the number of permutations of n distinct objects taken r at a time is given by $P(n, r) = \frac{n!}{(n-r)!}$. $(n \geq r)$ [4]

32. 2074 Set A Q.No. 5a OR How many numbers of 4 different digits can be formed from the digits 4, 5, 6, 7, 8? How many of these numbers are divisible by 5? How many of these numbers are not divisible by 5? [4]
Ans: 120,24,96

33. 2073 Set D Q.No. 5a In how many ways can the letters of the word "COMPUTER" be arranged so that (i) all the vowels are always together (ii) the vowels may occupy only odd positions. [4]
Ans: (i) 4320 (ii) 2880

34. 2072 Supp. Q.No. 5a Prove that $P(n, r) = \frac{n!}{(n-r)!}$ where the symbols have their usual meanings. [4]

35. 2071 Set C Q.No. 5 a In how many ways can the letters of the word "TUESDAY" be arranged? How many of these arrangements do not begin with T? How many begin with T and do not end with Y? [4]
Ans: 5040, 4320, 600

36. 2071 Set D Q.No. 5 a In how many ways can the letters of the word "COMPUTER" be arranged so that i) all vowels are always together? ii) the relative positions of the vowels and consonants are not changed? [4]
Ans: (i) 4320 (ii) 720

37. 2070 Set C Q.No. 5 a In how many ways can the letters of the word, 'CALCULUS' be arranged so that the two L's do not come together? [4]
Ans: 3780

38. 2070 (Old) Q.No. 7 a In how many ways can the letters of the word 'Sunday' be arranged? How many of these arrangements do not begin with S? How many begin with S and do not end with a? [4]
Ans: 720, 600, 96

39. 2069 (Set A) Q.No. 5a In how many ways can the letters of the world "ARRANGE" be arranged so that no two R is come together? [4]
Ans: 900

40. 2069 (Set A) Old Q.No. 7b In how many ways can the letters of the word "MONDAY" be arranged? How many of these arrangements do not begin with M? How many begins with M and does not end with Y? [4]
Ans: 720; 600; 96

41. 2069 (Set B) Q.No. 5a In how many ways can the letters of the word "MONDAY" be arranged? How many of these arrangements do not begin with M? How many begin with M and do not end with N? [4]
Ans: 720, 600, 96

42. 2069 Old (Set B) Q.No. 7b In how many ways can ten people be seated in a round table if two people insists on sitting next to each other? [4]
Ans: 80640

43. 2065 Q.No 7 b Prove that the total no. of permutations of a set of n objects taken r at a time is given by $P(n, r) = n(n-1)(n-2) \ldots (n-r+1)$, $n \geq r$. [4]

44. 2064 Q.No. 7 b Show that the number of ways in which the letters of the word "arrange" can be arranged so that two r's do not come together is 900. [4]

45. 2062 Q.No. 7 b In how many ways can 4 Art students and 4 Science students be arranged alternately at a round table? [4]
Ans: 144

46. 2061 Q.No. 7 b In how many ways can the letters of the word "MONDAY" be arranged? How many of these arrangements do not begin with M? How many begin with M and don't end with Y? [4]
Ans: 720, 600, 96

47. 2059 Q.No. 7 b Prove that the total number of permutations of a set of n objects taken r at a time is given by $P(n, r) = \frac{n!}{(n-r)!}$. [4]

48. 2057 Q.No. 7 b In how many ways can the letters of the word ARRANGE be arranged so that no two R's come together. [4]
Ans: 900

B. COMBINATION

FORMULAE

1. ${}^nP_r = r! \cdot {}^nC_r$
2. The total number of combinations of n objects taken r at a time is ${}^nC_r = C(n, r) = \frac{n!}{(n-r)!\, r!}$, $n \geq r$
3. i. ${}^nC_r = {}^nC_{r-1}$ (Complementary combination)
   ii. If ${}^nC_r = {}^nC_{r'}$ then either $r = r'$ or $r + r' = n$
   iii. ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$

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Marks Questions

2077 Set I Q.No. 1a Find the number of ways in which 5 courses out of 8 can be selected when 3 courses are compulsory. [2]
Ans: 10

2075 Set B Q.No. 1a Find the value of r if ${}^{9}C_{2r} = {}^{9}C_{3r-1}$. [2]
Ans: 1, 2

2075 Set C Q.No. 1a In an examination, an examinee has to secure A+ grade in each of the five subjects. In how many ways can the examinee fail to secure A+ grade? [2]
Ans: 31

2074 Supp Q.No. 1a In an examination, a candidate has to pass in each of the four subjects. In how many ways can the candidate fail? [2]
Ans: 15

2074 Set A Q.No. 1a If there are 10 persons in a party and each two of them shakes hands with each other, how many hand shakes happen in the party? [2]
Ans: 45

6. **2073 Set D Q.No. 1a** From 10 persons, in how many ways can a selection of 4 be made when two particular persons are always excluded? [2]
Ans: 70

7. **2071 Set C Q.No. 1 a** Find the number of ways in which 5 courses out of 8 can be selected when 3 courses are compulsory. [2]
Ans: 10

8. **2071 Set D Q.No. 1 a** A man has 5 friends. In how many ways can he invite one or more of them to a dinner? [2]
Ans: 31

9. **2070 Set C Q.No. 1 a** From 10 persons, in how many ways can a selection of 4 be made when two particular persons are always included? [2]
Ans: 28

10. **2070 Set D Q.No. 5 a** From 6 gentlemen and 4 ladies, a committee of 5 is to be formed. In how many ways can this be done so as to include at least two gentlemen? [2]
Ans: 246

11. **2069 (Set A) Old Q.No. 2a** In an examination paper containing 10 questions, a candidate has to answer 7 questions only, in how many ways can he choose the questions? [2]
Ans: 120

12. **2069 (Set B) Q.No. 1a** From 10 persons, in how many ways can a selection of 4 be made if two particular persons are always excluded. [2]
Ans: 70

13. **2069 Old Set B Q.No. 1b** How many different sums of money can be made from 4 coins of different denominations? [2]
Ans: 15

14. **2066 Q.No. 2 a** From 10 persons in how many ways can a selection of 4 be made if two particular persons are always excluded? [2]
Ans: 70

15. **2064 Q.No. 2 a** A person has got 12 acquaintances of whom 8 are relatives. In how many ways can he invite 7 guests so that 5 of them may be relatives? [2]
Ans: 336

16. **2062 Q.No. 2 a** From 10 persons, in how many ways can a committee of 4 be made when one particular person is always included? [2]
Ans: 84

17. **2057 Q.No. 2 a** A committee is to be chosen from 12 men and 8 women and is to consist of 3 men and 2 women. How many such committee can be formed? [2]
Ans: 6160

4 Marks Questions

18. **2077 Set G Q.No. 3** In how many ways a committee of three person can be formed out of 3 men and 4 women so as to include at least one woman. [4]
Ans: 34

19. **2076 GIE Set A Q.No. 5a** From 8 gentlemen and 6 ladies, a committee of 6 is to be formed. In how many ways can this be done so as to include at least 4 ladies? [4]
Ans: 469

20. **2076 GIE Set B Q.No. 5a** An examination paper consisting of 10 questions, is divided into two groups A and B. Group A contains 6 questions. In how many ways can a student attempt 7 questions selecting at least two questions from each group? [4]
Ans: 116

21. **2076 Set B Q.No. 5a** A committee of five persons is to be formed from 5 men and 3 women. In how many ways can this be done so that at least two women are included? [4]
Ans: 40

22. **2076 Set B Q.No. 5a OR** Show that the number of combinations of 'n' different objects taken 'r' at a time is given by $C(n, r) = \frac{n!}{(n-r)!\, r!}$. Also show that $C(n, r) + C(n, r-1) = C(n+1, r)$. [4]

23. **2076 Set C Q.No. 5a** In how many ways a committee of five can be formed out of 4 men and 3 women so that it includes at least one women? [4]
Ans: 21

24. **2075 GIE Q.No. 5a** In how many ways a committee of three person can be formed out of 4 men and 3 women so that it includes at least one woman? [4]
Ans: 19

25. **2075 Set A Q.No. 5a** An examination paper consisting of 10 questions, is divided into two groups A and B. Group A contains 6 questions. In how many ways can an examinee attempt 7 questions selecting at least two questions from each group? [4]
Ans: 116

26. **2074 Set B Q.No. 5a** From 3 men and 7 women a committee of 5 is to be formed. In how many ways can this be done so as to include at least one man? [4]
Ans: 231

27. 2075 Set C Q.No. 5a If C(n, r − 1) = 36, C(n, r) = 84 and C(n, r + 1) = 126, find the value of r and n. [4]
Ans: r = 3, n = 9

28. 2073 Supp Q.No. 5a In how many ways a committee of three can be formed out of 5 men and 2 women so that it always consists at least one women? [4]
Ans: 25

29. 2073 Set C Q.No. 5a There are ten electric bulbs in the stock of a shop out of which four are defectives. In how many ways can a selection of 6 bulbs be made so that 4 of them may be good bulbs? [4]
Ans: 90

30. 2072 Supp. Q.No. 5a OR Prove that C(n, r) + C(n, r− 1) = C(n + 1,r) where C(n, r) is the combination of n things taken r at a time. [4]

31. 2072 Set C Q.No. 5a A committee of five persons is to be selected from 5 men and 4 ladies. In how many ways can this be done so that at least two ladies are always included? [4]
Ans: 105

32. 2072 Set D Q.No. 5a A person has got 12 acquaintances of whom 8 are relatives. In how many ways can he invite 7 guests so that 5 of them may be relatives? [4]
Ans: 336

33. 2072 Set E Q.No. 5a In a group of 10 students, 6 are boys. In how many ways can 4 students be selected for mathematical competition so as to include atmost two girls? [4]
Ans: 185

34. 2071 Supp. Q.No. 5a An examination paper consists of 12 questions divided into two parts A and B. Part A contains 7 questions, part B contains remaining questions. A candidate is required to attempt 8 questions selecting at least 3 from each part. In how many ways can the candidates select the questions? [4]
Ans: 420

35. 2071 Old Q.No. 8 b In how many ways a committee of 8 members be selected from 8 gentlemen and 6 ladies, if the committee is to include not more than three ladies. [4]
Ans: 1589

36. 2070 Supp. Q.No. 5 a A committee of 5 is to be formed out of 6 gents and 4 ladies. In how many ways can this be done when at least two ladies are to be included? [4]
Ans: 186

37. 2069 (Set B) Q.No. 5a Or From 6 gentlemen and 4 ladies, a committee of 5 is to be formed. In how many ways can this be done so as to include at least 2 ladies? [4]
Ans: 186

38. 2068 Q.No. 7b A person has got 12 acquaintances of whom 8 are relatives. In how many ways can he invite 7 guests so that 5 of them may be relatives? [4]
Ans: 336

39. 2067 Q.No. 7b A committee of five is to be constituted from six boys and five girls. In how many ways can this be done so as to include at least one boy and one girl? [4]
Ans: 455

40. 2066 C Q.No. 7 b From 10 players in how many ways can a selection of 4 be made, when one particular player is always included, when two particular players are excluded? [4]
Ans: 84; 70

41. 2066 Q.No. 7 b A person has got 12 acquaintances of whom 8 are relatives. In how many ways can he invite seven guests so that 5 of them may be relatives? [4]
Ans: 336

42. 2063 Q.No. 7 b A candidate is required to answer 6 out of 10 questions which are divided into two groups each containing 5 questions and he is not permitted to attempt more than 4 from any group. In how many different ways can he make up his choice? [4]
Ans: 200

43. 2060 Q.No. 7 b From 6 gentlemen and 4 ladies a committee of 5 is to be formed. In how many ways can this be done so as to include at least one lady? [4]
Ans: 246

44. 2058 Q.No. 7 b From 10 football players in how many ways can a selection of a 4 be made (i) when one particular player is always included (ii) when two particular players are always excluded? [4]
Ans: (i) 84 (ii) 70

2. BINOMIAL THEOREM

A. BINOMIAL THEOREM

FORMULAE

1. Binomial theorem for positive integral index n;
$(a + x)^n = {}^nC_0\, a^n + {}^nC_1\, a^{n-1} x + {}^nC_2\, a^{n-2} x^2 + {}^nC_3\, a^{n-3} x^3 + \ldots + {}^nC_r\, a^{n-r} x^r + \ldots + {}^nC_n\, x^n$
2. General term:
a. The general term of $(a + x)^n$:
$t_{r+1} = {}^nC_r\, a^{n-r} x^r$
b. The general term of $(a - x)^n$:
$t_{r+1} = (-1)^r\, {}^nC_r\, a^{n-r} x^r$
3. Middle term:
a. When n is even in $(a + x)^n$, the middle term is
$t_{\frac{n}{2}+1} = {}^nC_{\frac{n}{2}}\, a^{n-\frac{n}{2}} x^{\frac{n}{2}} = {}^nC_{\frac{n}{2}}\, a^{\frac{n}{2}} x^{\frac{n}{2}}$
b. When n is odd in $(a + x)^n$, the middle term is
$t_{\frac{n+1}{2}} = t_{\frac{n-1}{2}+1}$
$= {}^nC_{\frac{n-1}{2}}\, a^{n-\frac{n-1}{2}} x^{\frac{n-1}{2}}$
$= {}^nC_{\frac{n-1}{2}}\, a^{\frac{n+1}{2}} x^{\frac{n-1}{2}}$
$t_{\frac{n+1}{2}+1} = t_{\frac{n+1}{2}}\, a^{n-\frac{n+1}{2}} x^{\frac{n+1}{2}}$
$= {}^nC_{\frac{n+1}{2}}\, a^{\frac{n-1}{2}} x^{\frac{n+1}{2}}$

2 Marks Questions

1. 2077 Set G Q.No. 1a Find the term independent of x in the binomial expansion of $\left(2x + \frac{1}{2x}\right)^{10}$. [2]
Ans: $t_4 = 252$

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2077 Set H Q.No. 1a Find the middle term in the expansion of $(3x + x^3)^{10}$. [2]

Ans: $61236x^{20}$

2076 GIE Set A Q.No. 1b Find the term independent of x in expansion: $\left(2x - \frac{1}{2x}\right)^{12}$ [2]

Ans: 924

2076 GIE Set B Q.No. 1b Find the middle term in the expansion of $\left(x + \frac{1}{x}\right)^{18}$. [2]

Ans: $\frac{18!}{9!\,9!}$

2076 Set C Q.No. 1b Find the middle term in the expansion of $\left(x - \frac{1}{x^2}\right)^{12}$. [2]

Ans: $\frac{924}{x^6}$

2075 GIE Q.No. 1b Find the term independent of x in the expansion of $\left(x - \frac{1}{2x}\right)^6$. [2]

Ans: $-\frac{5}{2}$

7. **2075 Set A Q.No. 1b** Find the coefficient of x in the expansion of $\left(x^2 + \frac{a^2}{x}\right)^5$. [2]

Ans: $10a^6$

8. **2074 Set B Q.No. 1b** Find the coefficient of x^6 in the expansion of $\left(x^3 + \frac{1}{x}\right)^{10}$. [2]

Ans: 210

9. **2073 Set C Q.No. 1b** Find middle term in the expansion of $\left(x - \frac{1}{3x^2}\right)^{12}$. [2]

Ans: $\frac{308}{243\,x^6}$

10. **2072 Supp. Q.No. 1b** Find the middle term in the expansion of $\left(x + \frac{1}{2x}\right)^{18}$. [2]

Ans: $\frac{12155}{128}$

11. **2072 Set C Q.No. 1b** Find the coefficient of the term containing x^2 in the expansion of $\left(\frac{2x}{3} - \frac{3}{2x}\right)^6$. [2]

Ans: $\frac{20}{3}$

12. **2071 Set C Q.No. 1 b** Find the term independent of x in the expansion of $\left(x^2 - \frac{1}{3x^2}\right)^{12}$. [2]

Ans: $\frac{308}{243}$

13. **2071 Set D Q.No. 1 b** Find the coefficient of x in the expansion of $\left(x^2 + \frac{a^2}{x}\right)^5$. [2]

Ans: $10a^6$

14. **2071 Old Q.No. 1 b** Find middle term or terms in the expansion of $\left(ax + \frac{1}{ax}\right)^{16}$. [2]

Ans: $\frac{16!}{8!\,8!}$

15. **2070 (Old) Q.No. 2 a** Find the term independent of x in the expansion of $\left(x^2 + \frac{1}{x}\right)^{12}$ [2]

Ans: 495

16. **2069 (Set A) Q.No. 1b** Which term is free from x in the expansion of $\left(x^2 + \frac{1}{x}\right)^{15}$? [2]

Ans: 3003

17. **2069 (Set A) Old Q.No. 1b** Find the coefficient of x^5 in the expansion of $\left(x + \frac{1}{2x}\right)^7$. [2]

Ans: $\frac{7}{2}$

18. **2068 Q.No. 1b** Find the coefficient of x^5 in the expansion of $\left(x + \frac{1}{2x}\right)^7$. [2]

Ans: $\frac{7}{2}$

19. **2067 Q.No. 1b** Find the middle term in the expansion of $\left(x + \frac{1}{x}\right)^{18}$. [2]

Ans: $\frac{18!}{9!\,9!}$

20. **2066 C. Q.No. 1 b** Find the middle term in the expansion of $\left(x + \frac{1}{x}\right)^{18}$. [2]

Ans: $\frac{18!}{9!\,9!}$

21. **2065 Q.No 1 b** Find the term free from x in the expansion of $\left(\frac{3x^2}{2} + \frac{1}{3x}\right)^9$. [2]

Ans: $\frac{7}{18}$

22. **2064 Q.No. 1 b** Find the middle term in the expansion of $\left(x + \frac{1}{x}\right)^{18}$. [2]

Ans: $\frac{18!}{9!\cdot 9!}$

23. **2063 Q.No. 1 b** Find the term independent of x in the expansion of $\left(x^2 + \frac{1}{x}\right)^{12}$. [2]

Ans: 9^{th} term = 495

24. **2062 Q.No. 1 b** If $C_0, C_1, C_2, \ldots, C_n$ are the binomial coefficients in the expansion of $(1 + x)^n$, show that: [2]

$C_0 + C_2 + C_4 + \ldots = 2^{n-1}$

25. **2061 Q.No. 1 b** Find the term independent of x in the expansion of $\left(x^2 + \frac{1}{x}\right)^{12}$. [2]

Ans: 9^{th} term = 495

26 2060 Q.No. 1 b Find the coefficient of x^5 in $\left(x+\frac{1}{2x}\right)^7$. [2]

Ans: $\frac{7}{2}$

27. 2058 Q.No. 1 b Find the seventh term of $(2x+y)^{12}$. [2]

Ans: $59136\ x^6y^6$

28. 2057 Q.No. 1 b Write the middle terms in the expansion of $(a+x)^n$ when n is odd. [2]

Ans: $C\left(n,\frac{n-1}{2}\right)a^{\frac{n+1}{2}}x^{\frac{n-1}{2}}$ and $C\left(n,\frac{n+1}{2}\right)a^{\frac{n-1}{2}}x^{\frac{n+1}{2}}$

4 Marks Questions

29. 2075 Set B Q.No. 5b If $C_0, C_1, C_2, \ldots, C_n$ are binomial coefficients in the expansion of $(1+x)^n$, prove that $C_0 + 4C_1 + 7C_2 + 10C_3 + \ldots + (3n+1)C_n = (3n+2)2^{n-1}$. [4]

30. 2074 Set A Q.No. 5b Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5\ldots(2n-1)}{n!}2^n x^n$. [4]

31. 2071 Supp. Q.No. 5b If the three successive coefficient in the expansion of $(1+x)^n$ are 28, 56 and 70, find n. [4]

Ans:8

32. 2071 Old Q.No. 7 b Define the general term of the binomial expansion of $(x+a)^n$. In the expansion of $(1+x)^n$, prove that the sum of the coefficients of even terms is equal to the sum of the coefficients of odd terms and each is equal to 2^{n-1}. [4]

33. 2070 Supp. Q.No. 5 b If the coefficient of x in the expansion of $\left(x^2+\frac{k}{x}\right)^5$ is 270, find k. [4]

Ans: 3

34. 2069 Old Set B Q.No. 8b If $(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots + C_nx^n$, prove that: $C_0^2 + C_1^2 + C_2^2 + \ldots + C_n^2 = \frac{(2n)!}{(n!)^2}$. [4]

35. 2066 Q.No. 8 b If three consecutive coefficients in the expansion of $(1+x)^n$ be 165, 330 and 462, find n. [4]

Ans: 11

36. 2061 Q.No. 8 b If the three consecutive coefficients in the expansion of $(1+x)^n$ be 165, 330, 462, find n. [4]

Ans: 11

37. 2059 Q.No. 8 b If $C_0, C_1, C_2, \ldots, C_n$ are the binomial coefficients in the expansion of $(1+x)^n$ then prove that

$C_0C_n + C_1C_{n-1} + \ldots\ldots + C_nC_0 = \frac{2n!}{n!\,n!}$ [4]

38. 2058 Q.No. 8 b Find the middle term in the expansion of $(1+x)^{2n}$, where n is a positive integer. [4]

Ans: $\frac{1\cdot3\cdot5\ldots(2n-1)(2x)^n}{n!}$

6 Marks Questions

39. 2076 GIE Set A Q.No. 9 If $(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots + C_nx^n$, prove that:

$C_0C_2 + C_1C_3 + C_2C_4 + \ldots\ldots + C_{n-2}C_n = \frac{(2n)!}{(n-2)!\,(n+2)!}$ [6]

40. 2076 Set B Q.No. 9 Show that:

$1 - \frac{1}{4} + \frac{1.3}{4.8} - \frac{1.3.5}{4.8.12} + \ldots$ to $\infty = \sqrt{\frac{2}{3}}$. [6]

41. 2074 Supp Q.No. 9 If $(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots + C_nx^n$, prove that:

$\frac{C_1}{C_0} + \frac{2C_2}{C_1} + \frac{3C_3}{C_2} + \ldots + \frac{nC_n}{C_{n-1}} = \frac{n(n+1)}{2}$ [6]

42. 2073 Supp Q.No. 9 Prove that:

$C_1 - 2C_2 + 3C_3 - 4C_4 + \ldots + n(-1)^{n-1}C_n = 0$, where $C_0, C_1, \ldots, C_n$ are the binomial coefficients. [6]

43. 2073 Set D Q.No. 9 If $(1+x)^n = C_0 + C_1x + C_2x^2 \ldots\ldots + C_nx^n$, prove that: $C_0C_n + C_1C_{n-1} + \ldots + C_nC_0 = \frac{2n!}{n!n!}$ [6]

44. 2072 Set D Q.No. 9 State Binomial theorem. In the expansion of $(1+x)^n$ prove that the sum of the coefficients of the odd terms is equal to the sum of coefficients of the even terms and each equals to $2^n - 1$. [6]

45. 2072 Set E Q.No. 9 If $(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots + C_nx^n$, prove that: $C_0C_n + C_1C_{n-1} + C_2C_{n-2} + \ldots + C_nC_0 = \frac{2n!}{n!n!}$ [6]

46. 2070 Set C Q.No. 9 Show that the middle term in the expansion of $\left(x-\frac{1}{x}\right)^{2n}$ is $\frac{1.3.5\ldots\ldots(2n-1)}{n!}(-2)^n$ [6]

47. 2070 Set D Q.No. 9 If $(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots + C_nx^n$, prove that: $C_0C_n + C_1C_{n-1} + \ldots + C_nC_0 = \frac{2n!}{(n!)^2}$ [6]

48. 2069 Set B Q.No. 9 If $(1+x)^n = C_0 + C_1x + C_2x^2 + \ldots = C_nx^n$, prove that: $C_0C_n + C_1C_{n-1} + \ldots + C_nC_0 = \frac{2n!}{n!n!}$ [6]

B. EXPONENTIAL AND LOGARITHMIC SERIES

FORMULAE

1. Expansion of e^x

$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots$

$= \sum_{n=0}^{\infty} \frac{x^n}{n!}$

when n = 1, $e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \ldots$

when n = −1, $e^{-1} = 1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \ldots$

2. Expaniosn of a^x

$a^x = 1 + \frac{x}{1!}\log_e a + \frac{x^2}{2!}(\log_e a)^2 + \frac{x^3}{3!}(\log_e a)^3 + \ldots$

where a is any poitive number.

3. The logarithmic series

$\log_e(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots\ (-1 < x \le 1)$

and $\log_e(1-x) = -x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} + \ldots\ (-1 \le x < 1)$

Also, $\log_e\left(\frac{1+x}{1-x}\right) = 2\left(x + \frac{x^3}{3} + \frac{x^5}{5} + \ldots\right)$

2 Marks Questions

1. 2076 Set B Q.No. 1b Show that: $\frac{1}{2!} + \frac{2}{3!} + \frac{3}{4!} + \ldots = 1$. [2]

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2075 Set B Q.No. 1b If $y = \frac{x}{1!} - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \ldots$, show that: $x = y + \frac{y^2}{2} + \frac{y^3}{3} + \frac{y^4}{4} + \ldots$ [2]

2075 Set C Q.No. 1b Prove that:
$\frac{1}{1\cdot3} + \frac{1}{2\cdot5} + \frac{1}{3\cdot7} + \frac{1}{4\cdot9} + \ldots = 2(1 - \ln 2)$. [2]

2074 Supp Q.No. 1b Prove that: $\frac{1}{2}\left(e - \frac{1}{e}\right) = 1 + \frac{1}{3!} + \frac{1}{5!} + \ldots$ [2]

2074 Set A Q.No. 1b If $y = x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \ldots$, show that: $x = y - \frac{y^2}{2!} + \frac{y^3}{3!} - \frac{y^4}{4!} + \ldots$ [2]

2073 Supp Q.No. 1b If $y = x - \frac{x^2}{2} + \frac{x^3}{3} - \ldots$ show that: $x = y + \frac{y^2}{2!} + \frac{y^3}{3!} + \ldots$ [2]

2073 Set D Q.No. 1b Show that: $\frac{2}{1!} + \frac{4}{3!} + \frac{6}{5!} + \ldots$ to $\infty = e$ [2]

2072 Set D Q.No. 1b Prove that: $\frac{2}{1!} + \frac{4}{3!} + \frac{6}{5!} + \ldots = e$. [2]

2072 Set E Q.No. 1b Show that: $\frac{2}{1!} + \frac{4}{3!} + \frac{6}{5!} + \ldots$ to $\infty = e$. [2]

2071 Supp. Q.No. 1b If $x = y - \frac{y^2}{2} + \frac{y^3}{3} - \frac{y^4}{4} + \ldots$, show that: $y = x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \ldots$ [2]

2070 Supp. Q.No. 1 b Prove that:
$\frac{1}{1\cdot3} + \frac{1}{2\cdot5} + \frac{1}{3\cdot7} + \frac{1}{4\cdot9} + \ldots = 2(1 - \ln 2)$ [2]

2070 Set C Q.No. 1 b Show that:
$\frac{1}{2}\left(e + \frac{1}{e}\right) = 1 + \frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \ldots$ [2]

2070 Set D Q.No. 1 b Show that: $\log_e 2 = \frac{1}{1\cdot2} + \frac{1}{3\cdot4} + \frac{1}{5\cdot6} + \ldots$ [2]

2069 Set B Q.No. 1b Prove that: $\log_e 2 = \frac{1}{1\cdot2} + \frac{1}{3\cdot4} + \frac{1}{5\cdot6} + \ldots$ [2]

2069 Old (Set B) Q.No. 3a Find the value of $\frac{1}{2}(e + e^{-1})$. [2]

Ans: $1 + \frac{1}{2!} + \frac{1}{4!} + \ldots$

2066 Q.No. 1 b Prove that: $\log_e 2 = \frac{1}{1\cdot2} + \frac{1}{3\cdot4} + \frac{1}{5\cdot6}$ [2]

2059 Q.No. 3 a Prove that: $\log_e 2 = \frac{1}{1\cdot2} + \frac{1}{3\cdot4} + \frac{1}{5\cdot6} + \ldots$ [2]

4 Marks Questions

2070 (Old) Q.No. 8b Prove that: $1 + \frac{2^2}{2!} + \frac{3^2}{3!} + \frac{4^2}{4!} + \ldots \infty = 2e$. [4]

2069 (Set A) Old Q.No. 8b If $y = \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots$ to ∞; prove that: $x = y - \frac{y^2}{2} + \frac{y^3}{3} - \frac{y^4}{4} + \ldots$ to ∞ [4]

2068 Q.No. 8a Prove that:
$1 + \frac{1+2}{2!} + \frac{1+2+3}{3!} + \frac{1+2+3+4}{4!} + \ldots \infty = \frac{3e}{2}$ [4]

2067 Q.No. 8b Prove that:
$\left(\frac{1}{3} - \frac{1}{2}\right) + \frac{1}{2}\left(\frac{1}{3^2} + \frac{1}{2^2}\right) + \frac{1}{3}\left(\frac{1}{3^3} - \frac{1}{2^3}\right) + \ldots \infty = 0$ [4]

2066 C Q.No. 8 b Prove that: $\frac{2}{3!} + \frac{4}{5!} + \frac{6}{7!} + \ldots \ldots \infty = \frac{1}{e}$ [4]

2065 Q.No 8 b Prove that: $\frac{1}{1\cdot2} + \frac{1}{2\cdot2^2} + \frac{1}{3\cdot2^3} + \ldots = \log_e 2$ [4]

2064 Q.No. 8 b If $y = x - \frac{1}{2}x^2 + \frac{1}{3}x^3 - \ldots$, show that:
$x = y + \frac{1}{2!}y^2 + \frac{1}{3!}y^3 + \ldots$ [4]

2063 Q.No. 8 b If $y = \frac{x^1}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots$ to ∞,
Prove that: $x = y - \frac{1}{2}y^2 + \frac{1}{3}y^3 - \frac{1}{4}y^4 + \ldots$ to ∞ [4]

2062 Q.No. 8 b Prove that: $\frac{2}{3!} + \frac{4}{5!} + \frac{6}{7!} + \ldots$ to $\infty = \frac{1}{e}$ [4]

2060 Q.No. 8 b Prove that: $\frac{1}{2!} + \frac{1+2}{3!} + \frac{1+2+3}{4!} + \ldots = \frac{e}{2}$ [4]

2057 Q.No. 8 a Show that: $\frac{\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \ldots}{\frac{1}{1!} + \frac{1}{3!} + \frac{1}{5!} + \ldots} = \frac{e-1}{e+1}$ [4]

6 Marks Questions

2077 Set I Q.No. 6 Define exponential and logarithm series. Also sum to infinity the series: $1^2 + \frac{2^2}{2!} + \frac{3^2}{3!} + \ldots$ [6]

Ans: 2e

2076 GIE Set A Q.No. 9 OR Show that: $\sum_{x=1}^{\infty} \frac{x^2}{(x+1)^2} = e - 1$ [6]

Ans: e – 1

2076 GIE Set B Q.No. 9 Show that $\sum_{n=1}^{\infty} \frac{n^2}{(n+1)!} = e - 1$ [6]

2076 Set C Q.No. 9 Prove that: $\frac{\frac{1}{1!} + \frac{1}{3!} + \frac{1}{5!} + \ldots}{\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \ldots} = \frac{e+1}{e-1}$ [6]

2075 GIE Q.No. 9 Prove that:
$\frac{5}{1\cdot2\cdot3} + \frac{7}{3\cdot4\cdot5} + \frac{9}{5\cdot6\cdot7} + \ldots$ to $\infty = -1 + 3\log 2$. [6]

2075 Set A Q.No. 9 Sum to infinity the series:
$1 + \frac{3}{1!} + \frac{5}{2!} + \frac{7}{3!} + \ldots$ [6]

Ans: 3e

35. **2075 Set C Q.No. 9** Write e^x in the series form. Using it, show that: $\frac{\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\ldots\ldots}{\frac{1}{1!}+\frac{1}{3!}+\frac{1}{5!}+\ldots\ldots} = \frac{1-e^{-1}}{1+e^{-1}}$. [6]

36. **2074 Set B Q.No.9** Sum to infinity the series: $\frac{1^2}{1!}+\frac{2^2}{2!}+\frac{3^2}{3!}+\ldots$ [6]

Ans: 2e

37. **2073 Set C Q.No. 9a** Prove that: $\frac{\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\ldots}{\frac{1}{1!}+\frac{1}{3!}+\frac{1}{5!}+\ldots} = \frac{e-1}{e+1}$. [6]

38. **2072 Supp. Q.No. 9** Show that: $\sum_{n=1}^{\infty}\frac{n^2}{(n+1)!} = e-1$. [6]

39. **2072 Set C Q.No. 9** Prove that:
$1+\frac{1+3}{2!}+\frac{1+3+5}{3!}+\frac{1+3+5+7}{4!}+\ldots = 2e$ [6]

40. **2071 Set C Q.No. 9** Show that: $\sum_{n=1}^{\infty}\frac{n^2}{(n+1)!} = e-1$ [6]

41. **2071 Set D Q.No. 9** Show that:
$1+\frac{1+2}{2!}+\frac{1+2+3}{3!}+\frac{1+2+3+4}{4!}+\ldots = \frac{3e}{2}$ [6]

42. **2069 (Set A) Q.No. 9** Show that: $\frac{\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\ldots}{\frac{1}{1!}+\frac{1}{3!}+\frac{1}{5!}+\ldots} = \frac{e-1}{e+1}$ [6]

3. ELEMENTARY GROUP THEORY

FORMULAE

1. Binary Operation on a Set
   Let S be a non empty set. A mapping f from $S \times S$ to S is said to be binary operation on the set S. The image of the ordered pair (a, b) under the mapping f is denoted by a f b. Often we use symbols $*, \otimes, o, \times, -, +$, etc. to denote binary operation on a set.
2. Let G be a non empty set with binary operation 'o'. An algebraic structure (G, o) is called a group if the operation 'o' satisfies the following properties:

a. Closure property
   For all $a, b \in G$ implies that $a \circ b \in G$.

b. Associative property
   For all $a, b, c \in G$ implies that $a \circ (b \circ c) = (a \circ b) \circ c$

c. Existence of identity element
   For each element $a \in G$ there exists an identity element denoted by e such that
   $a \circ e = a = e \circ a$.

d. Existence of an inverse element
   For each element $a \in G$ there exist an inverse element of a denoted by a^{-1} in G such that
   $a \circ a^{-1} = e = a^{-1} \circ a$.

3. Commutative Group
   The group (G, o) is said to be commutative (abelian group) if $a \circ b = b \circ a$ for all $a, b \in G$.

2 Marks Questions

1. **2077 Set I Q.No. 1b** Prepare a Caley's table for $G = \{1, \omega, \omega^2\}$ where ω is the cube root of unity under multiplication. [2]
2. **2076 GIE Set A Q.No. 1c** Define binary operation with example. [2]
3. **2076 GIE Set B Q.No. 1c** Test the associative property for the binary operation* defined by $m*n = m + n + 1$, $m, n \in Z$. [2]
4. **2076 Set B Q.No. 1c** Prepare a Cayley's table for $S = \{0, 2, 3\}$, under addition modulo 4. [2]
5. **2076 Set C Q.No. 1c** Using Caley's table for $(G, *)$ where $G = \{-1, 1\}$, find inverse elements of G. [2]

Ans: -1, 1

6. **2075 GIE Q.No. 1c** Examine the commutative property for the operation '*' defined by $m * n = m + n$ on the set of integers Z; $m, n \in Z$. [2]

Ans: Commutative

7. **2075 Set A Q.No. 1c** If a and b are the elements of a group $(G, *)$ and if $a * b = e$, prove that $b = a^{-1}$. [2]
8. **2075 Set B Q.No. 1c** Solve $3x + 6 = 5$ in Z_7. [2]

Ans: 2

9. **2075 Set C Q.No. 1c** Prove that multiplication on the set Z^- of all negative integers is not a binary operation on Z^-. [2]
10. **2074 Supp Q.No. 1c** If the binary operation * on Z, the set of integers is defined by $m * n = m + n + 1$ for every $m, n \in Z$, show that * satisfies associative property. [2]
11. **2074 Set A Q.No. 1c** Let $a*b = a - b$ on Z. Show that '*' is not an associative binary operation. [2]
12. **2074 Set B Q.No. 1c** Prepare Cayley's table for the set $S = \{0, 1, 2\}$ under the operation of multiplication modulo 3. [2]
13. **2073 Supp Q.No. 1c** Show that the set $G = \{-1, 1, -i, i\}$, the fourth roots of unity satisfies the binary operation of multiplication. [2]
14. **2073 Set C Q.No. 1c** Find the inverses of the elements of $G = \{-1, 1\}$ under multiplications, if exist. [2]

Ans: -1, 1

15. **2073 Set D Q.No. 1c** Let $G = \{0, 1, 2\}$. Form a composition table for G under addition modulo 3. Find the inverse element of 2. [2]

Ans: 1

16. **2072 Supp. Q.No. 1c** Let $G = \{0, 1, 2\}$. Form a composition table for G under multiplication modulo 3. Find the inverse element of 2. [2]

Ans: 2

17. **2072 Set C Q.No. 1c** If $a * b = 3a + 2b$ for $a, b \in Z$, the set of integers, show that * is a binary operation on z. [2]
18. **2072 Set D Q.No. 1c** In a Caley's table for a finite group, does each element occur exactly once in each row and exactly once in each column? [2]
19. **2072 Set E Q.No. 1c** Test the commutative property for the operation * defined by $m * n = n$, $m, n \in Z$. [2]

Ans: Not commutative

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20. **2071 Supp. Q.No. 1c** If possible, solve $2x + 1 = 6$ in Z_7 [2]
Ans: x = 6

21. **2071 Set C Q.No. 1 c** Let G = {0, 1, 2}. Form a composition table for G under the multiplication modulo 3. Find the identity element of 2. [2]
Ans: 1

22. **2071 Set D Q.No. 1 c** Show that the multiplication is a binary operation on the set S = {–1, 0, 1} [2]

23. **2070 Supp. Q.No. 1 c** Let $m*n = \sqrt{mn}$ for $m, n \in Z$. Verify that the operation * is not a binary operation on Z. [2]

24. **2070 Set C Q.No. 1 c** Let G = {0, 1, 2}. Form a composition table for G under addition modulo 3. Find the identity element of 1. [2]
Ans: 0

25. **2070 Set D Q.No. 1 c** Show that the multiplication is a binary operation on the set S = { –1, 0, 1} [2]

26. **2069 (Set A) Q.No. 1c** Let S = {–1, 1} and * denote the usual operation of multiplication. Represent it by Cayley's table. Show that the multiplication is a binary operation on S. [2]

27. **2069 (Set B) Q.No. 1c** If the binary operation * on Q, the set of rational numbers is defined by a*b = a + b + ab for every a, b∈Q show that * satisfies associative property. [2]

4 Marks Questions

28. **2077 Set H Q.No. 3** Prove that $\left\{\frac{n}{5}, n \in Z\right\}$ is a group with respect to addition. [4]

29. **2077 Set H Q.No. 3 OR** Define group. Let (G, ∗)be a group, prove that:
$(a * b)^{-1} = b^{-1} * a^{-1} \forall a, b \in G.$ [4]

30. **2076 GIE Set A Q.No. 5b** Show that the set of all positive rational numbers form an abelian group under the composition defined by $x * y = \frac{xy}{2}$ [4]

31. **2076 GIE Set A Q.No. 5b OR** Let S = {0, 1, 2, 3}. From a Caley's table for S under the addition modulo 4 ($+_4$). Show that $+_4$ satisfies the closure and associative property. Does 'S' form a group under $+_4$? [4]

32. **2076 GIE Set B Q.No. 5b** Let G = {1, – 1, i, -- i} where i is an imaginary number. Show that G forms a group under the multiplication operation. [4]

33. **2076 GIE Set B Q.No. 5b OR** Let (G, *) be a group. If a, b, c are the elements of G and (i) a * b = a * c prove that b = c (ii) b * a = c * a, prove that b = c [4]

34. **2076 Set B Q.No. 5b** Define abelian group. If (G, *) is an abelian group, prove that $(a * b)^{-1} = a^{-1} * b^{-1}, \forall a, b \in G$. [4]

35. **2076 Set C Q.No. 5b** If a and b are the elements of a group (G, *), then prove that a*x = b and x* a = b, x∈G have unique solution in (G, *). [4]

36. **2076 Set C Q.No. 5b OR** If a, b ∈ G, where (G, *) is a group, prove: [4]
i. $(a * b)^{-1} = b^{-1} * a^{-1}$
ii. $(a^{-1})^{-1} = a$

37. **2075 GIE Q.No. 5b** If a and b are the elements of a group (G, ∗), then prove that a ∗ x = b and x ∗ a = b have unique solution in (G, ∗). [4]

38. **2075 GIE Q.No. 5b OR** Define Abelian group. Also prove that if G is a group such that $(a * b)^2 = a^2 * b^2$ for all a, b ∈ G, then G is Abelian. [4]

39. **2075 Set A Q.No. 5b** Show that the set of integers Z forms a group under the operation of addition. [4]

40. **2075 Set A Q.No. 5b OR** If a and b are the elements of a group (G, *), prove that a * x = b has a unique solution in (G, *). [4]

41. **2075 Set B Q.No. 6a** Let ∗ be defined on Q^+ by $a * b = \frac{ab}{2}$. Show that $(Q^+, *)$ is an Abelian group. [4]

42. **2075 Set C Q.No. 5b** Define a group. Prove that the set of all three dimensional vectors form an infinite Abelian group under vector addition. [4]

43. **2075 Set C Q.No. 5b OR** If a and b are the elements of group (G, ∗) such that
i. a ∗ b = b prove that a = e.
ii. a ∗ b = e, prove that $b = a^{-1}$. [4]

44. **2074 Supp. Q.No. 5b** Let G = {1, –1, i, –i}. Show that G forms a group under the operation of multiplication. [4]

45. **2074 Supp Q.No. 5b OR** Let G be a group. If a, b∈(G,∗), prove that $(a*b)^{-1} = b^{-1} * a^{-1}$. [4]

46. **2074 Set A Q.No. 6a** If a and b are the elements of group (G,*), and
i. If a * b = e, prove that $b = a^{-1}$
ii. If a * b = b, prove that a = e. [4]

47. **2074 Set B Q.No. 5b** Show that $\{2^n, n \in z\}$ is an Abelian group with respect to multiplication. [4]

48. **2074 Set B Q.No. 5b OR** If a, b ∈ (G, o) where G is a group. Prove that: [4]
i. $(aob)^{-1} = b^{-1}$ o a^{-1} ii. $(a^{-1})^{-1} = a$.

49. **2073 Supp Q.No. 5b** Define abelian group. If (G, *) is an abelian group, show that $(a*b)^{-1} = a^{-1} * b^{-1}$; a, b∈G. [4]

50. **2073 Supp Q.No. 5b OR** Verify that $\{2^m : m \in Z\}$ is an abelian group with respect to multiplication, where Z is the set of integers. [4]

51. **2073 Set C Q.No. 5b** Define Abelian group. Prove that a group G is Abelian if and only if $(a \circ b)^{-1} = a^{-1} \circ b^{-1}$ for all a, b∈G. [4]

52. **2073 Set C Q.No. 5b OR** Show that the set of all positive rational numbers under the composition defined by $a*b = \frac{ab}{5}$ forms a group. [4]

53. **2073 Set D Q.No. 5b** Given the algebraic structure (G,*) with G = {1, ω, ω²} where ω represents the cube roots of unity and * stands for the binary operation of ordinary multiplication of complex numbers, show that (G, *) is a group. [4]

54. **2073 Set D Q.No. 5b OR** If a, b ∈ (G, o), prove that $(a \circ b)^{-1} = b^{-1} \circ a^{-1}$. [4]

55. **2072 Supp. Q.No. 5b** Given that the algebraic structures (G, *) with G = {1, ω, ω²} where ω represents an imaginary cube root of unity and * stands for the binary operation of multiplication, show that (G, *) is a group. [4]

56. **2072 Set C Q.No. 5b** Show that the set of all vectors in space under addition is a group. [4]

57. **2072 Set C Q.No. 5b OR** If a, b ∈ (G, *) where G is a group. Prove. (i) $(a * b)^{-1} = b^{-1} * a^{-1}$ (ii) $(a^{-1})^{-1} = a$ [4]

58. **2072 Set D Q.No. 5a** Let (G, *) be a group. If a, b ∈ G, then prove that (i) $(a * b)^{-1} = b^{-1} * a^{-1}$ and (ii) $(a^{-1})^{-1} = a$ [4]

59. **2072 Set D Q.No. 5a OR** Define a group. Let a, b, c and x be elements of a group G. Solve the following for x: $x^2 = a^2$ and $x^5 = e$ [4]

Ans: a^{-4}

60. **2072 Set E Q.No. 5b** Show that the set T = {–1, 1} forms a group under multiplication operation. [4]

61. **2072 Set E Q.No. 5b OR** Prove that every element in a group (G, o) has unique inverse. [4]

62. **2071 Supp. Q.No. 6a** Define group. Verify that $\{2^m : m \in Z\}$ is a group with respect to multiplication. [4]

63. **2071 Set C Q.No. 5 b** Given the algebraic structure (G, *) with G = {1, ω, ω²} where ω represents the cube root of unity and * stands for the binary operation of ordinary multiplication of complex numbers, show that (G,*) is a group. [4]

64. **2071 Set C Q.No. 5 b OR** If a, b, c, are the elements of a group (G, *), prove that:

$a * b = a * c \Rightarrow b = c$ and $b * a = c * a \Rightarrow b = c$. [4]

65. **2071 Set D Q.No. 5 b** A binary operation * defined on the set S = {a, b, c} is presented in the following Cayley's table.

*	a	b	c
a	a	b	c
b	b	c	a
c	c	a	b

Show that: (S, *) forms a group. [4]

66. **2071 Set D Q.No. 5 b OR** Let a, b, c be the elements of a group (G, *)

i. If a* b = b, prove that: a = e.

ii. If a*b = e, prove that: $b = a^{-1}$. [4]

67. **2070 Supp. Q.No. 6 a** If a and b are the elements of a group (G, *) such that

i. a * b = b, prove that a = e.

ii. a * b = e, prove that $b = a^{-1}$. [4]

68. **2070 Supp. Q.No. 6 a OR** Let G = {0, 1, 2, 3, 4}. Construct cayley's table for G under the multiplication modulo 5. Find the inverse of each element of G. [4]

69. **2070 Set C Q.No. 5 b** Show that the set T = {-1, 1} forms a group under multiplication operation. [4]

70. **2070 Set C Q.No. 5 b Or** a, b, c are the elements of a group (G,o)

i. if a o b = a o c prove that b = c.

ii. if b o a = c o a prove that b = c. [4]

71. **2070 Set D Q.No. 5 b** Show that the set of integers Z forms a group under the operation of addition. [4]

72. **2070 Set D Q.No. 5 b Or** If a and b are the elements of a group (G, 0) prove that the equation a o x = b has a unique solution in (G, o). [4]

73. **2069 (Set A) Q.No. 5b** Define group. Let G = {1, –1, i, – i} where i is an imaginary unit and * stands for the binary operation of multiplication. Show that (G, *) forms a group. [4]

74. **2069 (Set A) Q.No. 5b or** If a and b are the elements of a group (G, o) prove that: $(a \circ b)^{-1} = b^{-1} \circ a^{-1}$ [4]

75. **2069 (Set B) Q.No. 5b** Given the algebraic structure (G, *) with G = {1, w, w²} where w represents the imaginary cube root of unity and * stands for the binary operation of multiplication, show that (G, *) is a group. [4]

4. CONIC SECTIONS

A. PARABOLA

FORMULAE

1. If $e = 1$, the curve is a **parabola.**
   If $e < 1$, the curve is an **ellipse.**
   If $e > 1$, the curve is the **hyperbola.**
2. Table for Different Types of Parabola

Form of parabola	$y^2 = 4ax$	$y^2 = -4ax$	$x^2 = 4ay$	$x^2 = -4ay$	$(y-k)^2 = 4a(x-h)$	$(x-h)^2 = 4a(y-k)$
Focus	(a, 0)	(–a, 0)	(0, a)	(0, – a)	(h + a, k)	(h, k + a)
Directrix	x + a = 0	x – a = 0	y + a = 0	y – a = 0	x = h – a	y = k – a
Axis	y = 0	y = 0	x = 0	x = 0	y = k	x = h
Vertex	(0, 0)	(0, 0)	(0, 0)	(0, 0)	(h, k)	(h, k)
Tangent at vertex	x = 0	x = 0	y = 0	y = 0	x = h	y = k

3. The equation of a tangent to the parabola $y^2 = 4ax$ at (x_1, y_1) is $yy_1 = 2a(x + x_1)$
4. Equation of the tangent in slope form is $y = mx + \frac{a}{m}$.
5. Condition of tagency of a straight line $y = mx + c$ to a parabola $y^2 = 4ax$ is $c = \frac{a}{m}$. Point of contact $= \left(\frac{a}{m^2}, \frac{2a}{m}\right)$.
6. The equation of the normal at the point (x_1, y_1) of the parabola $y^2 = 4ax$ is $y - y_1 = -\frac{y_1}{2a}(x - x_1)$
7. The equation of normal to the parabola $y^2 = 4ax$ in slope form is $y = mx - 2am - am^3$.

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Marks Questions

1. **2076 GIE Set A Q.No. 2a** Find the equation of the parabola with focus at (– 2, 3) and directrix x + 4 = 0. [2]
   Ans: $y^2 - 4x - 6y - 7 = 0$
2. **2075 Set B Q.No. 2a** Determine the equation of the chord joining the points t_1 and t_2 on the parabola $y^2 = 4ax$. [2]
   Ans: $2x - (t_1 + t_2)y + 2at_1t_2 = 0$
3. **2071 Supp. Q.No. 2a** Find the equation of the tangent to the parabola $y^2 = 9x$ at (4, –6). [2]
   Ans: $3x + 4y + 12 = 0$
4. **2069 (Set A) Old Q.No. 5c** Find the equation of the normal to the parabola $y^2 = 4ax$ at the point (x_1, y_1). [2]
5. **2069 Old (Set B) Q.No. 2c** Find the equation of the tangent to the parabola $y^2 = 16x$ at the point (4, 8). [2]
   Ans: $y = x + 4$
6. **2068 Q.No. 2c** Prove that the line $lx + my + n = 0$ touches the parabola $y^2 = 4ax$ if $ln = am^2$. [2]
7. **2068 Q.No. 2c** Prove that the line $lx + my + n = 0$ touches the parabola $y^2 = 4ax$ if $ln = am^2$. [2]
8. **2066 Q.No. 5 c** Find the equations of the tangents from the point (–6, 9) to the parabola $y^2 = 24x$. [2]
   Ans: $2x + y + 3 = 0$, $x - 2y + 24 = 0$
9. **2064 Q.No. 5 c** Find the equation of the parabola in which the ends of the latus rectum have the coordinates (– 1, 5) and (– 1, –11) and the vertex is (– 5, – 3). [2]
   Ans: $y^2 + 6y - 16x - 71 = 0$
10. **2063 Q.No. 5 c** Find the coordinates of the vertex and the focus of the parabola whose equation is $y^2 = 6y - 12x + 45$. [2]
    Ans: vertex = $\left(\frac{9}{2}, 3\right)$ and Focus = $\left(\frac{3}{2}, 3\right)$
11. **2062 Q.No. 5 c** Determine the equation of the chord joining the points t_1 and t_2 on the parabola $y^2 = 4ax$. [2]
    Ans: $2x - (t_1 + t_2)y + 2at_1t_2 = 0$
12. **2060 Q.No. 2 c** Find the equation of the normal to the parabola $y^2 = 5x$ perpendicular to the line $x + 2y = 7$. [2]
    Ans: $y = 2x - 15$
13. **2058 Q.No. 2 c** Find the equation of the tangent to the parabola $y^2 = 16x$ at the point (4, 8). [2]
    Ans: $x - y + 4 = 0$
14. **2059 Q.No. 2 c** Find the focus and directrix of the parabola $x^2 = 12y$. [2]
    Ans: (0, 3) and $y + 3 = 0$
15. **2057 Q.No. 2 c** Find the focus and directrix of the parabola $y^2 - 4y - 8x - 20 = 0$. [2]
    Ans: (– 1, 2) and $x + 5 = 0$

4 Marks Questions

16. **2077 Set I Q.No. 3** Find equation and the point of contact of tangent to the parabola $y^2 = 12x$ which makes an angle 45° with the straight line $x - 2y + 3 = 0$. [4]
    Ans: $3x - y + 1 = 0$ and $x + 3y + 27 = 0$; $\left(\frac{1}{3}, 2\right)$, (27, –18)
17. **2077 Set I Q.No. 4** Prove that the line $lx + my + n = 0$ will be normal to the parabola $y^2 = 4ax$ if $al(2m^2 + l^2) + m^2n = 0$. [4]
18. **2076 GIE Set B Q.No. 6a** Find the condition for the line $y = mx + c$ is tangent to the parabola $y^2 = 4ax$. Find the equation of the tangent in the slope form. [4]
    Ans: $y = mx + \frac{a}{m}$
19. **2076 Set B Q.No. 6a** Find the condition that a line $ax + by + c = 0$ may be normal to the parabola $y^2 = 4mx$. [4]
    Ans: $am(2b^2 + a^2) + b^2c = 0$
20. **2076 Set C Q.No. 6a** Find condition that a line $y = mx + c$ is tangent to the parabola $y^2 = 4ax$. [4]
    Ans: $c = \frac{a}{m}$
21. **2075 GIE Q.No. 6a** Find the condition that the line $ax + by + c = 0$ may be tangent to the parabola $y^2 = 4x$. [4]
    Ans: $b^2 = c$
22. **2075 Set A Q.No. 6a** Find the equation of the tangent to the parabola $y^2 = 4ax$ at the point (x_1, y_1). [4]
    Ans: $yy_1 = 2a(x + x_1)$
23. **2075 Set B Q.No. 6b** Prove that the lines joining the ends of latus rectum of the parabola $y^2 = 4ax$ to the point of intersection of the directrix and the axis are at right angles. [4]
24. **2075 Set C Q.No. 6a** Find the condition of tangency of a straight line $y = mx + c$ to a parabola $y^2 = 4ax$. [4]
    Ans: $c = \frac{a}{m}$
25. **2074 Supp Q.No. 6a** Find the equation of the tangent to the parabola $y^2 = 4ax$ in the slope form. Also find the point of contact. [4]
    Ans: $y = mx + \frac{a}{m}$; $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$
26. **2074 Set A Q.No. 6b** Find the condition under which the line $y = mx + c$ is tangent to the parabola $y^2 = 4ax$. Also find the equation of the tangent in the slope form. [4]
    Ans: $c = \frac{a}{m}$; $y = mx + \frac{a}{m}$
27. **2074 Set B Q.No. 6a** Show that the pair of tangents from the point (–2, 3) to the parabola $y^2 = 8x$ are at right angle. [4]
28. **2073 Supp Q.No. 6a** Find the condition that a line $y=mx+c$ is a tangent to the parabola $y^2 = 4ax$. [4]
    Ans: $c = \frac{a}{m}$
29. **2073 Set C Q.No. 6a** If a tangent to the parabola $y^2 = 12x$ makes an angle 45° with the straight line $x - 2y + 3 = 0$, find the equation of the tangent. [4]
    Ans: $3x - y + 1 = 0$ and $x + 3y + 27 = 0$
30. **2073 Set D Q.No. 6a** Find the equation of the tangent to the parabola $y^2 = 4ax$ at the point (x_1, y_1). [4]
    Ans: $yy_1 = 2a(x + x_1)$
31. **2072 Supp. Q.No. 6a** Define conic section. Find the equation of the parabola in its standard form. [4]
32. **2072 Set C Q.No. 6a** Show that the pair of tangents from the point (–2, 3) to the parabola $y^2 = 8x$ are at right angle. [4]
33. **2072 Set D Q.No. 6a** If the tangent to the parabola $y^2 = 12x$ makes an angle 45° with the straight line $x - 2y + 3 = 0$, find its equation and the point of contact. [4]
    Ans: $3x - y + 1 = 0$ and $x + 3y + 27 = 0$; $\left(\frac{1}{3}, 2\right)$, (27, –18)
34. **2072 Set E Q.No. 6b** Find the condition under which the line $y = mx + c$ is tangent to the parabola $y^2 = 4ax$. Find the equation of the tangent in slope form. [4]
    Ans: $c = \frac{a}{m}$, $y = mx + \frac{a}{m}$

35. 2071 Supp. Q.No. 6b Find the area of the triangle formed by the lines joining the vertex of the parabolay^2 = 12x to the ends of its latus rectum. [4]
Ans: 18 sq. units

36. 2071 Set C Q.No. 6 a Find the equation of the normal to the parabola $y^2 = 4ax$ in the slope form. [4]
Ans: $y = mx - 2am - am^3$

37. 2071 Set D Q.No. 6 a Find the equation of the parabola in the standard form $y^2 = 4ax$. [4]

38. 2071 Old Q.No. 9 a Deduce the equation of the parabola in the standard from $y^2 = 4ax$. [4]

39. 2070 Set C Q.No. 6 a Find the equation of the tangent to the parabola $y^2 = 4ax$ at the point (x_1, y_1). [4]
Ans: $yy_1 = 2a(x + x_1)$

40. 2070 Set D Q.No. 6 a Prove that the line $3x + 4y + 6 = 0$ is tangent to the parabola $2y^2 = 9x$. Find its point of contact. [4]
Ans: (2, –3)

41. 2070 (Old) Q.No. 9 b If the normal at any point $P(at_1^2, 2at_1)$ on the parabola $y^2 = 4ax$ meets the curve again in $Q(at_2^2, 2at_2)$, prove that $t_1 + \frac{2}{t_1} + t_2 = 0$. [4]

42. 2069 (Set A) Q.No. 6a Find the equation of the normal to the parabola $y^2 = 4ax$ at the point (x_1, y_1) and express this in slope form. [4]
Ans: $y - y_1 = \frac{-y_1}{2a}(x - x_1)$ and $y = mx - 2am - am^3$

43. 2069 (Set A) Old Q.No. 9b Given an equation of the parabola $y^2 = 6y - 12x + 45$, find the focus, vertex, equation of the directrix and the length of the latus rectum. [4]
Ans: $\left(\frac{3}{2}, 3\right)$; $\left(\frac{9}{2}, 3\right)$; 2x – 15 = 0; 12.

44. 2069 (Set B) Q.No. 6a Find the condition under which the line $y = mx + c$ is tangent to the parabola $y^2 = 4ax$. Find the equation of tangent in slope form. Also, find the point of contact. [4]
Ans: $c = \frac{a}{m}$, $y = mx + \frac{a}{m}$; Point of contact = $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$

45. 2069 Old (Set B) Q.No. 9b Find the equation of the parabola in standard form. [4]
Ans: $y^2 = 4ax$

46. 2068 Q.No. 9b Find the coordinates of the focus, the vertex, the equation of the directrix and the length of the latus rectum of the parabola $y^2 = 6y - 12x + 45$. [4]
Ans: $\left(\frac{3}{2}, 3\right)$; $\left(\frac{9}{2}, 3\right)$; 2x – 15 = 0; 12

47. 2067 Q.No. 9b Show that the pair of tangents from the point (–2, 3) to the parabola $y^2 = 8x$ are at right angle. [4]

48. 2068 Q.No. 9b Find the coordinates of the focus, the vertex, the equation of the directrix and the length of the latus rectum of the parabola $y^2 = 6y - 12x + 45$. [4]
Ans: $\left(\frac{3}{2}, 3\right)$; $\left(\frac{9}{2}, 3\right)$; 2x – 15 = 0; 12

49. 2067 Q.No. 9b Show that the pair of tangents from the point (–2, 3) to the parabola $y^2 = 8x$ are at right angle. [4]

50. 2066 C Q.No. 9 b Find the equation of the parabola in the standard form $y^2 = 4ax$. [4]

51. 2065 Q.No 9 b Find the equation of the tangent to the parabola $y^2 = 4ax$ at a point (x_1, y_1) on the parabola. [4]
Ans: $yy_1 = 2a(x + x_1)$

52. 2064 Q.No. 9 b Deduce the equation of the parabola in the standard form $y^2 = 4ax$. [4]

53. 2063 Q.No. 9 b Prove that the line $lx + my + n = 0$ touches the parabola $y^2 = 4ax$ if $ln = am^2$ [4]

54. 2062 Q.No. 9 b Find the equation of the normal to the parabola $y^2 = 4ax$ in the slope form. [4]
Ans: $y = mx - 2am - am^3$

55. 2061 Q.No. 9 b Prove that the latus rectum of a parabola bisects the angle between the tangent and the normal at either extremity of the latus rectum. [4]

56. 2060 Q.No. 9 b Deduce the equation of the tangent to the parabola $y^2 = 4ax$ at (x_1, y_1) on the parabola. [4]
Ans: $yy_1 = 2a(x + x_1)$

57. 2059 Q.No. 9 b Find the condition that the line $y = mx + c$ may be a tangent to the parabola $y^2 = 4ax$. [4]
Ans: $c = \frac{a}{m}$

58. 2058 Q.No. 9 b Show that the normal to the parabola $y^2 = 8x$ at (2, 4) meets the parabola again in (18, – 12). [4]

59. 2057 Q.No. 9 b Find the equation of the parabola in the standard form $y^2 = 4ax$. [4]

6 Marks Questions

60. 2070 Supp. Q.No. 9 Prove that the tangent to a parabola $y^2 = 4ax$ at a point (x_0, y_0) on the parabola is given by the equation $yy_0 = 2a(x + x_0)$. Reduce the equation in slope form. [6]

B. ELLIPSE

FORMULAE

Tables for Different Types of Ellipse

Ellipse	Center	Vertex	Focus	Major axis	Minor axis	Eccentricity (e)	Length of Latus ratum	Directrix
$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $a > b > 0$	(0, 0)	(±a, 0)	(±ae, 0)	2a	2b	$\sqrt{1 - \frac{b^2}{a^2}}$	$\frac{2b^2}{a}$	$x = \pm\frac{a}{e}$
$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $b > a > 0$	(0, 0)	(0, ±b)	(0, ±be)	2b	2a	$\sqrt{1 - \frac{a^2}{b^2}}$	$\frac{2a^2}{b}$	$y = \pm\frac{b}{e}$
$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$, $a > b > 0$	(h, k)	(h±a, k)	(h±ae, k)	2a	2b	$\sqrt{1 - \frac{b^2}{a^2}}$	$\frac{2b^2}{a}$	$x = h \pm \frac{a}{e}$
$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$, $b > a > 0$	(h, k)	(h, k±b)	(h, k±be)	2b	2a	$\sqrt{1 - \frac{a^2}{b^2}}$	$\frac{2a^2}{b}$	$y = k \pm \frac{b}{e}$

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2 Marks Questions

1. **2076 GIE Set B Q.No. 2a** Find the foci of the ellipse $3x^2 + 4y^2 = 36$ [2]
   Ans: $(\pm\sqrt{3}, 0)$
2. **2075 Set C Q.No. 2a** Find the foci of the ellipse $\frac{(x-1)^2}{25} + \frac{y^2}{16} = 1$. [2]
   Ans: $(\pm 3, 0)$
3. **2074 Supp Q.No. 2a** Find the foci of the ellipse $\frac{x^2}{8} + \frac{(y-2)^2}{12} = 1$. [2]
   Ans: (0, 0), and (0, 4)
4. **2072 Supp. Q.No. 2a** Find the eccentricity and the coordinates of the foci of the ellipse $\frac{x^2}{9} + \frac{y^2}{16} = 1$ [2]
   Ans: $\frac{\sqrt{7}}{4}$, $(0, \pm\sqrt{7})$
5. **2072 Set E Q.No. 2a** Find the eccentricity and the foci of the ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$. [2]
   Ans: $\frac{4}{5}$; (0, ±4)
6. **2071 Set C Q.No. 2 a** Find the eccentricity and the foci of the ellipse $25x^2 + 4y^2 = 100$. [2]
   Ans: $\frac{\sqrt{21}}{5}$, $(0, \pm\sqrt{21})$
7. **2070 Set C Q.No. 2 a** Find the eccentricity and the foci of the ellipse $\frac{x^2}{9} + \frac{y^2}{16} = 1$ [2]
   Ans: $\frac{\sqrt{7}}{4}$, $(0, \pm\sqrt{7})$
8. **2070 Set D Q.No. 2 a** Find the eccentricity and the foci of the ellipse $3x^2 + 4y^2 = 36$. [2]
   Ans: $\frac{1}{2}$, $(\pm\sqrt{3}, 0)$
9. **2070 (Old) Q.No. 2 b** Find the equation of the ellipse in the standard form whose focus is at (–2, 0) and vertex at (5, 0).[2]
   Ans: $\frac{x^2}{25} + \frac{y^2}{21} = 1$
10. **2069 (Set B) Q.No. 2a** Find the eccentricity and the foci of the ellipse $\frac{(x+2)^2}{16} + \frac{(y-5)^2}{9} = 1$. [2]
    Ans: $e = \frac{\sqrt{7}}{4}$, $(-2 \pm \sqrt{7}, 5)$

4 Marks Questions

11. **2077 Set I Q.No. 3 OR** Find the eccentricity and coordinates of foci of: $\frac{x^2}{8} + \frac{(y-2)^2}{12} = 1$ [4]
    Ans: $\frac{\sqrt{3}}{3}$, (0, 0) and (0, 4)
12. **2077 Set I Q.No. 4 OR** Find the vertices and foci of the ellipse $16x^2 + 25y^2 + 64x + 50y - 311 = 0$ [4]
    Ans: (3, – 1) and (–7, – 1); (1, – 1) and (– 5, – 1)
13. **2076 GIE Set A Q.No. 6a** Show that $9x^2 + 4y^2 - 18x - 16y - 11 = 0$ represents an ellipse. Find the vertex, focus and eccentricity. [4]
    Ans: (1, –1) and (1, 5); $(1, 2 \pm \sqrt{5})$; $\frac{\sqrt{5}}{3}$
14. **2076 Set B Q.No. 6a OR** Find the vertices and foci of the ellipse $\frac{(x+2)^2}{16} + \frac{(y-5)^2}{9} = 1$. [4]
    Ans: (–6, 5) and (2, 5); $(-2 \pm \sqrt{7}, 5)$
15. **2076 Set C Q.No. 6a OR** Find the vertices and foci of the curve $\frac{(x+6)^2}{4} + \frac{y^2}{36} = 1$. [4]
    Ans: $(-6, \pm 6)$, $(-6, \pm 4\sqrt{2})$
16. **2075 GIE Q.No. 6a OR** Find the eccentricity and the coordinates of the foci of the curve $9x^2 + 5y^2 - 30y = 0$.
    Ans: $\frac{2}{3}$; (0, 1) and (0, 5)
17. **2075 Set A Q.No. 6a OR** Find the equation of the ellipse in the standard form with a vertex at (0, 8) and passing through $\left(3, \frac{32}{5}\right)$. [4]
    Ans: $\frac{x^2}{25} + \frac{y^2}{64} = 1$
18. **2075 Set B Q.No. 6b OR** Find the vertices, eccentricities, foci and length of major axis of the ellipse $\frac{(x+2)^2}{2} + y^2 = 5$. [4]
    Ans: $(-2 \pm \sqrt{10}, 0)$, $\frac{1}{\sqrt{2}}$, $(-2 \pm \sqrt{5}, 0)$, $2\sqrt{10}$
19. **2074 Set A Q.No. 6b OR** Find the vertices, eccentricties, foci and length of major axis of the ellipse $\frac{x^2}{5} + \frac{(y+2)^2}{3} = 1$. [4]
    Ans: $(\pm\sqrt{5}, -2)$; $\sqrt{\frac{2}{5}}$; $(\pm\sqrt{2}, -2)$; $2\sqrt{5}$
20. **2074 Set B Q.No. 6a OR** Find the eccentricity and the coordinates of the foci of the ellipse: $x^2 + 4y^2 - 4x + 24y + 24 = 0$ [4]
    Ans: $\frac{\sqrt{3}}{2}$, $(2 \pm 2\sqrt{3}, -3)$
21. **2073 Supp Q.No. 6a OR** Find the vertices, eccentricity and foci of the ellipse $5x^2 + 9y^2 = 45$. [4]
    Ans: $(\pm 3, 0)$, $\frac{2}{3}$, $(\pm 2, 0)$
22. **2073 Set C Q.No. 6a OR** Find the equation of the ellipse whose major axis is twice its minor axis and passes through the point (0, 1). [4]
    Ans: $x^2 + 4y^2 = 4$
23. **2073 Set D Q.No. 6a OR** Find the centre, eccentricity and foci of the ellipse $9x^2 + 5y^2 - 30y = 0$. [4]
    Ans: (0, 3); $\frac{2}{3}$; (0, 5) and (0, 1)
24. **2072 Set D Q.No. 6a OR** Find the eccentricity and coordinates of the foci of the curve $\frac{(x+6)^2}{4} + \frac{y^2}{36} = 1$. [4]
    Ans: $\frac{2\sqrt{2}}{3}$, $(-6, \pm 4\sqrt{2})$
25. **2071 Supp. Q.No. 6b OR** Find the vertices, eccentricities, foci and length of major axes of the ellipse $\frac{(x+5)^2}{9} + \frac{(y-1)^2}{4} = 1$. [4]
    Ans: (–2, 1) and (–8, 1); $\frac{\sqrt{5}}{3}$; $(-5 \pm \sqrt{5}, 1)$; 6
26. **2071 Set D Q.No. 6 a OR** Find the equation of the ellipse whose distance between two foci is 8 and the semi-latus rectum is 6. [4]
    Ans: $3x^2 + 4y^2 = 192$
27. **2071 Old Q.No. 9 a OR** Find the eccentricity and the foci of the ellipse: $\frac{(x+2)^2}{16} + \frac{(y-5)^2}{9} = 1$. [4]
    Ans: $\frac{\sqrt{7}}{4}$, $(-2 \pm \sqrt{7}, 5)$

28. **2069 (Set A) Q.No. 6a or** Find the eccentricity, the coordinates of the vertices and the foci of ellipse $9x^2 + 5y^2 - 30y = 0$. [4]

Ans: $e = \frac{2}{3}$, (0, 0) and (0, 6); (0, 1) and (0, 5)

29. **2069 (Set A) Old Q.No. 9b or** Show that $9x^2 + 5y^2 - 30y = 0$ represents the equation of an ellipse. Find the eccentricity, the coordinates of the centre and the foci. [4]

Ans: $\frac{2}{3}$; (0, 3); (0, 5) and (0, 1)

30. **2069 Old (Set B) Q.No. 9b Or** Find the equation of the ellipse whose latus rectum is 3 and eccentricity is $\frac{1}{\sqrt{2}}$. [4]

Ans: $x^2 + 2y^2 = 9$

31. **2068 Q.No. 9b OR** Find the coordinates of the vertices, the eccentricity and the coordinates of the foci of the ellipse $25x^2 + 4y^2 = 100$. [4]

Ans: (0, ±5), $\frac{\sqrt{21}}{5}$, (0, $\pm\sqrt{21}$)

32. **2067 Q.No. 9b OR** Show that $x^2 + 4y^2 - 4x + 24y + 24 = 0$ represents the equation of an ellipse. Find centre, vertex and focus. [4]

Ans: (2, –3); (6, –3), (–2, – 3); (2 ±2$\sqrt{3}$, –3)

33. **2068 Q.No. 9b OR** Find the coordinates of the vertices, the eccentricity and the coordinates of the foci of the ellipse $25x^2 + 4y^2 = 100$. [4]

Ans: (0, ±5), $\frac{\sqrt{21}}{5}$, (0, $\pm\sqrt{21}$)

34. **2067 Q.No. 9b OR** Show that $x^2 + 4y^2 - 4x + 24y + 24 = 0$ represents the equation of an ellipse. Find centre, vertex and focus. [4]

Ans: (2, –3); (6, –3), (–2, – 3); (2 ±2$\sqrt{3}$, –3)

35. **2066 C Q.No. 9 b OR** Find the eccentricity and the foci of the ellipse: $9x^2 + 5y^2 - 30y = 0$ [4]

Ans: $\frac{2}{3}$, (0, 5) and (0, 1)

36. **2066 Q.No. 9 b** Find the equation of the ellipse in the standard position whose latus rectum is equal to half its major axis and which passes through the point $(\sqrt{6}, 1)$. [4]

Ans: $x^2 + 2y^2 = 8$

37. **2065 Q.No 9 b OR** Show that: $9x^2+4y^2-18x-16y-11=0$ represents the equation of an ellipse. Find its centre, vertex and focus. [4]

Ans: (1, 2); (1, 5) and (1, –1); (1, 2±$\sqrt{5}$)

38. **2064 Q.No. 9 b OR** Find the eccentricity and the loci of the ellipse: $9x^2 + 5y^2 - 30y = 0$. [4]

Ans: $\frac{2\sqrt{2}}{3}$, (0, 3 ± 2$\sqrt{3}$)

39. **2062 Q.No. 9 b OR** Find the eccentricity and the coordinates of the foci of the ellipse: $\frac{x^2}{8} + \frac{(y-2)^2}{12} = 1$. [4]

Ans: $\frac{1}{\sqrt{3}}$, (0, 0), (0, 4)

40. **2061 Q.No. 5 c** Find the equation of the ellipse in the standard position with a focus at (0, –5) and eccentricity $\frac{1}{3}$. [4]

Ans: $9x^2 + 8y^2 = 180$

41. **2060 Q.No. 9 b OR** Find the eccentricity and the foci of the ellipse: $\frac{x^2}{8} + \frac{(y-2)^2}{12} = 1$. [4]

Ans: $\frac{1}{\sqrt{3}}$, (0, 4) and (0, 0)

42. **2059 Q.No. 9 b OR** Deduce the equation of the ellipse in the standard position if a focus is at (0, –5) and eccentricity is $\frac{1}{3}$. [4]

Ans: $9x^2 + 8y^2 = 180$

43. **2058 Q.No. 9 b OR** Find the eccentricity and the foci of the ellipse. $\frac{(x+2)^2}{16} + \frac{(y-5)^2}{9} = 1$. [4]

Ans: $\frac{\sqrt{7}}{4}$, (–2 ±$\sqrt{7}$, 5)

44. **2057 Q.No. 9 b OR** Find the eccentricity, length of the latus rectum and coordinates of the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{4} = 1$. [4]

Ans: $\frac{\sqrt{3}}{2}$, 2, (±2$\sqrt{3}$, 0)

C. HYPERBOLA

FORMULAE

Tables for Different Types of Hyperbola

Equation of hyperbola	$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$	$\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} =$
Center	(0, 0)	(0, 0)	(h, k)	(h, k)
Vertices	(± a, 0)	(0, ± b)	(h ± a, k)	(h, k ± b)
Foci	(± ae, 0)	(0, ± be)	(h ± a, k)	(h, k ± be)
Equation of transverse axis	y = 0	x = 0	x = h	y = k
Equation of conjugate axis	x = 0	y = 0	y = k	x = h
Length of transverse axis	2a	2b	2a	2b
Length of conjugate axis	2b	2a	2b	2a
Equation of directrices	$x = \pm\frac{a}{e}$	$y = \pm\frac{b}{e}$	$x = h \pm \frac{a}{e}$	$x = k \pm \frac{b}{e}$
Eccentricity (e)	$\sqrt{1+\frac{b^2}{a^2}}$	$\sqrt{1+\frac{a^2}{b^2}}$	$\sqrt{1+\frac{b^2}{a^2}}$	$\sqrt{1+\frac{a^2}{b^2}}$
Latus rectum	$\frac{2b^2}{a}$	$\frac{2a^2}{b}$	$\frac{2b^2}{a}$	$\frac{2a^2}{b}$

2 Marks Questions

1. **2077 Set G Q.No. 1b** Determine the equation of the hyperbola with vertex (8, 0) and passing through $(8\sqrt{2}, 4)$. [2]

Ans: $\frac{x^2}{8} - \frac{y^2}{16} = 1$

2. **2077 Set H Q.No. 1b** Find the vertices and eccentricity of the hyperbola $\frac{(x+2)^2}{16} - \frac{(y-1)^2}{9} = 1$ [2]

Ans: (–6, 1) and (2, 1), $\frac{5}{4}$

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2076 Set B Q.No. 2a Find the eccentricity and foci of the hyperbola $\frac{x^2}{25} - \frac{y^2}{16} = 1$. [2]

Ans: $\frac{\sqrt{41}}{5}$, $(\pm\sqrt{41}, 0)$

2076 Set C Q.No. 2a Determine the equation of the hyperbola with a focus at (5, 0) and a vertex (3, 0). [2]

Ans: $\frac{x^2}{9} - \frac{y^2}{16} = 1$

2075 GIE Q.No. 2a Show that the equation $9x^2 - 16y^2 + 18x + 32y - 151 = 0$ represents a hyperbola. Also find its eccentricity. [2]

Ans: $\frac{5}{4}$

2075 Set A Q.No. 2a Find the foci of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$. [2]

Ans: $(\pm 5, 0)$

2074 Set A Q.No. 2a Find the equation of a hyperbola in standard position such that its transverse and conjugate axes are respectively 4 and 5. [2]

Ans: $\frac{x^2}{4} - \frac{4y^2}{25} = 1$

2074 Set B Q.No. 2a Find the equation of hyperbola with a focus at (7, 0) and a vertex at (5, 0). [2]

Ans: $\frac{x^2}{25} - \frac{y^2}{24} = 1$

2073 Supp Q.No. 2a Determine the equation of the hyperbola with a focus at (–5, 0) and a vertex at (3, 0). [2]

Ans: $\frac{x^2}{9} - \frac{y^2}{16} = 1$

2073 Set C Q.No. 2a Find the foci and vertices of the hyperbola $9x^2 - 16y^2 = 144$. [2]

Ans: $(\pm 5, 0)$; $(\pm 4, 0)$

2073 Set D Q.No. 2a Find the equation of a hyperbola with a focus at (–7, 0) and eccentricity $\frac{7}{4}$. [2]

Ans: $\frac{x^2}{16} - \frac{y^2}{33} = 1$

2072 Set C Q.No. 2a Find eccentricity and foci of the hyperbola $\frac{x^2}{36} - \frac{y^2}{64} = 1$. [2]

Ans: $\frac{5}{3}$, $(\pm 10, 0)$

2072 Set D Q.No. 2a Find the equation of the hyperbola with vertex (8, 0) and passing through the point $(8\sqrt{2}, 4)$. [2]

Ans: $\frac{x^2}{8} - \frac{y^2}{16} = 1$

2071 Set D Q.No. 2 a Find the eccentricity and the foci of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$. [2]

Ans: 5/3, $(\pm 5, 0)$

2071 Old Q.No. 2 c Find the coordinates of vertices and eccentricity of the hyperbola $\frac{x^2}{16} - \frac{y^2}{4} = 1$. [2]

Ans: $(\pm 4, 0)$, $\frac{\sqrt{5}}{2}$

2070 Supp. Q.No. 2 a Find the eccentricity of hyperbola $x^2 - 4y^2 - 12 = 0$. [2]

Ans: $\frac{\sqrt{5}}{2}$

2069 (Set A) Q.No. 2a Find the eccentricity and the foci of the hyperbola $3x^2 - 4y^2 = 36$. [2]

Ans: $\frac{\sqrt{7}}{2}$, $(\pm\sqrt{21}, 0)$

2067 Q.No. 5c Find the equation of hyperbola in the standard form with a focus at (0, 5) and a vertex at (0, – 3). [2]

Ans: $16y^2 - 9x^2 = 144$

2066 C Q.No. 5 c Find the equation to the hyperbola in the standard form with a focus at (–7, 0) and eccentricity $\frac{7}{4}$. [2]

Ans: $\frac{x^2}{16} - \frac{y^2}{33} = 1$

2065 Q.No 5 c Find the eccentricity and foci of the hyperbola $3x^2 - 4y^2 = 36$. [2]

Ans: $\frac{\sqrt{7}}{2}$, $(\pm\sqrt{21}, 0)$

4 Marks Questions

2076 GIE Set A Q.No. 6a OR Find the vertices, foci and eccentricity of the hyperbola: $5x^2 - 20y^2 - 20x = 0$ [4]

Ans: (0, 0) and (4, 0); $\frac{\sqrt{5}}{2}$; $(2 \pm \sqrt{5}, 0)$

2076 GIE Set B Q.No. 6a OR Find the vertices, eccentricity and foci of the hyperbola $9x^2 - 16y^2 + 36x + 32y - 124 = 0$

Ans: (2, 1) and (–6, 1), $\frac{5}{4}$, (–7, 1) and (3, 1)

2075 Set C Q.No. 6a OR Find the vertices, centre, eccentricity and foci of the hyperbola $9(x - 1)^2 - 16(y + 2)^2 = 144$. [4]

Ans: (5, –2), (–3, –2); (1, –2); $\frac{5}{4}$; (6, – 2), (–4, –2)

2074 Supp Q.No. 6a OR Obtain the equation to the hyperbola in the standard form with a focus at (–7, 0) and eccentricity $\frac{7}{4}$. [4]

Ans: $\frac{x^2}{16} - \frac{y^2}{33} = 1$

2072 Supp. Q.No. 6a OR Find the eccentricity, coordinates of the vertices and the foci of the hyperbola: $5x^2 - 20y^2 - 20x = 0$ [4]

Ans: $\frac{\sqrt{5}}{2}$; (4, 0) and (0, 0); $(2 \pm \sqrt{5}, 0)$,

2072 Set E Q.No. 6b OR Find the equation of the hyperbola with vertex at (0, 8) and passing through the point $(4, 8\sqrt{2})$. [4]

Ans: $\frac{x^2}{16} - \frac{y^2}{64} = -1$

2071 Set C Q.No. 6 a OR Find the equation of the hyperbola with a focus at (0,5) and a vertex at (0,–3). [4]

Ans: $16y^2 - 9x^2 = 144$

2070 Set C Q.No. 6 a or Find the coordinates of the vertices, the eccentricity and the coordinates of the foci of the hyperbola $5x^2 - 20y^2 - 20x = 0$. [4]

Ans: (4, 0) and (0, 0); $\frac{\sqrt{5}}{2}$; $(2 \pm \sqrt{5}, 0)$

29. 2070 Set D Q.No. 6 a Or Deduce the equation of a hyperbola with a focus at (6, 0) and a vertex at (4, 0) [4]

Ans: $\frac{x^2}{16} - \frac{y^2}{20} = 1$

30. 2070 (Old) Q.No. 9 b Or Find the equation to the hyperbola in standard form whose focus is at (0, 5) and vertex at (0, –3) [4]

Ans: $16y^2 - 9x^2 = 144$

31. 2069 (Set B) Q.No. 6a Or Find the equation of the hyperbola with focus at (–5, 0) and vertex at (2, 0). [4]

Ans: $21x^2 - 4y^2 = 84$

32. 2066 Q.No. 9 b OR Determine the equation of the hyperbola in the standard position with focus at (–7, 0) and eccentricity $\frac{7}{4}$. [4]

Ans: $\frac{x^2}{16} - \frac{y^2}{33} = 1$

33. 2063 Q.No. 9 b OR Find the eccentricity and the coordinates of the foci of the hyperbola $\frac{x^2}{16} - \frac{y^2}{4} = 1$ [4]

Ans: $\frac{\sqrt{5}}{2}$; $(\pm 2\sqrt{5}, 0)$

34. 2061 Q.No. 9 b OR Find the eccentricity and the foci of the hyperbola: $3x^2 - 4y^2 = 36$ Ans: $\frac{\sqrt{7}}{2}$, $(\pm\sqrt{21}, 0)$ [4]

5. CO-ORDINATES IN SPACE

A. CO-ORDINATES IN SPACE

FORMULAE

1. Distance between point (x_1, y_1, z_1) and (x_2, y_2, z_2)
$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$
2. Section formula:

i. $(x, y, z) = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}, \frac{m_1z_2 + m_2z_1}{m_1 + m_2}\right)$ (internal division)

ii. $(x, y, z) = \left(\frac{m_1x_2 - m_2x_1}{m_1 - m_2}, \frac{m_1y_2 - m_2y_1}{m_1 - m_2}, \frac{m_1z_2 - m_2z_1}{m_1 - m_2}\right)$ (external division)

3. Centroid of a Triangle:
$(x, y, z) = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}, \frac{z_1 + z_2 + z_3}{3}\right)$
4. Mid point formula:
$(x, y, z) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2}\right)$
5. Direction Cosines of a Line
Let α, β, γ be the angles which a given directed line makes with the positive direction of the axes. Then cos α, cos β, cos γ, are called the direction cosines (dc's) of the line. The direction cosines of a line are usually denoted by l, m, n so that $l = \cos\alpha$, $m = \cos\beta$, $n = \cos\gamma$.
Also, $l^2 + m^2 + n^2 = 1$
6. Direction Ratios
Any three numbers a, b, c which are proportional to the direction cosines are called direction ratios (dr's.) of the given line. That is, if a, b, c are the direction ratios or the direction numbers of the line, then
$\frac{l}{a} = \frac{m}{b} = \frac{n}{c}$
$\therefore l = \frac{a}{\sqrt{a^2 + b^2 + c^2}}$
$m = \frac{b}{\sqrt{a^2 + b^2 + c^2}}$
$n = \frac{c}{\sqrt{a^2 + b^2 + c^2}}$
7. The dcs. of x axis are (1, 0, 0), dcs. of y axis are (0, 1, 0) and dcs. of z axis are (0, 0, 1).
8. Projection of the join of two points on a line
Let PQ be the line joining two given points $P(x_1, y_1, z_1)$ and $Q(x_2, y_2, z_2)$. Let C'D' be a line whose direction cosines are l, m, n.
Projection of PQ on C'D' = $(x_2 - x_1)l + (y_2 - y_1)m + (z_2 - z_1)n$
9. Direction Ratios and Direction Cosines of Line Joining Two Points
The line PQ, joining $P(x_1, y_1, z_1)$, $Q(x_2, y_2, z_2)$ has its direction ratios: $x_2 - x_1$, $y_2 - y_1$ and $z_2 - z_1$ and direction cosines: $\frac{x_2 - x_1}{PQ}, \frac{y_2 - y_1}{PQ}, \frac{z_2 - z_1}{PQ}$
10. Angle Between Two Lines

a. $\theta = \cos^{-1}(l_1l_2 + m_1m_2 + n_1n_2)$
The lines are perpendicular if $l_1l_2 + m_1m_2 + n_1n_2 = 0$ and the lines are parallel if $\frac{l_1}{l_2} = \frac{m_1}{m_2} = \frac{n_1}{n_2}$

b. $\theta = \cos^{-1}\left(\frac{a_1a_2 + b_1b_2 + c_1c_2}{\sqrt{a_1^2 + b_1^2 + c_1^2}\sqrt{a_2^2 + b_2^2 + c_2^2}}\right)$
The lines are perpendicular if $a_1a_2 + b_1b_2 + c_1c_2 = 0$ and the lines are parallel if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

2 Marks Questions

1. 2077 Set H Q.No. 1c Find the angle between the lines whose direction cosines are proportional to 1, 2, 2 and 2, 3, 6. [2]

Ans: $\cos^{-1}\left(\frac{20}{21}\right)$

2. 2076 GIE Set A Q.No. 2b If l, m, n are the direction cosines of a line, prove that: $l^2 + m^2 + n^2 = 1$ [2]
3. 2076 GIE Set B Q.No. 2b If α, β and γ are the direction angles of a line, prove that: $\cos 2\alpha + \cos 2\beta + \cos 2\gamma + 1 = 0$ [2]
4. 2076 Set B Q.No. 2b Find the ratio in which the line joining the points P(–2, 4, 7) and Q(3, – 5, – 1) is divided by the ZX- plane. [2]

Ans: 4 : 5

5. 2076 Set C Q.No. 2b Find the direction cosines of the line joining the points (1, 2, 3) and (4, 5, 7). [2]

Ans: $\frac{3}{\sqrt{34}}, \frac{3}{\sqrt{34}}, \frac{4}{\sqrt{34}}$

6. 2075 GIE Q.No. 2b Find the angle between the two lines whose direction cosines are proportional to 3, – 4, 5 and 2, 3, – 6. [2]

Ans: $\cos^{-1}\left(-\frac{18\sqrt{2}}{35}\right)$

7. 2075 Set C Q.No. 2b Find the direction cosines of the line passing through the points A(–1, 2, 5) and B(–2, 4, 3). [2]

Ans: $-\frac{1}{3}, \frac{2}{3}, -\frac{2}{3}$

8. 2074 Supp Q.No. 2b Find the direction cosines of a line which is equally inclined to the axes. [2]

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Ans: $\pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}$

2074 Set B Q.No. 2b Find the direction cosines of the line PQ passing through P(2, 3, 4) and Q(5, 9, 13) [2]

Ans: $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

2073 Supp Q.No. 2b Find the direction cosines of a line joining the points (1,2,3) and (4,5,7). [2]

Ans: $\frac{3}{\sqrt{34}}, \frac{3}{\sqrt{34}}, \frac{4}{\sqrt{34}}$

2073 Set C Q.No. 2b If O is the origin, P(2, 3, 4) and Q(1, –2, 1) be any two points, show that OP is perpendicular to OQ. [2]

2073 Set D Q.No. 2b If α, β and γ are the direction cosines of a line, prove that $\cos2\alpha + \cos2\beta + \cos2\gamma + 1 = 0$. [2]

2072 Supp. Q.No. 2b Find the direction cosines of a line passing through the points P(2, 3, 4) and Q(1, 4, 6). [2]

Ans: $-\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{2}{\sqrt{6}}$

2072 Set C Q.No. 2b Find the ratio in which the line joining the points P(–2, 4, 7) and Q(3, –5, –1) is divided by the yz- plane. [2]

Ans: 2 : 3

2072 Set D Q.No. 2b If P and Q denote the coordinates (2, 6, 2) and (4, 5, 0) respectively, find the direction cosines of the line PQ. [2]

Ans: $\frac{2}{3}, \frac{-1}{3}, \frac{-2}{3}$

2072 Set E Q.No. 2b Find the angle between the two lines whose direction ratios are 2, 3, 4 and 1, –2, 1. [2]

Ans: $\frac{\pi^c}{2}$

2071 Set D Q.No. 2 b Find the direction cosines of a line passing through the points M(–2, 4, 3) and N(–1, 2, 5). [2]

Ans: $\frac{1}{3}, \frac{-2}{3}, \frac{2}{3}$

2070 Supp. Q.No. 2 b Find the locus of a point which is equidistant from the points (1, 2, 3) and (3, 2, –1). [2]

Ans; x – 2z = 0

2070 Set C Q.No. 2 b Show that the direction cosines of a line equally inclined to the axes are $\pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}$. [2]

2069 (Set B) Q.No. 2b Find the direction cosines of a line which are equally inclined to the axes. [2]

Ans: $\pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}$

2068 Q.No. 5c Show that the points (3, 0, 1), (2, 2, 2), (–1, 3, 3) and (0, 1, 2) are the vertices of a parallelogram. [2]

2067 Q.No. 5 b The section of two points P(2, –4, 3) and Q(x, y, z) in the ratio 2 : 1 is (– 2, 2, –3). Find Q. [2]

Ans: (–4, 5, –6)

2066 Q.No. 5b Find the ratio in which the line joining the points (2, 4, 5) and (3, 5,–4) is divided by xy-plane. [2]

Ans: 5:4

2065 Q. No. 5 b Show that the points A (1, 2, 3), B (4, 0, 4) and C (–2, 4, 2) are collinear. [2]

2064 Q.No. 5 a Prove that the points (- 4, 9, 6), (0, 7, 10) and (- 1, 6, 6) are the vertices of a right angled isosceles triangle. [2]

2063 Q.No. 5a Find the direction cosines of a line whose direction ratios are 1, 2, 2. [2]

Ans: $\frac{1}{3}, \frac{2}{3}, \frac{2}{3}$

2062 Q.No. 5b Show that P (1, 2, 3), Q(4, 0, 4) and R(- 2, 4, 2) are collinear. [2]

2061 Q.No. 5b If the section of two points P(2, -4, 3) and Q(x, y, z) in the ratio 2:1 is (- 2, 2, -3), then find Q. [2]

Ans: (- 4, 5, - 6)

2060 Q.No. 5b Find the co-ordinates of the point which divides the line joining (2, -4, 3) and (5, 5, -6) in the ratio 2:1. [2]

Ans: (4, 2, - 3)

2059 Q.No. 5b Find the angle between the lines whose direction cosines are proportional to 1, 2, 4 and -2, -9, 5. [2]

Ans: 90°

2058 Q.No. 5b Find direction cosines of a line joining the points (-1, 2, 5) and (-2, 4, 3). [2]

Ans: $\frac{-1}{3}, \frac{2}{3}, \frac{-2}{3}$

2057 Q.No. 5b What are direction cosines of a line? Prove: $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 2$ [2]

2056 Q.No. 5b Show that the line joining the points (1, 2, 3) and (4, 5, 7) is parallel to the line joining the points (-4, 3, -6) and (2, 9, 2). [2]

4 Marks Questions

2075 Set A Q.No. 6b Show that the angle between the two diagonals of a cube is $\cos^{-1}\left(\frac{1}{3}\right)$. [4]

2071 Set C Q.No. 6 b Show that the line AB is perpendicular to CD if A, B, C, D are the points (2, 3, 4), (5, 4, –1), (3, 6, 2) and (1, 2, 0) respectively. [4]

2070 Set D Q.No. 6 b Find the angle between two straight lines whose direction cosiness are l_1, m_1, n_1 and l_2, m_2, n_2. [4]

Ans: Cos $\theta = l_1 l_2 + m_1 m_2 + n_1 n_2$

2069 (Set A) Q.No. 6b Find the angle between the two lines whose direction ratios are a_1, b_1, c_1 and a_2, b_2, c_2. Also, find the condition under which the two lines are perpendicular. [4]

Ans: $\theta = \cos^{-1}\left(\frac{a_1a_2 + b_1b_2 + c_1c_2}{\sqrt{a_1^2 + b_1^2 + c_1^2}\sqrt{a_2^2 + b_2^2 + c_2^2}}\right)$; $a_1a_2 + b_1b_2 + c_1c_2 = 0$

2068 Q.No. 14 a Find the angle between the two straight lines whose direction cosines are l_1, m_1, n_1 and l_2, m_2, n_2. Also, find the condition for the two lines to be perpendicular to each other. [4]

Ans: $\theta = \cos^{-1}(l_1l_2 + m_1m_2 + n_1n_2)$; $l_1l_2 + m_1m_2 + n_1n_2 = 0$

2068 Q.No. 14 a Or Show that the line joining the points (1, 2, 3) and (–1, –2, –3) is parallel to the line joining the points (2, 3, 4) and (5, 9, 13). [4]

2067 Q.No. 14 a Find the angle between the lines whose direction cosines are given by $l + m + n = 0$ and $2lm + 2ln - mn = 0$ [4]

Ans: 120°

2067 Q.No. 14 a OR Prove that line which makes angle, x, y, z, δ with four diagonals of a cube is

$\cos^2x + \cos^2y + \cos^2z + \cos^2\delta = \frac{4}{3}$. [4]

42. **2066 Q.No. 14 a** Prove that the straight lines whose dc's are given by ul + vm + wn = 0 and fmn + gnl + hlm = 0 are perpendicular if $\frac{f}{u} + \frac{g}{v} + \frac{h}{w} = 0$ [4]

43. **2066 Q.No. 14 a OR** A (2, 3, –1), B (5, 2, 3), C (4, 3, –5), D (–2, 1, –3) are four points in space. Find the projection of AB on CD. [4]
Ans: $\frac{-1}{\sqrt{11}}$

44. **2065 Q. No. 14 a** Find the direction cosines of the line which is perpendicular to the lines with direction cosines proportional to 3, –1, 1 and –3, 2, 4. [4]
Ans: $\left(\frac{2}{\sqrt{30}}, \frac{5}{\sqrt{30}}, \frac{-1}{\sqrt{30}}\right)$

45. **2065 Q. No. 14 a OR** The projection of a line on the axis are 6, 2, 3. Find the length of the line and its direction cosines. [4]
Ans: $\left(\frac{6}{7}, \frac{2}{7}, \frac{3}{7}\right)$

46. **2064 Q.No. 14 a** Find the direction cosines l, m, n of two lines which are connected by the relations:
l + m + n = 0 and mn - 2nl - 2lm = 0 [4]
Ans: $\left(\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{-2}{\sqrt{6}}\right), \left(\frac{-1}{\sqrt{6}}, \frac{2}{\sqrt{6}}, \frac{-1}{\sqrt{6}}\right)$

47. **2064 Q.No. 14 a OR** Find the ratio in which the line joining the points (- 3, 4, - 8) and (5, - 6, 4) is divided by the xy plane. Find also the coordinates of the point of intersection of the line with the plane. [4]
Ans: 2:1

48. **2062 Q.No. 14a** Find the direction cosines l, m, n of two lines which are connected by the relations: 4l+3m-2n = 0 and lm - mn + nl = 0. [4]
Ans: $\left(\frac{2}{3}, \frac{-2}{3}, \frac{1}{3}\right)$ and $\left(\frac{3}{13}, \frac{4}{13}, \frac{12}{13}\right)$

49. **2062 Q.No. 14a OR** Find the ratio in which the line joining the points (- 2, 4, 7) and (3, -5, -8) is divided xy-plane. [4]
Ans: 7:8

50. **2061 Q.No. 14a** Prove that the lines whose direction cosines are given by the relation al + bm + cn = 0 and fmn + gnl + hlm = 0 are perpendicular if $\frac{f}{a} + \frac{g}{b} + \frac{h}{c} = 0$. [4]

51. **2061 Q.No. 14b OR** Prove that a line which makes angle x, y, z, t with four diagonals of a cube is
$\cos^2 x + \cos^2 y + \cos^2 z + \cos^2 t = \frac{4}{3}$. [4]

52. **2060 Q.No. 14a** The projection of a line on the axes are 6, 2, 3. Find the length of the line and its direction cosines. [4]
Ans: 7 unit, direction cosines $\frac{6}{7}, \frac{2}{7}, \frac{3}{7}$

53. **2060 Q.No. 14a OR** Find the direction cosines of the line which is perpendicular to the lines with direction cosines proportional to (1, -2, -2) and (0, 2, 1). [4]
Ans: $\frac{2}{3}, -\frac{1}{3}, \frac{2}{3}$

54. **2059 Q.No. 14a** Find the angle between the lines whose direction cosines are (l_1, m_1, n_1) and (l_2, m_2, n_2) [4]
Ans: $\theta = \cos^{-1}(l_1l_2 + m_1m_2 + n_1n_2)$

55. **2059 Q.No. 14a OR** Given three collinear points A(3, 2, -4), B(5, 4, -6) and C(9, 8, -10). Find the ratio in which B divides AC. [4]
Ans: 1:2

56. **2058 Q.No. 14a** Find the angle between the lines whose direction cosines are given by (l_1, m_1, n_1) and (l_2, m_2, n_2). [4]
Ans: $\theta = \cos^{-1}(l_1l_2 + m_1m_2 + n_1n_2)$

57. **2058 Q.No. 14a OR** Show that the angle between two diagonals of a cube is $\cos^{-1}\left(\frac{1}{3}\right)$. [4]

58. **2056 Q.No. 14a OR** Find the ratio in which the yz-plane divides the line joining (4, 6, 7) and (-1, 2, 5). Also find the coordinates of the point on the yz plane. [4]
Ans: 4:1; $\left(0, \frac{14}{5}, \frac{27}{5}\right)$

59. **2056 Q.No. 14a OR** Find the ratio in which the yz-plane divides the line joining (4, 6, 7) and (-1, 2, 5). Also find the coordinates of the point on the yz plane. [4]
Ans: 4:1; $\left(0, \frac{14}{5}, \frac{27}{5}\right)$

60. **2057 Q.No. 14a** Show that the angle between two diagonals of a cube is $\cos^{-1}\frac{1}{3}$. [4]

61. **2057 Q.No. 14a OR** Find the angles between the two lines whose direction cosines are (l_1, m_1, n_1) and (l_2, m_2, n_2). [4]
Ans: $\theta = \cos^{-1}(l_1l_2 + m_1m_2 + n_1n_2)$

62. **2056 Q.No. 14a** Find the direction cosines of the line which is perpendicular to the lines with direction cosines proportional to 3, -1, 1 and -3, 2, 4. [4]
Ans: $\frac{2}{\sqrt{30}}, \frac{5}{\sqrt{30}}, \frac{-1}{\sqrt{30}}$

6 Marks Questions

63. **2075 Set B Q.No. 9** Prove that the straight lines whose direction cosines are given by the relations al+bm + cn = 0 and fmn + gnl + hlm = 0 are perpendicular if $\frac{f}{a} + \frac{g}{b} + \frac{h}{c} = 0$ and parallel if $\sqrt{af} \pm \sqrt{bg} \pm \sqrt{ch} = 0$. [6]

64. **2074 Set A Q.No. 9** Prove that the lines whose direction cosines are given by the relations al + bm + cn = 0 and fmn + gnl + hlm = 0 are perpendicular if $\frac{f}{a} + \frac{g}{b} + \frac{h}{c} = 0$. [6]

65. **2071 Supp. Q.No. 9** Show that the straight lines whose direction cosines are given by the equations al+bm+cn = 0 and $ul^2+vm^2+wn^2 = 0$ are perpendicular if
$a^2(v+w) + b^2(u+w) + c^2(u+v)=0$ and parallel if $\frac{a^2}{u} + \frac{b^2}{v} + \frac{c^2}{w} = 0$. [6]

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8. PLANE

FORMULAE

1. Intercept Form of the Equation of a Plane
$\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$
2. Normal Form of the Equation of a Plane
$lx + my + nz = p$
3. General equation of a plane that passes through a given point (x_1, y_1, z_1) is
$a(x - x_1) + b(y - y_1) + c(z - z_1) = 0$
4. Equation of the plane passing through three given non collinear points (x_1, y_1, z_1), (x_2, y_2, z_2) and (x_3, y_3, z_3) is
$$\begin{vmatrix} x & y & z & 1 \\ x_1 & y_1 & z_1 & 1 \\ x_2 & y_2 & z_2 & 1 \\ x_3 & y_3 & z_3 & 1 \end{vmatrix} = 0$$
5. Angle between Two Planes
$$\cos\theta = \frac{a_1a_2 + b_1b_2 + c_1c_2}{\sqrt{a_1^2 + b_1^2 + c_1^2}\sqrt{a_2^2 + b_2^2 + c_2^2}}$$
i. If the planes are parallel, then $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$
ii. If the planes are perpendicular, then $a_1a_2+b_1b_2 + c_1c_2=0$
6. Plane through the Intersection of Two Planes
The plane through the intersection of two planes
$a_1x + b_1y + c_1z + d_1 = 0, a_2x + b_2y + c_2z + d_2 = 0$ is
$(a_1x + b_1y + c_1z + d_1) + k(a_2x + b_2y + c_2z + d_2) = 0$
where k is same constant.
7. Angle Between a Plane and a Line
$$\cos(90° - \theta) = \sin\theta = \frac{Aa_1 + Bb_1 + Cc_1}{\sqrt{A^2 + B^2 + C^2}\sqrt{a_1^2 + b_1^2 + c_1^2}}$$
where, the plane is $Ax + By + Cz + D = 0$ and a, b, c are the direction ratios of the line.

2 Marks Questions

1. **2075 Set A Q.No. 2b** Find the equation of the plane which makes equal intercepts on the axes and passes through the point (2, 3, 4). [2]
Ans: x + y + z = 9
2. **2075 Set B Q.No. 2b** Find the intercepts made by the plane $2x + 3y + 4z = 24$ on the coordinate axes. [2]
Ans: 12, 8, 6
3. **2074 Set A Q.No. 2b** Find the equation of the plane whose intercepts on the axes are 2, 3 and 4 respectively. [2]
Ans: 6x + 4y + 3z = 12
4. **2071 Supp. Q.No. 2b** Find k so that the planes $x-2y + kz = 0$ and $2x + 5y - z = 0$ are at right angles. [2]
Ans: k = –8
5. **2071 Set C Q.No. 2 b** Find the equation of the plane through (1, 2, 3) and parallel to the plane $3x-4y+5z = 0$. [2]
Ans: 3x – 4y + 5z = 10
6. **2070 Set D Q.No. 2 b** Find the equation of the plane which makes equal intercepts on the axes and passes through the point (2, 3, 4). [2]
Ans: x + y + z = 9
7. **2069 (Set A) Q.No. 2b** Find the equation of the plane through the point (3, –4, 5) and parallel to the plane $3x - 4y + 5z=7$. [2]
Ans: 3x – 4y + 5z = 50

4 Marks Questions

8. **2077 Set G Q.No. 4** Find the equation of the plane through the point (2, 2, 1) and (9, 3, 6) and normal to the plane $2x + 6y + 6z = 9$. [4]
Ans: 3x + 4y – 5z = 9
9. **2076 GIE Set A Q.No. 6b** A plane cuts the co-ordinate axes at the points A, B, C and the centroid of the triangle ABC is (1, 2, 1). Find the equation of the plane. [4]
Ans: 2x + y + 2z = 6
10. **2076 GIE Set B Q.No. 6b** Find the equation of the plane passing through the points (1, 1, 0), (– 2, 2, – 1) and (1, 2, 1). [4]
Ans: 2x + 3y – 3z = 5
11. **2076 Set B Q.No. 6b** Show that the plane $2x + 3y – 4z = 3$ is parallel to the plane $10x + 15y – 20z = 12$ and is perpendicular to $3x + 2y + 3z = 5$. [4]
12. **2076 Set C Q.No. 6b** Find the equation of the plane through the point (2, – 3, 1) and perpendicular to the line joining the two points (3, 4, – 1) and (2, – 1, 5). [4]
Ans: x + 5y – 6z + 19 = 0
13. **2075 GIE Q.No. 6b** Find the equation of the plane through the point (2, 1, 4) and perpendicular to each of the planes $9x – 7y + 6z + 48 = 0$ and $x + y + z = 0$. [4]
Ans: 13x + 3y – 16z + 35 = 0
14. **2075 Set C Q.No. 6b** Find the equation of the plane through (–2, 3, 4) and perpendicular to the planes $3x+2y + 2z – 8 = 0$ and $2x + 3y + 4z – 6 = 0$. [4]
Ans: 2x – 8y + 5z + 8 = 0
15. **2074 Supp Q.No. 6b** Show that the plane $2x + 3y – 4z = 3$ is parallel to the plane $10x + 15y –20z = 12$ and perpendicular to the plane $3x + 2y +3z = 5$. [4]
16. **2074 Set B Q.No. 6b** Find the equation of the plane through the intersection of the planes $x + y + z = 6$ and $2x + 3y + 4z + 5 = 0$ and perpendicular to the plane $4x + 5y – 3z = 8$. [4]
Ans: x + 7y + 13z + 96 = 0
17. **2073 Supp Q.No. 6b** Find the equation of the plane through (–2, 3, 4) and perpendicular to the planes $2x + 3y + 4z = 6$ and $3x + 2y + 2z = 8$. [4]
Ans: 2x – 8y + 5z + 8 = 0
18. **2073 Set C Q.No. 6b** Find the equation of the plane through the point (2,–3, 1) and perpendicular to the line joining the two points (3, 4, –1) and (2, –1, 5). [4]
Ans: x + 5y –6z + 19 = 0
19. **2073 Set D Q.No. 6b** Find the equation of the plane passing through the points (1,1,0), (–2, 2,–1) and (1, 2, 1). [4]
Ans: 2x + 3y – 3z = 5
20. **2072 Supp. Q.No. 6b** Find the equation of the plane through the points (2, 2, 1) and (9, 3, 6) and normal to the plane $2x + 6y + 6z = 9$. [4]
Ans: 3x + 4y – 5z = 9

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21. 2072 Set C Q.No. 6b Find the equation of the plane through the intersection of the planes $2x + 3y + 10z = 8$ and $2x - 3y + 7z = 2$, and perpendicular to the plane $3x - 2y + 4z = 5$. [4]
Ans: $2y + z = 2$

22. 2072 Set D Q.No. 6b Show that the plane $2x + 3y - 4z = 3$ is parallel to the plane $10x + 15y - 20z = 12$ and is perpendicular to the plane $3x + 2y + 3z = 5$. [4]

23. 2072 Set E Q.No. 6a Find the equation of the plane passing through the points (1, 1 0), (–2, 2,–1) and (1, 2, 1). [4]
Ans: $2x + 3y - 3z = 5$

24. 2071 Set D Q.No. 6 b Find the equation of the plane through the points (–1, 1, 1) and (1, –1, 1) and perpendicular to the plane $x + 2y + 2z = 5$. [4]
Ans: $2x + 2y - 3z + 3 = 0$

25. 2070 Set C Q.No. 6 b Find the equation of the plane through the points (2, 2, 1) and (9, 3, 6), and normal to the plane $2x + 6y + 6z = 9$. [4]
Ans: $3x + 4y - 5z = 9$

26. 2069 (Set B) Q.No. 6b Find the equation of the plane through the points (1, 1, 0) (–2, 2, –1) and (1, 2, 1). [4]
Ans: $2x + 3y - 3z = 5$

6 Marks Questions

27. 2070 Supp. Q.No. 10 Prove that a plane through three points (x_1, y_1, z_1), (x_2, y_2, z_2) and (x_3, y_3, z_3) is given by

$$\begin{vmatrix} x - x_1 & y - y_1 & z - z_1 \\ x_2 - x_1 & y_2 - y_1 & z_2 - z_1 \\ x_3 - x_1 & y_3 - y_1 & z_3 - z_1 \end{vmatrix} = 0$$

Also, find the equation of the plane passing through (2, 2, –1), (3, 4, 2) and (7, 0, 6). [6]
Ans: $5x + 2y - 3z = 17$

6. VECTORS AND ITS APPLICATIONS

A. ELEMENTS OF VECTORS AND ITS APPLICATIONS

FORMULAE

1. Magnitude and direction of a vector
If x and y are horizontal and vertical components of a vector $\vec{a}$ then $|\vec{a}| = \sqrt{x^2 + y^2}$ is the magnitude of $\vec{a}$ and $\theta = \tan^{-1}\frac{y}{x}$ gives the direction of $\vec{a}$.

2. Unit vector
A vector whose magnitude is unity is called a unit vector.
If $\vec{a}$ is a vector then $\frac{\vec{a}}{|\vec{a}|}$ is called the unit vector of $\vec{a}$ denoted by $\hat{a}$, read as 'a cap'.

3. Parallel vectors
If $\vec{a}$ and $\vec{b}$ are two vectors then the vectors are said to be parallel if $\vec{a} = k\vec{b}$, k is any real number.

4. Collinear vectors
Vectors whose directions are either parallel or coincident are called collinear vectors. Otherwise, the vectors are non collinear.

5. Coplanar vectors
Three or more non zero vectors lying in the same plane or parallel plane, are called coplanar vectors. Otherwise, they are said to be non coplanar vectors. Two vectors are always coplanar.

6. Linear combination of vectors
A vector $\vec{r}$ is said to be a linear combination of vectors $\vec{a_1}, \vec{a_2}, \vec{a_3}, \vec{a_4}, \ldots, \vec{a_n}$ if there exist scalars $x_1, x_2, x_3, \ldots, x_n$ such that
$\vec{r} = x_1\vec{a_1} + x_2\vec{a_2} + x_3\vec{a_3} + \ldots + x_n\vec{a_n}$

7. Linearly dependent vectors
A set of vectors $\vec{a_1}, \vec{a_2}, \vec{a_3}, \vec{a_4}, \ldots, \vec{a_n}$, is said to be linearly dependent if there exist scalars $x_1, x_2, x_3, \ldots, x_n$ not all zero such that
$x_1\vec{a_1} + x_2\vec{a_2} + x_3\vec{a_3} + \ldots + x_n\vec{a_n} = 0$

8. Linearly independent vectors
A set of vectors $\vec{a_1}, \vec{a_2}, \vec{a_3}, \vec{a_4}, \ldots, \vec{a_n}$ is said to be linearly independent if there exist scalars $x_1, x_2, x_3 \ldots x_n$ all zero such that
$x_1\vec{a_1} + x_2\vec{a_2} + x_3\vec{a_3} + \ldots + x_n\vec{a_n} = 0$

2 Marks Questions

1. 2077 Set G Q.No. 1c If $3\hat{i} + \hat{j} - \hat{k}$ and $x\hat{i} - 4\hat{j} + 4\hat{k}$ are collinear vectors, find x. [2]
Ans: –12

2. 2076 GIE Set A Q.No. 2c Find $\vec{b}$ when $\vec{a} = (2, 4)$ and $2\vec{a} + 3\vec{b} = (9, 2)$ [2]
Ans: $\left(\frac{5}{3}, -2\right)$

3. 2076 GIE Set B Q.No. 2c If $3\hat{i} + \hat{j} - \hat{k}$ and $\lambda\hat{i} - 4\hat{j} + 4\hat{k}$ are collinear vectors, find the value of λ. [2]
Ans: –12

4. 2076 Set B Q.No. 2c If $\vec{a} = (3, -1, -4)$, $\vec{b} = (-2, 4, -3)$ and $\vec{c} = (-5, 7, -1)$, find $|2\vec{a} + \vec{b} - \vec{c}|$. [2]
Ans: $\sqrt{206}$ units

5. 2076 Set C Q.No. 2c Show that the vectors $\hat{i} + 2\hat{j} + 4\hat{k}$, $2\hat{i} + 5\hat{j} - \hat{k}$ and $3\hat{i} + 8\hat{j} - 6\hat{k}$ are collinear. [2]

6. 2075 GIE Q.No. 2c Show that the vectors $\vec{i} + 2\vec{j} + 4\vec{k}$, $2\vec{i} + 5\vec{j} - \vec{k}$ and $3\vec{i} + 8\vec{j} - 6\vec{k}$ are collinear. [2]

7. 2075 Set A Q.No. 2c Express $\vec{r} = (4, 7)$ as the linear combination of $\vec{a} = (5, -4)$ and $\vec{b} = (-2, 5)$. [2]
Ans: $\vec{r} = 2\vec{a} + 3\vec{b}$

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2075 Set B Q.No. 2c Show that the points $2\vec{i} + \vec{j} - \vec{k}$, $3\vec{i} - 2\vec{i} + \vec{k}$ and $\vec{i} + 4\vec{j} - 3\vec{k}$ are collinear. [2]

2074 Supp Q.No. 2c OB and OC are two straight lines and D is a point on BC such that BD : DC = m : n, show that $\vec{OD} = \frac{n\vec{OB} + m\vec{OC}}{m+n}$. [2]

2074 Set B Q.No. 2c If $\vec{a} = (3, -1, -4)$, $\vec{b} = (-2, 4, -3)$ and $\vec{c} = (-5, 7, -1)$, find the unit vector along $\vec{a} - 2\vec{b} + \vec{c}$. [2]

Ans: $\left(\frac{2}{3}, \frac{-2}{3}, \frac{1}{3}\right)$

2073 Supp Q.No. 2c Show that the vectors $\vec{i} + 2\vec{j} + 4\vec{k}$, $2\vec{i} + 5\vec{j} - \vec{k}$ and $3\vec{i} + 8\vec{j} + 6\vec{k}$ are collinear. [2]

2073 Set C Q.No. 2c If $\vec{a} = 2\vec{i} - 3\vec{j} + 4\vec{k}$ and $\vec{b} = -\vec{i} + 2\vec{j} - 2\vec{k}$, find a unit vector along the direction of $2\vec{a} + 3\vec{b}$. [2]

Ans: $\frac{1}{\sqrt{5}}\vec{i} + \frac{2}{\sqrt{5}}\vec{k}$

2073 Set D Q.No. 2c ABCD is a parallelogram. G is the point of intersection of its diagonals and if O is any point show that: $\vec{OA} + \vec{OB} + \vec{OC} + \vec{OD} = 4\vec{OG}$ [2]

2072 Supp. Q.No. 2c If $3\vec{i} + \vec{j} - \vec{k}$ and $\lambda\vec{i} - 4\vec{j} + 4\vec{k}$ are collinear vectors, find the value of λ. [2]

Ans: – 12

2072 Set C Q.No. 2c Prove that the vectors $\vec{i} - 2\vec{j} + 3\vec{k}$, $2\vec{i} + 3\vec{j} - 4\vec{k}$ and $-7\vec{j} + 10\vec{k}$ are collinear. [2]

2072 Set D Q.No. 2c If $\vec{a} = (3, -1, -4)$, $\vec{b} = (-2, 4, -3)$ find unit vector along $\vec{a} - 2\vec{b}$. [2]

Ans: $\left(\frac{7}{\sqrt{134}}, \frac{-9}{\sqrt{134}}, \frac{2}{\sqrt{134}}\right)$

2072 Set E Q.No. 2c If $\vec{OP} = \vec{i} + 3\vec{j} - 7\vec{k}$ and $\vec{OQ} = 5\vec{i} - 2\vec{j} + 4\vec{k}$, find $\vec{PQ}$ and its direction cosines. [2]

Ans: $4\vec{i} - 5\vec{j} + 11\vec{k}; \frac{4}{9\sqrt{2}}, \frac{-5}{9\sqrt{2}}, \frac{11}{9\sqrt{2}}$

2071 Supp. Q.No. 2c Find the value of λ if the points with position vectors $\vec{i} + 2\vec{j} + \vec{k}$, $2\vec{i} - \vec{j} + 3\vec{k}$ and $5\vec{i} - 10\vec{j} + \lambda\vec{k}$ are collinear. [2]

Ans: $\lambda = 9$

2071 Set C Q.No. 2 c If $3\vec{i} + \vec{j} - \vec{k}$ and $\lambda\vec{i} - 4\vec{j} + 4\vec{k}$ are collinear vectors, find the value of λ. [2]

Ans: $\lambda = -12$

2071 Set D Q.No. 2 c Show that the three points whose position vectors are $7\vec{j} + 10\vec{k}$, $-\vec{i} + 6\vec{j} + 6\vec{k}$ and $-4\vec{i} + 9\vec{j} + 6\vec{k}$ form an isosceles triangle. [2]

2071 Old Q.No. 3 b If D is the middle point of BC of the triangle ABC show that $\vec{AB} + \vec{AC} = 2\vec{AD}$. [2]

2070 Set C Q.No. 2 c ABCD is a parallelogram. G is the point of intersection of its diagonals and if O is any point show that: $\vec{OA} + \vec{OB} + \vec{OC} + \vec{OD} = 4\vec{OG}$. [2]

2070 Set D Q.No. 2 c The vertices A, B, C of a triangle are (2, –1, –3), (4, 2, 3) and (6, 3, 4) respectively. Show that $\vec{AB} = (2, 3, 6)$ and AC = 9. [2]

2070 (Old) Q.No. 3 b Find the direction cosines of the vector $\vec{MN}$ where position vectors of M is $-\vec{i} + 6\vec{j} + 6\vec{k}$ and N is $-4\vec{i} + 9\vec{j} + 6\vec{k}$. [2]

Ans: $-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0$

2069 (Set A) Q.No. 2c Show that the three points with position vectors $\vec{i} + 2\vec{j} + 4\vec{k}$, $2\vec{i} + 5\vec{j} - \vec{k}$ and $3\vec{i} + 8\vec{j} - 6\vec{k}$ are collinear. [2]

2069 (Set A) Old Q.No. 4a If $\vec{a} = (3, 4)$ and $3\vec{a} + 2\vec{b} = (5, 6)$ find $\vec{b}$. [2]

Ans: (–2, – 3)

2069 (Set B) Q.No. 2c If $\vec{OP} = \vec{i} + 3\vec{j} - 7\vec{k}$ and $\vec{OQ} = 5\vec{i} - 2\vec{j} + 4\vec{k}$, find $\vec{PQ}$ and a unit vector along the direction of $\vec{PQ}$. [2]

Ans: $4\vec{i} - 5\vec{j} + 11\vec{k}, \frac{4}{9\sqrt{2}}\vec{i} - \frac{5}{9\sqrt{2}}\vec{j} + \frac{11}{9\sqrt{2}}\vec{k}$

2068 Q.No. 4a ABCD is a parallelogram. G is the point of intersection of its diagonals and if O is any point, show that $\vec{OA} + \vec{OB} + \vec{OC} + \vec{OD} = 4\vec{OG}$. [2]

2067 Q.No. 4a Determine the unit vector of $2\vec{a} - 3\vec{b}$ where $\vec{a} = 4\vec{i} + 3\vec{j}$ and $\vec{b} = -2\vec{i} - 3\vec{j}$. [2]

Ans: $\frac{14}{\sqrt{421}}\vec{i} + \frac{15}{\sqrt{421}}\vec{j}$

2066 C Q.No. 3 b Find a unit vector parallel to the sum of the vectors $2\vec{i} + 4\vec{j} - 5\vec{k}$ and $\vec{i} + 2\vec{j} + \vec{k}$ [2]

Ans: $\frac{3}{\sqrt{61}}\vec{i} + \frac{6}{\sqrt{61}}\vec{j} - \frac{4}{\sqrt{61}}\vec{k}$

2066 Q.No. 4 a Prove that the points A, B, C are collinear, if $\vec{OA} = \vec{i} + 2\vec{j} + 4\vec{k}$, $\vec{OB} = 2\vec{i} + 5\vec{j} - \vec{k}$ and $\vec{OC} = 3\vec{i} + 8\vec{j} - 6\vec{k}$. [2]

2065 Q.No 3 b If $3\vec{i} + \vec{j} - \vec{k}$ and $\lambda\vec{i} - 4\vec{j} + 4\vec{k}$ are collinear vector. Find λ. [2]

Ans: – 12

2064 Q.No. 4a If $\vec{a} = (3, 4)$ and $3\vec{a} + 2\vec{b} = (5, 6)$, find $\vec{b}$. [2]

Ans: (– 2, – 3)

34. 2063 Q.No. 3 b If $\vec{a} = (2, -3)$ and $\vec{b} = (4, -2)$, find unit vector along $4\vec{a} - 3\vec{b}$. [2]

Ans: $\left(\frac{-2}{\sqrt{13}}, \frac{-3}{\sqrt{13}}\right)$

35. 2062 Q.No. 4 a If $\vec{OP} = \vec{i} + 3\vec{j} - 7\vec{k}$ and $\vec{OQ} = 5\vec{i} + 2\vec{j} - 4\vec{k}$ find $\vec{PQ}$ and determine its direction cosines. [2]

Ans: $4\vec{i} - 5\vec{j} + 11\vec{k}, \frac{4}{9\sqrt{2}}, \frac{-5}{9\sqrt{2}}, \frac{11}{9\sqrt{2}}$

36. 2060 Q.No. 4 a If $\vec{a} = (2, -3)$ and $\vec{b} = (4, -2)$. Find the unit vector along $4\vec{a} - 3\vec{b}$. [2]

Ans: $\left(\frac{-2}{\sqrt{13}}, \frac{-3}{\sqrt{13}}\right)$

37. 2059 Q.No. 3 b If $\vec{a} + \vec{b} = (5, 6)$ and $\vec{a} - \vec{b} = (3, 2)$, find $\vec{a}$ and $\vec{b}$. [2]

Ans: (4, 4) and (1, 2)

38. 2058 Q.No. 4 a If $\vec{a} = (3, -1, -4)$, $\vec{b} = (-2, 4, -3)$ and $\vec{c} = (-5, 7, -1)$ find $|\vec{a} - 2\vec{b} + \vec{c}|$. [2]

Ans: 3 units

39. 2057 Q.No. 4 a ABCDEF is a regular hexagon. Express $\vec{AC}$ and $\vec{AD}$ in terms of $\vec{AB}$ and $\vec{BC}$. [2]

Ans: $\vec{AC} = \vec{AB} + \vec{BC}$, $\vec{AD} = 2\vec{BC}$

4 Marks Questions

40. 2070 (Old) Q.No. 10 a Prove that the vectors $\vec{a} - 2\vec{b} + 3\vec{c}$, $-2\vec{a} + 3\vec{b} - 4\vec{c}$ and $-\vec{b} + 2\vec{c}$ are coplanar. [4]

41. 2069 (Set A) Old Q.No. 10a OB and OC are two straight lines and D is a point on BC such that BD:DC = m:n, show that: $\vec{OD} = \frac{n\vec{OB} + m\vec{OC}}{m+n}$ [4]

42. 2068 Q.No. 10a Prove that the three vectors $\vec{a} - 2\vec{b} + 3\vec{c}$, $-2\vec{a} + 3\vec{b} - 4\vec{c}$ and $-\vec{b} + 2\vec{c}$ are coplanor. [4]

43. 2067 Q.No. 10a Show that the three points whose position vectors are $2\vec{i} - \vec{j} + \vec{k}$, $\vec{i} - 3\vec{j} - 5\vec{k}$ and $3\vec{i} - 4\vec{j} - 4\vec{k}$ form the sides of a right angled triangle. [4]

44. 2066 C Q.No. 10 a Show that the points A, B and C with position vectors $\vec{i} - 2\vec{j} + 3\vec{k}$, $2\vec{i} + 3\vec{j} - 4\vec{k}$, $-7\vec{j} + 10\vec{k}$ respectively are collinear. [4]

45. 2066 Q.No. 10 a Prove that the vectors $5\vec{a} + 6\vec{b} + 7\vec{c}$, $7\vec{a} - 8\vec{b} + 9\vec{c}$ and $3\vec{a} + 20\vec{b} + 5\vec{c}$ are coplanar. [4]

46. 2065 Q.No 10 a Show that the following vectors are linearly dependent: $5\vec{i} + 6\vec{j} + 7\vec{k}$, $7\vec{i} - 8\vec{j} + 9\vec{k}$ and $3\vec{i} + 20\vec{j} + 5\vec{k}$ [4]

47. 2064 Q.No. 10 a Show that the three points whose position vectors are $7\vec{j} + 10\vec{k}$, $-\vec{i} + 6\vec{j} + 6\vec{k}$ and $-4\vec{i} + 9\vec{j} + 6\vec{k}$ form an isosceles right angled triangle. [4]

48. 2063 Q.No. 10 a ABCD is a parallelogram G is the point of intersection of the diagonals and if O is any point, show that: $\vec{OA} + \vec{OB} + \vec{OC} + \vec{OD} = 4\vec{OG}$ [4]

49. 2062 Q.No. 10 a OB and OC are two straight lines and D is a point on BC such that BD:DC = m:n, show that $\vec{OD} = \frac{n\vec{OB} + m\vec{OC}}{m+n}$ [4]

50. 2061 Q.No. 10 a Prove that the following vectors are coplanar; $\vec{a} - 3\vec{b} + 5\vec{c}$, $\vec{a} - 2\vec{b} + 3\vec{c}$, $-2\vec{a} + 3\vec{b} - 4\vec{c}$ [4]

51. 2060 Q.No. 10 a Show that the three points whose positions vectors are $7\vec{j} + 10\vec{k}$, $-\vec{i} + 6\vec{j} + 6\vec{k}$ and $-4\vec{i} + 9\vec{j} + 6\vec{k}$ form an isosceles right angled triangle. [4]

52. 2059 Q.No. 10 a Prove that the vectors $-\vec{a} + 4\vec{b} + 3\vec{c}$; $2\vec{a} - 3\vec{b} - 5\vec{c}$ and $2\vec{a} + 7\vec{b} - 3\vec{c}$ are coplanars, where $\vec{a}$, $\vec{b}$, $\vec{c}$ are any vectors. [4]

53. 2058 Q.No. 10 a Show that the points A, B and C with position vectors $\vec{i} - 2\vec{j} + 3\vec{k}$, $2\vec{i} + 3\vec{j} - 4\vec{k}$, $-7\vec{j} + 10\vec{k}$ respectively are collinear. [4]

54. 2057 Q.No. 10 a If the position vector of M and N are $3\vec{i} + \vec{j} - 3\vec{k}$ and $4\vec{i} - 2\vec{j} + \vec{k}$ respectively, find $\vec{MN}$ and determine its direction cosines. [4]

Ans: $\vec{MN} = \vec{i} - 3\vec{j} + 4\vec{k}$ $\left(\frac{1}{\sqrt{26}}, \frac{-3}{\sqrt{26}}, \frac{4}{\sqrt{26}}\right)$

B. PRODUCT OF VECTORS

1. Scalar Product

If $\vec{a} = (a_1, a_2)$ and $\vec{b} = (b_1, b_2)$ then

$\vec{a} \cdot \vec{b} = a_1 b_1 + a_2 b_2$

If $\vec{a} = (a_1, a_2, a_3)$, $\vec{b} = (b_1, b_2, b_3)$ then

$\vec{a} \cdot \vec{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$

2. The angle between two vectors $\vec{a}$ and $\vec{b}$ is given by $\cos^{-1}\left(\frac{\vec{a} \cdot \vec{b}}{|\vec{a}||\vec{b}|}\right)$.

3. Projection of $\vec{a}$ on $\vec{b} = \frac{\vec{a} \cdot \vec{b}}{|\vec{b}|}$

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Projection of $\vec{b}$ on $\vec{a} = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}|}$

4. Perpendicular or orthogonal vectors: Two vectors $\vec{a}$ and $\vec{b}$ are orthogonal if and only if $\vec{a} \cdot \vec{b} = 0$

5. $\vec{i} \cdot \vec{j} = \vec{j} \cdot \vec{k} = \vec{k} \cdot \vec{i} = 0$
$\vec{i} \cdot \vec{i} = \vec{j} \cdot \vec{j} = \vec{k} \cdot \vec{k} = 1$

6. If $\vec{a} = (a_1, a_2, a_3)$, $\vec{b} = (b_1, b_2, b_3)$, then
$\vec{a} \times \vec{b} = (a_2b_3 - a_3b_2)\vec{i} - (a_1b_3 - a_3b_1)\vec{j} + (a_1b_2 - a_2b_1)\vec{k}$
$= \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix}$

7. $\vec{a} \times \vec{b} = (|\vec{a}||\vec{b}| \sin\theta)\hat{n} = ab \sin\theta \hat{n}$

8. Angle between Two Vectors
$\theta = \sin^{-1} \frac{|\vec{a} \times \vec{b}|}{|\vec{a}||\vec{b}|}$

9. Vector perpendicular to $\vec{a}$ and $\vec{b} = \vec{a} \times \vec{b}$.
Unit vector perpendicular to $\vec{a}$ and $\vec{b} = \frac{\vec{a} \times \vec{b}}{|\vec{a} \times \vec{b}|}$.

10. Vector Products of $\vec{i}, \vec{j}, \vec{k}$
a. $\vec{i} \times \vec{j} = \vec{k}$, $\vec{j} \times \vec{k} = \vec{i}$, $\vec{k} \times \vec{i} = \vec{j}$
b. $\vec{j} \times \vec{i} = -\vec{k}$, $\vec{k} \times \vec{j} = -\vec{i}$, $\vec{i} \times \vec{k} = -\vec{j}$
c. $\vec{i} \times \vec{i} = \vec{j} \times \vec{j} = \vec{k} \times \vec{k} = 0$

11. $\vec{a} \times \vec{b} \neq \vec{b} \times \vec{a}$ but $\vec{a} \times \vec{b} = -\vec{b} \times \vec{a}$

12. Area of the parallelogram $= |\vec{a} \times \vec{b}| = ab \sin\theta$
Area of the triangle $= \frac{1}{2}|\vec{a} \times \vec{b}| = \frac{1}{2}ab \sin\theta$

13. Two vectors $\vec{a}$ and $\vec{b}$ are parallel if $\vec{a} \times \vec{b} = 0$.

2 Marks Questions

1. **2076 GIE Set A Q.No. 3c** If $\vec{a}$ and $\vec{b}$ are perpendicular vectors and $\vec{a} = (4, 5)$, $\vec{b} = (2, k)$, find the value of k. [2]
Ans: $-\frac{8}{5}$

2. **2076 GIE Set B Q.No. 3c** Find a unit vector perpendicular to each of the vectors $3\hat{i} + \hat{j} + 2\hat{k}$ and $2\hat{i} - 2\hat{j} + 4\hat{k}$. [2]
Ans: $\frac{\vec{i} - \vec{j} - \vec{k}}{\sqrt{3}}$

3. **2076 Set B Q.No. 3a** If $\vec{a} = \hat{i} + 2\hat{j} - \hat{k}$ and $\vec{b} = \hat{i} - \hat{j} + \hat{k}$, find the projection of $\vec{b}$ on $\vec{a}$. [2]
Ans: $-\frac{2}{\sqrt{6}}$

4. **2076 Set C Q.No. 3a** Show that the vector $\vec{a} \times \vec{b}$ is perpendicular to vectors $\vec{a}$ and $\vec{b}$. [2]

5. **2075 GIE Q.No. 3c** If $\vec{a} = (1, 1, -2)$ and $\vec{b} = (2, 1, -1)$, find the projection of $\vec{a}$ on $\vec{b}$. [2]
Ans: $\frac{5}{\sqrt{6}}$

6. **2075 Set A Q.No. 3c** Find the cosine of the angle between the two vectors $\vec{a} = \vec{i} - 2\vec{j} + 3\vec{k}$ and $\vec{b} = \vec{i} + 3\vec{j} + 2\vec{k}$. [2]
Ans: $\frac{1}{14}$

7. **2075 Set C Q.No. 2c** If $\vec{a} = (1, 2)$ and $\vec{b} = (-3, 1)$, find the projection of $\vec{a}$ on $\vec{b}$. [2]
Ans: $-\frac{1}{\sqrt{10}}$

8. **2074 Supp Q.No. 3c** If $\vec{a} = 6\vec{i} + 3\vec{j} - 5\vec{k}$ and $\vec{b} = \vec{i} - 4\vec{j} + 2\vec{k}$, show that $\vec{a} \times \vec{b}$ is perpendicular to $\vec{a}$. [2]

9. **2074 Set A Q.No. 2c** Prove that $(\vec{a} - \vec{b}) \times (\vec{a} + \vec{b}) = 2\vec{a} \times \vec{b}$. [2]

10. **2074 Set B Q.No. 3c** Find the area of the parallelogram determined by the vectors $\vec{i} + 2\vec{j} + 3\vec{k}$ and $-3\vec{i} - 2\vec{j} + \vec{k}$. [2]
Ans: $6\sqrt{5}$ sq. units

11. **2073 Supp Q.No. 3c** If $\vec{a} = \vec{i} + 2\vec{j} - \vec{k}$ and $\vec{b} = \vec{i} - \vec{j} + \vec{k}$ find the projection of $\vec{a}$ on $\vec{b}$. [2]
Ans: $\frac{-2}{\sqrt{3}}$

12. **2073 Set C Q.No. 3c** Show that vector product $\vec{a} \times \vec{b}$ is perpendicular to both vectors $\vec{a}$ and $\vec{b}$. [2]

13. **2073 Set D Q.No. 3c** If $\vec{a} + \vec{b} + \vec{c} = 0$, prove that $\vec{a} \times \vec{b} = \vec{b} \times \vec{c} = \vec{c} \times \vec{a}$. [2]

14. **2072 Supp. Q.No. 3c** If $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$ prove that $\vec{a}$ is perpendicular to $\vec{b}$. [2]

15. **2072 Set C Q.No. 3c** Find the angle between the vectors $2\vec{i} - \vec{j} + \vec{k}$ and $\vec{i} - 3\vec{j} - 5\vec{k}$. [2]
Ans: $\theta = 90°$

16. **2072 Set D Q.No. 3c** If $(\vec{a} + \vec{b}) \cdot (\vec{a} - \vec{b}) = 0$, prove that $|\vec{a}| = |\vec{b}|$. [2]

17. **2072 Set E Q.No. 3c** Find the area of the triangle determined by the vectors $3\vec{i} + 4\vec{j}$ and $-5\vec{i} + 7\vec{j}$. [2]
Ans: 20.5 sq. units

18. **2071 Set C Q.No. 3 c** For what value of m is the pair of vectors $\vec{i} - 2\vec{j} + 4\vec{k}$ and $2\vec{i} + 7\vec{j} + m\vec{k}$ orthogonal? [2]
Ans: m = 3

19. **2071 Set D Q.No. 3 c** Find a unit vector perpendicular to each of the vectors $3\vec{i} + \vec{j} + 2\vec{k}$ and $2\vec{i} - 2\vec{j} + 4\vec{k}$ [2]
Ans: $\frac{\vec{i} - \vec{j} - \vec{k}}{\sqrt{3}}$

20. **2071 Old Q.No. 3 c** Find the vector perpendicular to each of the vectors (1, 3, – 4) and (2, 1, –1). [2]
Ans: (1, –7, – 5)

21. **2070 Supp. Q.No. 2 c** If θ is the angle between two unit vectors $\vec{a}$ and $\vec{b}$, show that $\frac{1}{2}|\vec{a}-\vec{b}| = \sin\frac{\theta}{2}$. [2]

22. **2070 Set C Q.No. 3 c** If $|\vec{a}+\vec{b}| = |\vec{a}-\vec{b}|$, prove that $\vec{a}$ is perpendicular to $\vec{b}$. [2]

23. **2070 Set D Q.No. 3 c** Find the sine of the angle between the two vectors: $2\vec{i}-\vec{j}+\vec{k}$ and $3\vec{i}+4\vec{j}-\vec{k}$ [2]
Ans: $\sqrt{\frac{155}{156}}$

24. **2070 (Old) Q.No. 4 b** Find the unit vector perpendicular to the vectors $4\vec{i}-2\vec{j}+3\vec{k}$ and $5\vec{i}+\vec{j}-4\vec{k}$ [2]
Ans: $\frac{5\vec{i}+31\vec{j}+14\vec{k}}{\sqrt{1182}}$

25. **2069 (Set A) Q.No. 3c** Find the area of the parallelogram determined by the vectors: $\vec{i}+2\vec{j}+3\vec{k}$ and $-3\vec{i}-2\vec{j}+\vec{k}$. [2]
Ans: $6\sqrt{5}$ sq. units

26. **2069 (Set A) Old Q.No. 3b** If $|\vec{a}+\vec{b}| = |\vec{a}-\vec{b}|$, prove that $\vec{a}$ is perpendicular to $\vec{b}$. [2]

27. **2069 (Set B) Q.No. 3c** If $\vec{a} = \vec{i}+\vec{j}-2\vec{k}$ and $\vec{b} = 2\vec{i}-\vec{j}-\vec{k}$ are any two vectors, find the cosine of the angle between the two vectors. [2]
Ans: $\cos\theta = \frac{1}{2}$

28. **2069 Old (Set B) Q.No. 3b** For what value of x is the pair of vectors: $x\vec{i}-2\vec{j}+4\vec{k}$ and $2\vec{i}+7\vec{j}+\vec{k}$ orthogonal? [2]
Ans: 5

29. **2069 Old (Set B) Q.No. 4a** Find the area of the triangle determine by the vectors: $3\vec{i}+4\vec{j}+\vec{k}$ and $-5\vec{i}+7\vec{j}$. [2]
Ans: 20.5 sq. units

30. **2068 Q.No. 3b** Find the area of the triangle determined by the vectors $3\vec{i}+4\vec{j}$ and $-5\vec{i}+7\vec{j}$. [2]
Ans: 20.5 sq. units

31. **2067 Q.No. 3b** Given $\vec{a}$ = (3, 1, 2) and $\vec{b}$ = (2, – 2, 4), find the projection of $\vec{a}$ on $\vec{b}$. [2]
Ans: $\sqrt{6}$

32. **2066 C Q.No. 4 a** If $\vec{a} = \vec{i}+2\vec{j}+3\vec{k}$ and $\vec{b} = 2\vec{i}+3\vec{j}+4\vec{k}$, find the projection of $\vec{a}$ on $\vec{b}$. [2]
Ans: $\frac{20}{\sqrt{29}}$

33. **2066 Q.No. 3 b** For what value of m are the vectors $\vec{i}-2\vec{j}+4\vec{k}$, $2\vec{i}+7\vec{j}+m\vec{k}$ orthogonal? [2]
Ans: 3

34. **2065 Q.No 4 a** Find the value of r if the vectors $3\vec{i}-\vec{j}-2\vec{k}$ and $2\vec{i}-2\vec{j}+r\vec{k}$ are orthogonal. [2]
Ans: 4

35. **2064 Q.No. 3 b** Find the area of the triangle determined by the vectors $3\vec{i}+4\vec{j}$ and $-5\vec{i}+7\vec{j}$. [2]
Ans: 20.5 sq. units

36. **2063 Q.No. 4 a** If $\vec{i}$, $\vec{j}$, $\vec{k}$ are three mutually perpendicular unit vectors and $\vec{a} = \vec{i}-2\vec{j}+\vec{k}$, $\vec{b} = 2\vec{i}-3\vec{j}-\vec{k}$, find the cosine of the angle between the two vectors. [2]
Ans: $\sqrt{\frac{7}{12}}$

37. **2062 Q.No. 3 b** Find the area of the parallelogram determined by the vectors $\vec{i}+2\vec{j}+3\vec{k}$ and $-3\vec{i}-2\vec{j}+\vec{k}$ [2]
Ans: $6\sqrt{5}$ sq. units

38. **2061 Q.No. 3 b** Find a unit vector perpendicular to $2\vec{i}+3\vec{j}-\vec{k}$ and $\vec{i}+\vec{j}-2\vec{k}$. [2]
Ans: $\frac{-5}{\sqrt{35}}\vec{i}+\frac{3}{\sqrt{35}}\vec{j}-\frac{1}{\sqrt{35}}\vec{k}$

39. **2061 Q.No. 4 a** If $\vec{a}$ and $\vec{b}$ are two vectors of unit length and θ is the angle between them. Show that $\frac{1}{2}|\vec{a}-\vec{b}| = \sin\frac{\theta}{2}$. [2]

40. **2060 Q.No. 3 b** Find the cosine of the angle between the vectors: $2\vec{i}+\vec{j}+\vec{k}$ and $4\vec{i}+3\vec{j}+5\vec{k}$. [2]
Ans: $\frac{8}{5\sqrt{3}}$

41. **2059 Q.No. 4 a** Find the angle between two vectors $\vec{a} = \vec{i}+\vec{j}-2\vec{k}$ and $\vec{b} = 2\vec{i}-\vec{j}-\vec{k}$. [2]
Ans: 60°

42. **2058 Q.No. 3 b** Show that the area of the parallelogram determined by $\vec{i}+\vec{j}-3\vec{k}$ and $-\vec{i}-2\vec{j}-3\vec{k}$ is $\sqrt{118}$ sq. units [2]

43. **2057 Q.No. 3 b** Show that the vectors $2\vec{i}+3\vec{j}-8\vec{k}$ and $2\vec{i}+4\vec{j}+2\vec{k}$ are orthogonal. [2]

4 Marks Questions

44. **2075 Set B Q.No. 7a** State and prove the sine law by the vector method. [4]

45. **2075 Set B Q.No. 7a OR** Prove that if θ is the angle between the vectors $\vec{a}$ and $\vec{b}$, then $\vec{a}.\vec{b} = ab\cos\theta$. [4]

46. **2071 Old Q.No. 10 b** Show that the area of the triangle PQR whose vertices are P(1, 2, 3), Q(3, 4, 5) and R (1, 4, 7) is $2\sqrt{6}$ sq. units. [4]

47. **2071 Old Q.No. 11 a** Prove by vector method: cos (A + B) = cos A cos B – sin A sin B. [4]

48. **2070 (Old) Q.No. 11 a** Prove by vector method: cos(A + B) = cos A cos B - sin A sin B. [4]

49. **2069 (Set A) Old Q.No. 11a** Prove by vector method that: sin (A – B) = sin A cos B – cos A sin B. [4]

50. **2069 Old (Set B) Q.No. 9a** Prove, analytically that the angle in a semi-circle is a right angle. [4]

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51. **2069 Old (Set B) Q.No. 10a** Show that the three points whose position vectors are $2\vec{i} - \vec{j} + \vec{k}$, $\vec{i} - 3\vec{j} - 5\vec{k}$ and $3\vec{i} - 4\vec{j} - 4\vec{k}$ form the sides of a right angled triangle. Also, find the remaining two angles. [4]

Ans: $\cos^{-1}\left(\sqrt{\frac{35}{41}}\right)$ and $\cos^{-1}\left(\sqrt{\frac{6}{41}}\right)$

52. **2069 Old (Set B) Q.No. 11a** Prove vectorically that in any triangle $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ [4]

53. **2068 Q.No. 11 a** Using vector method, prove that: $c^2 = a^2 + b^2 - 2ab\cos C$ [4]

54. **2067 Q.No. 11a** Prove by vector method:
$\cos(A + B) = \cos A \cos B - \sin A \sin B$. [4]

55. **2066 C Q.No. 11 a** Prove by vector method:
$\cos(A - B) = \cos A \cos B + \sin A \sin B$. [4]

56. **2066 Q.No.11 a** Use vector method to prove that, in any triangle ABC, $a = b\cos C + c\cos B$. [4]

57. **2065 Q.No 11 a** By using vectors, prove that in any ΔABC, $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$. [4]

58. **2064 Q.No. 11 a** Using vector method, prove in any triangle, that: $b^2 = c^2 + a^2 - 2ac\cos B$. [4]

59. **2063 Q.No. 11 a** Using vector method, prove in any triangle that: $a = b\cos C + c\cos B$. [4]

60. **2062 Q.No. 11 a** Prove vectorically that:
$\cos(A - B) = \cos A \cos B + \sin A \sin B$. [4]

61. **2061 Q.No. 11 a** Prove, in any triangle, by vector method that: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$. [4]

62. **2060 Q.No. 11 a** Prove by vector method:
$\sin(A - B) = \sin A \cos B - \cos A \sin B$. [4]

63. **2059 Q.No. 11 a** Prove by vector method:
$\sin(A + B) = \sin A \cos B + \cos A \sin B$. [4]

64. **2058 Q.No. 11 a** Prove by vector method.
$\cos(A - B) = \cos A \cos B + \sin A \sin B$. [4]

65. **2057 Q.No. 11 a** Prove by vector method:
$\cos(A - B) = \cos A \cos B + \sin A \sin B$. [4]

6 Marks Questions

66. **2077 Set H Q.No. 6** Define cross product of two vectors and give its geometrical interpretation. Prove by vector method: $\cos(A - B) = \cos A \cos B + \sin A \sin B$. [6]

67. **2076 GIE Set A Q.No. 10** Define vector product at two vectors $\vec{p}$ and $\vec{q}$. Using vector product, prove that $\sin(A - B) = \sin A \cos B - \cos A \sin B$. [6]

68. **2076 GIE Set B Q.No. 10** Define scalar product of two vectors. For any triangle ABC, prove by vector method that
i. $b = c\cos A + a\cos C$
ii. $a^2 = b^2 + c^2 - 2bc\cos A$. [6]

69. **2076 Set B Q.No. 10** Define cross product of two vectors and interpret the product geometrically. If $\vec{a}, \vec{b}, \vec{c}$ are three non-zero vectors, prove that: $\vec{a} \times (\vec{b} + \vec{c}) = \vec{a} \times \vec{b} + \vec{a} \times \vec{c}$. [6]

70. **2076 Set C Q.No. 10** Define vector product of two vectors. Also prove using vector method
$\sin(A + B) = \sin A \cos B + \cos A \sin B$. [6]

71. **2075 GIE Q.No. 10** Define vector product of two vectors and geometrically interpret it. Also determine the expression for $\sin\theta$. [6]

Ans: $\frac{|\vec{a} \times \vec{b}|}{|\vec{a}||\vec{b}|}$

72. **2075 Set A Q.No. 10** Define vector product of two vectors. Interpret the vector product of two vectors geometrically. Prove, in any triangle, by vector method that
$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$. [6]

73. **2075 Set C Q.No. 10** Define a dot product. Interpret it geometrically. Let A(1, 0, –1), B(–1, 2, 0), C(2, 0, –3) and D(3, –2, –1) are four points. Show that the projection of AB on CD is equal to projection of CD on AB. Also, show that their inclination is $\cos^{-1}\left(\frac{-4}{9}\right)$. [6]

74. **2074 Supp Q.No. 10** Define scalar product of two vectors. Prove by vector method that
$\cos(A - B) = \cos A.\cos B + \sin A.\sin B$. [6]

75. **2074 Set A Q.No. 10** Using vectors prove that
i. $b^2 = c^2 + a^2 - 2ca\cos B$.
ii. $c = a\cos B + b\cos A$ for any triangle ABC. [6]

76. **2074 Set B Q.No. 10** Define Scalar product of two vectors. Prove vectorically $\cos(A + B) = \cos A \cdot \cos B - \sin A \cdot \sin B$. [6]

77. **2073 Supp Q.No. 10** Define vector product of two vectors, prove by vector method $\sin(A - B) = \sin A \cos B - \cos A \sin B$. [6]

78. **2073 Set C Q.No. 10** Define scalar product of two vectors. Prove vectorically that $\cos(A - B) = \cos A \cos B + \sin A \sin B$. [6]

79. **2073 Set D Q.No. 10** Define scalar product of two vectors. Give the geometrical interpretation of the scalar product of two vectors. Prove vectorically that, $b^2 = c^2 + a^2 - 2ca\cos B$ [6]

80. **2072 Supp. Q.No. 10** Define vector product of two vectors. Using vector method prove that
$\sin(A - B) = \sin A \cos B - \cos A \sin B$. [6]

81. **2072 Set C Q.No. 10** Define Vector product of two Vectors. Prove by Vector method
$\sin(A + B) = \sin A \cos B + \cos A \sin B$. [6]

82. **2072 Set D Q.No. 10** Define Vector product of two Vector. Prove by Vector method that in any triangle ABC,
$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$. [6]

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83. 2072 Set E Q.No. 10 Define scalar product of two vectors. Give the geometrical interpretation of the scalar product of two vectors. In any triangle prove vectorically that $a^2 = b^2 + c^2 - 2bc \cos A$. [6]

84. 2071 Supp. Q.No. 10 Define the scalar product of two vectors. Prove by vector method: $\cos(A+B) = \cos A \cos B - \sin A \sin B$. [6]

85. 2071 Set C Q.No. 10 Define vector product of two vectors. Prove by vector method that: $\sin(A + B) = \sin A \cos B + \cos A \sin B$. [6]

86. 2071 Set D Q.No. 10 Define scalar product of two vectors. Prove by vector method that $\cos(A + B) = \cos A \cos B - \sin A \sin B$. [6]

87. 2070 Supp. Q.No. 11 Define scalar product of two vectors. Prove by vector method that $\cos(A+B)=\cos A \cos B - \sin A \sin B$. [6]

88. 2070 Supp. Q.No. 11 OR Define a vector product. Find a unit vector perpendicular to the plane of $\vec{a} = \vec{i} + \vec{j} - 2\vec{k}$, $\vec{b} = \vec{i} - 2\vec{j} + \vec{k}$. Also compute the sine of the angle between them. [6]

Ans: $\frac{1}{\sqrt{3}}(-\vec{i} - \vec{j} - \vec{k}), \frac{\sqrt{3}}{2}$

89. 2070 Set C Q.No. 10 Define vector product of two vectors. Using vector method, prove that: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$. [6]

90. 2070 Set D Q.No. 10 Define scalar product of two vectors. Prove by vector method that: $\cos(A - B) = \cos A \cos B + \sin A \sin B$. [6]

91. 2069 (Set A) Q.No. 10 Define scalar product of two vectors. Prove by the method of vectors that: $\cos(A - B) = \cos A \cos B + \sin A \sin B$. [6]

92. 2069 (Set B) Q.No. 10 Define vector product of two vectors. Interpret the vector product of two vectors geometrically. Prove by vector method that: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$. [6]

7. DERIVATIVE AND ITS APPLICATION

A. DERIVATIVES

I. DERIVATIVE BY FIRST PRINCIPLE OR DEFINITION

FORMULAE

1. $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$
2. Right Hand and Left Hand Derivatives

$Rf'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$, $h > 0$

$Lf'(x) = \lim_{h \to 0} \frac{f(x-h) - f(x)}{-h}$, $h > 0$

4 Marks Questions

1. 2071 Old Q.No. 9 b Find the derivative of $e^{\tan x}$ from first principle. [4]
Ans: $e^{\tan x} \sec^2 x$

2. 2070 Supp. Q.No. 6 b Find, from first principle, the derivative of $\sin x^2$. [4]
Ans: $2x \cos x^2$

3. 2069 (Set A) Old Q.No. 10b Find from first principle, the derivative of $e^{\cos x}$. [4]
Ans: $-e^{\cos x} \cdot \sin x$

4. 2069 (Set B) Q.No. 11 Or Find from first principle, the derivative of $e^{\sin x}$. [4]

5. 2069 Old (Set B) Q.No. 10b Find, from definition the derivative of $\log(\sin \frac{x}{a})$. [4]
Ans: $\frac{1}{a} \cot \frac{x}{a}$

6. 2068 Q.No. 10b Find from first principle, the derivative of $e^{\sin x}$. [4]
Ans: $\cos x \, e^{\sin x}$

7. 2067 Q.No. 10b Find from first principle, the derivative of: $\sin^{-1} x$. [4]
Ans: $\frac{1}{\sqrt{1-x^2}}$

8. 2066 C Q.No. 10 b Find from first principle, the derivative of: $\log \tan x$: [4]
Ans: 2 Cosec 2x

9. 2066 Q.No. 10 b Find the derivative of Sin (log x) from first principle. [4]
Ans: $\frac{1}{x} \cos(\log x)$

10. 2065 Q.No 10 b Find from first principle, the derivative of a^x. [4]
Ans: $a^x \log a$

11. 2064 Q.No. 10 b Find from first principle, the derivative of $\log \sin x$. [4]
Ans: $\cot x$

12. 2063 Q.No. 10 b Find from first principle, the derivative of $\log \tan x$. [4]
Ans: $\frac{1}{\sin x \cos x}$

13. 2062 Q.No. 10 b Find from first principle, the derivative of $\tan^{-1} x$. [4]
Ans: $\frac{1}{1+x^2}$

14. 2061 Q.No. 10 b Find from first principle, the derivative of $e^{\sqrt{x}}$ [4]
Ans: $\frac{1}{2\sqrt{x}} e^{\sqrt{x}}$

15. 2060 Q.No. 10 b Find from first principle, the derivative of $e^{\sin x}$. [4]
Ans: $\cos x \, e^{\sin x}$

16. 2059 Q.No. 10 b Find, from definition, the derivative of $e^{\tan x}$. [4]
Ans: $\sec^2 x \, e^{\tan x}$

17. 2058 Q.No. 10 b Find from first principle, the derivatives of $e^{\tan x}$. [4]
Ans: $\sec^2 x \, e^{\tan x}$

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6 Marks Questions

18. **2077 Set G Q.No. 6** Find from definition, the derivative of sin (logx). [6]
Ans: $\frac{1}{x}\cos(\log x)$

19. **2076 GIE Set B Q.No. 11 OR** Find, from first principles, the derivative of $\sin^{-1} x$. [6]

20. **2076 Set B Q.No. 11** From definition, find the derivative of $e^{\tan x}$. [6]
Ans: $e^{\tan x}\sec^2 x$

21. **2076 Set C Q.No. 11** From definition, find the derivative of $\log\cos^{-1} x$. [6]
Ans: $\frac{-1}{\cos^{-1}x\sqrt{1-x^2}}$

22. **2075 GIE Q.No. 11** Find from first principle the derivative of $\tan^{-1}x$. [6]
Ans: $\frac{1}{1+x^2}$

23. **2075 Set A Q.No. 11 OR** Find from first principle, the derivative of logsinx. [6]
Ans: cotx

24. **2075 Set B Q.No. 10** Find, from first principle, the derivative of ln $(\sin x^2)$. [6]
Ans: $2x\cot x^2$

25. **2075 Set C Q.No. 11 OR** Find from first principle, the derivative of $\cos x^2$.
Ans: $-2x\sin x^2$

26. **2074 Supp Q.No. 11 OR** Find from first principle, the derivative of $\sin x^2$. [6]
Ans: $2x\cos x^2$

27. **2074 Set A Q.No. 11** Find, from first principle, the derivative of $\ln(\cos\frac{x}{a})$. [6]
Ans: $-\frac{1}{a}\tan\frac{x}{a}$

28. **2074 Set B Q.No. 11** Find from definition the derivative of log (tan x). [6]
Ans: 2 cosec 2x

29. **2073 Supp Q.No. 11 OR** Find from first principle, the derivatives of $\cos^{-1}x$. [6]
Ans: $-\frac{1}{\sqrt{1-x^2}}$

30. **2073 Set C Q.No. 11** Find from first principle the derivative of log (sec x). [6]
Ans: tan x

31. **2073 Set D Q.No. 11 OR** Find from first principle, the derivative of sin (logx). [6]
Ans: $\frac{1}{x}\cos(\log x)$

32. **2072 Supp. Q.No. 11 OR** Find from first principle, the derivative of log (tanx). [6]
Ans: 2 cosec 2 x

33. **2072 Set C Q.No. 11 OR** Find, from first principle, the derivative of xlnx. [6]
Ans: 1 + lnx

34. **2072 Set D Q.No. 11 OR** Find from first principle. the derivative of ln $\cos^{-1} x$. [6]
Ans: $\frac{-1}{\cos^{-1}x\sqrt{1-x^2}}$

35. **2072 Set E Q.No. 11 OR** Find from first principle, the derivative of $\sin x^2$. [6]
Ans: $2x\cos x^2$

36. **2071 Supp. Q.No. 11** Find from first principle, the derivative of ln $(\cos\sqrt{x})$. [6]
Ans: $\frac{1}{2\sqrt{x}}\tan\sqrt{x}$

37. **2071 Set C Q.No. 11 OR** Find from first principle, the derivative of $\tan^{-1}x$. [6]
Ans: $\frac{1}{1+x^2}$

38. **2071 Set D Q.No. 11 OR** Find from first principle, the derivative of: $\ln(\sin\frac{x}{a})$. [6]
Ans: $\frac{1}{a}\cot\frac{x}{a}$

39. **2070 Set C Q.No. 11 or** Find from first principle, the derivative of log (tanx). [6]
Ans: 2 Cosec 2x

40. **2070 Set D Q.No. 11 Or** Find from first principle, the derivative of x^x. [6]
Ans: $x^x(1 + \log x)$

41. **2070 (Old) Q.No. 10 b** Find the derivative of log (tan x) by first principle. [6]
Ans: 2 Cosec 2 x

42. **2069 (Set A) Q.No. 11 or** Find from first principle, the derivative of sin(log x). [6]
Ans: $\frac{1}{x}\cos(\log x)$

II. DERIVATIVE USING FORMULA

FORMULAE

1. i. $\frac{d(x^n)}{dx} = nx^{n-1}$ ii. $\frac{d}{dx}(e^x) = e^x$
   iii. $\frac{d}{dx}(a^x) = a^x \ln a$ iv. $\frac{d}{dx}(\ln x) = \frac{1}{x}$
   v. $\frac{d}{dx}(\sin x) = \cos x$ vi. $\frac{d}{dx}(\cos x) = -\sin x$
   vii. $\frac{d}{dx}(\tan x) = \sec^2 x$ viii. $\frac{d}{dx}(\sec x) = \sec x \tan x$
   ix. $\frac{d}{dx}(\cot x) = -\text{cosec}^2 x$
   x. $\frac{d}{dx}(\text{cosec } x) = -\text{cosec } x \cdot \cot x$
2. i. $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$ ii. $\frac{d}{dx}(\cos^{-1} x) = \frac{-1}{\sqrt{1-x^2}}$
   iii. $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$ iv. $\frac{d}{dx}(\cot^{-1} x) = \frac{-1}{1+x^2}$
   v. $\frac{d}{dx}(\sec^{-1} x) = \frac{1}{x\sqrt{x^2-1}}$ vi. $\frac{d}{dx}(\text{cosec}^{-1} x) = \frac{-1}{x\sqrt{x^2-1}}$

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3. i. $\frac{d[uv]}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$ ii. $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$

4. Derivative of hyperbolic function

$\frac{d}{dx}(\sinh x) = \cosh x$

$\frac{d}{dx}(\cosh x) = \sinh x$

$\frac{d}{dx}(\tanh x) = \text{sech}^2 x$

$\frac{d}{dx}(\coth x) = -\text{cosech}^2 x$

$\frac{d}{dx}(\text{sech } x) = -\text{sech } x \tanh x$

$\frac{d}{dx}(\text{cosech } x) = -\text{cosech } x \coth x$

5. Derivative of inverse hyperbolic functions

$\frac{d(\sinh^{-1}x)}{dx} = \frac{1}{\sqrt{1+x^2}}$

$\frac{d}{dx}(\cosh^{-1}x) = \frac{1}{\sqrt{x^2-1}}$ $(x > 1)$

$\frac{d}{dx}(\tanh^{-1}x) = \frac{1}{1-x^2}$ $-1 < x < 1$

$\frac{d}{dx}(\coth^{-1}x) = \frac{-1}{x^2-1}$, $|x| > 1$

$\frac{d}{dx}(\text{sech}^{-1}x) = \frac{-1}{x\sqrt{1-x^2}}$, $|x| < 1$

$\frac{d}{dx}(\text{cosech}^{-1}x) = \frac{-1}{|x|\sqrt{1+x^2}}$, $x \in \mathbb{R} - \{0\}$

2 Marks Questions

1. **2077 Set I Q.No. 1c** Find the derivative of $\sinh^{-1}(\cosh x)$. [2]

Ans: $\frac{\sinh x}{\sqrt{1+\cosh^2 x}}$

2. **2075 Set B Q.No. 3a** Find the derivative of $x^{\sinh x}$. [2]

Ans: $x^{\sinh x}\left(\frac{\sinh x}{x} + \log x \cosh x\right)$

3. **2071 Supp. Q.No. 3a** Find the derivative of $(\sec x)^{\tan x}$. [2]

Ans: $(\sec x)^{\tan x}(\tan^2 x + \sec^2 x.\ \log \sec x)$

4. **2071 Old Q.No. 2 b** Find the derivative of $\log \sinh x$. [2]

Ans: $\coth x$

5. **2070 Supp. Q.No. 3 a** Find the derivative of $(\ln x)^{\sin hx}$. [2]

Ans: $(\ln x)^{\sin hx}\left[\frac{\sin hx}{x \ln x} + \cosh x.\ \ln(\ln x)\right]$

6. **2070 (Old) Q.No. 2 c** Find $\frac{dy}{dx}$ when $y = \text{sec h}(\tan^{-1}x)$. [2]

Ans: $-\frac{\text{sec h}(\tan^{-1}x)\tan h(\tan^{-1}x)}{1+x^2}$

7. **2069 (Set A) Old Q.No. 2b** Find the derivative of $\left(\sin h\frac{x}{a}\right)^{x^2}$. [2]

Ans: $\left(\sin h\frac{x}{a}\right)^{x^2}\left\{\frac{x^2}{a}\coth\frac{x}{a} + 2x\log\left(\sin h\frac{x}{a}\right)\right\}$

8. **2069 Old (Set B) Q.No. 2a** Find the derivative of $(\text{Cosh}x)^{\sinh^{-1}x}$. [2]

Ans: $(\cos hx)^{\sinh^{-1}x}\left(\sinh^{-1}x \tan hx + \frac{1}{\sqrt{1+x^2}}\log\cos hx\right)$

9. **2068 Q.No. 2b** Find the derivative of $\left(\cos h\frac{x}{a}\right)^{\log x}$. [2]

Ans: $\left(\cosh\frac{x}{a}\right)^{\log x}\left\{\frac{1}{a}\log x.\ \tan h\frac{x}{a} + \frac{1}{x}\log\left(\cos h\frac{x}{a}\right)\right\}$

10. **2067 Q.No. 2b** Find the derivative of $x^{\cos h\frac{x}{a}}$. [2]

Ans: $x^{\cos h\frac{x}{a}}\left(\frac{1}{a}\log x \sin h\frac{x}{a} + \frac{1}{x}\cos h\frac{x}{a}\right)$

11. **2066 C Q.No. 2 b** Find the derivative of: $\log\left(\sin h\frac{x}{a}\right)$. [2]

Ans: $\frac{1}{a}\coth\frac{x}{a}$

12. **2066 Q.No. 2 b** Find the derivative of $2\tan h^{-1}\left(\tan\frac{1}{2}x\right)$ [2]

Ans: sec x

13. **2065 Q.No 2 b** Find the derivative of Arc tan sin hx. [2]

Ans: Sec hx

14. **2064 Q.No. 2 b** Find the derivative of: $\left(\sin h\frac{x}{a}\right)^{x^2}$ [2]

Ans: $\left(\sin h\frac{x}{a}\right)^{x^2}\left[\frac{x^2}{a}\coth\frac{x}{a} + 2x\log\sin h\frac{x}{a}\right]$

15. **2063 Q.No. 2 b** Find the derivative of $x^{\cos h^2(x/a)}$. [2]

Ans: $x^{\cos h^2(x/a)}\left(\frac{1}{x}\cos h^2\frac{x}{a} + \frac{1}{a}\log\sinh\frac{2x}{a}\right)$

16. **2062 Q.No. 2 b** Find the derivative of $\log\left(\sin h\frac{x}{a}\right)$. [2]

Ans: $\frac{1}{a}\coth\frac{x}{a}$

17. **2061 Q.No. 2 b** Find the derivative of: $x^{\cos h\, x/a}$ [2]

Ans: $x^{\cosh(x/a)}\left[\frac{\cosh x/a}{x} + \frac{\log x \sinh x/a}{a}\right]$

18. **2060 Q.No. 2 b** Find the derivative of $2\tan^{-1}\left(\tan h\frac{x}{2}\right)$. [2]

Ans: sechx

19. **2059 Q.No. 2 a** Find the derivative of $e^{\cosh^{-1}x}$. [2]

Ans: $\frac{1}{\sqrt{x^2-1}}e^{\cosh^{-1}x}$

20. **2058 Q.No. 2 b** Find the derivative of $x^{\cosh x}$. [2]

Ans: $x^{\cosh x}\left(\frac{\cosh x}{x} + \log x \sinh x\right)$

21. **2057 Q.No. 2 b** Show that: $\lim_{x\to 0}\frac{\log(1+x)}{x} = 1$. [2]

4 Marks Questions

22. **2057 Q.No. 10 b** Find the derivative of: $\left(\sin h\frac{x}{a} + \cosh\frac{x}{a}\right)^{nx}$ [4]

Ans: $n\left(\sin h\frac{x}{a} + \cosh\frac{x}{a}\right)^{nx}\left[\frac{x}{a} + \log\left(\sinh\frac{x}{a} + \cosh\frac{x}{a}\right)\right]$

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APPLICATION OF DERIVATIVES
DIFFERENTIALS, TARGET AND NORMAL

FORMULAE

1. Differentials
$\Delta y = f(x + \Delta x) - f(x)$ is the actual change in dependent variable y.
The differential of independent variable x, denoted by dx, is defined by $dx = \Delta x$.
The differential of dependent variable y, denoted by dy, is defined by $dy = f'(x)\,dx$; which is the approximate change in y.
Error = |Actual change – Approximate change|.
Percentage error = $\left|\frac{\Delta y - dy}{y}\right| \times 100$.
2. Equation of Tangent
$$y - y_1 = -\left(\frac{dy}{dx}\right)_{(x, y) = (x_1, y_1)} (x - x_1)$$
3. Equation of Normal
$$y - y_1 = -\left(\frac{dx}{dy}\right)_{(x, y) = (x_1, y_1)} (x - x_1)$$
4. The tangent to $y = f(x)$ at P is horizontal if and only if $\frac{dy}{dx} = 0$ at P.
5. The tangent to $y = f(x)$ at P is vertical if and only if $\frac{dx}{dy} = 0$ at P.

2 Marks Questions

1. **2077 Set H Q.No. 2a** Find the equation of normal to the curve $y = 2x^3 - 5x^2 + 8$ at (2, 4). [2]
Ans: x + 4y = 18
2. **2076 GIE Set B Q.No. 3a** Find the point on the curve $4y = x^2$ where the tangent drawn makes angle 45° with the x-axis. [2]
Ans: (2, 1)
3. **2075 GIE Q.No. 3a** Find the equation of the normal to the curve $y = x^3 - 2x^2 + 4$ at (2, 4). [2]
Ans: x + 4y – 18 = 0
4. **2075 Set C Q.No. 3a** Find the equation of the tangent to $y = x^3 - 2x^2 + 4$ at (2, 4). [2]
Ans: 4x – y – 4 = 0
5. **2074 Supp Q.No. 3a** Find the equation of the normal to the curve $y = 2x^3 - 5x^2 + 8$ at the point (2, 4). [2]
Ans: x + 4y = 18
6. **2074 Set A Q.No. 3a** Find the points on the curve $x^2 + y^2 = 36$ at which the tangents are parallel to the y-axis. [2]
Ans: (6, 0), (–6, 0)
7. **2074 Set B Q.No. 3a** Find the equation of the normal of the curve $y = 2x^3 - 5x^2 + 8$ at (2, 4). [2]
Ans: x + 4y = 18
8. **2072 Set E Q.No. 3a** Find the points on the circle $x^2 + y^2 = 16$ at which the tangents are parallel to X–axis. [2]
Ans: (0, ±4)
9. **2071 Set C Q.No. 3 a** Find the points on the curve $y = x^3 - 3x^2 + 1$ where the tangent is parallel to the x-axis. [2]
Ans: (0,1) and (2, – 3)
10. **2071 Old Q.No. 6 c** Find the points on the curve $y = x^3 - 3x^2 + 1$ where the tangents are parallel to the x-axis. [2]
Ans: (0,1) and (2, –3)
11. **2070 Supp. Q.No. 3 b** Find the slope of the tangent to the curve $y = x^3 + 2x^2 + 3x - 10$ at (–3, 2). [2]
Ans: 16
12. **2070 Set D Q.No. 3 a** Find the equation of the tangent to the curve $y = 2x^3 - 5x^2 + 8$ at (2, 4) [2]
Ans: 4x – y = 4
13. **2070 (Old) Q.No. 6 c** Find the points on circle $x^2 + y^2 = 16$ at which tangents are parallel to y- axis. [2]
Ans: (4, 0), (–4, 0)
14. **2068 Q.No. 5c** At what angle does the curve $y(1+x) = x$ cut the x-axis? [2]
Ans: 45°
15. **2067 Q.No. 2c** Find the angle of intersection between the curves $y = x^2$ and $6y = 7 - x^3$ at (1, 1). [2]
Ans: 90°
16. **2066 C Q.No. 2 c** Find the points on the curve $x^2 + y^2 = 16$ at which the tangents are parallel to y–axis. [2]
Ans:(4, 0), (–4, 0)
17. **2066 Q.No. 2 c** Find the angle of intersection of the curves $y^2 = x^3$ and $y = 2x$ at the point (0, 0). [2]
Ans: $\tan^{-1}(2)$
18. **2065 Q.No 2 c** Find where the tangent is parallel to the x–axis for the curve $y = x^3 - 3x^2 - 9x + 15$. [2]
Ans: (–1, 20) and (3, –12)
19. **2064 Q.No. 2 c** Find the points on the curve $y = x^3 - 3x^2 + 1$ where the tangents are parallel to x–axis. [2]
Ans: (0, 1), (2, – 3)
20. **2063 Q.No. 2 c** A circular copperplate is heated so that its radius increases from 5cm to 5.06cm. Find the approximate increase in area. [2]
Ans: 0.6 π cm²
21. **2062 Q.No. 2 c** Find the angle of intersection of the curves $4y = x^2 + 12$ and $y^2 = 8x$ at (2, 4) [2]
Ans: 0°
22. **2061 Q.No. 2 c** Find the slope and inclination with the x–axis of the tangent of $y = -3x - x^4$ at $x = -1$. [2]
Ans: 1 and $\frac{\pi^c}{4}$
23. **2060 Q.No. 5 c** Find the points on the curve $4y = x^4 - 8x^2$ where the tangents are paralleled to the x–axis. [2]
Ans: (0, 0), (– 2, – 4) and (2, –4)
24. **2058 Q.No. 5 c** Find the slope and inclination with x–axis of the tangent of: $x^2 + y^2 = 36$ at (0, 6). [2]
Ans: 0 and 0°
25. **2057 Q.No. 5 c** Find the slope and inclination with x–axis of the tangent of the curve $2y = 2 - x^2$ at $x = 1$. [2]
Ans: –1, $\frac{3\pi^c}{4}$

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II. L HOSPITAL'S RULE

FORMULAE

If $\phi(x)$ and $\psi(x)$ and their derivatives $\phi'(x)$ and $\psi'(x)$ are continuous at $x = a$ and if $\phi(a) = \psi(a) = 0$, then

$$\lim_{x \to a} \frac{\phi(x)}{\psi(x)} = \lim_{x \to a} \frac{\phi'(x)}{\psi'(x)} = \frac{\phi'(a)}{\psi'(a)}$$ provided $\psi'(a) \neq 0$

2 Marks Questions

1. **2076 GIE Set A Q.No. 3a** Evaluate $\lim_{x \to 2} \frac{x^4 - 16}{x^3 - 8}$ using L–Hospital's rule. [2]
Ans: $\frac{8}{3}$

2. **2076 Set B Q.No. 3b** Evaluate, using L' Hospital rule: $\lim_{x \to 0} \frac{x - \sin x \cdot \cos x}{x^3}$. [2]
Ans: $\frac{2}{3}$

3. **2076 Set C Q.No. 3c** Evaluate, using L' Hospital rule: $\lim_{x \to 0} \frac{e^x - x - 1}{x^2}$. [2]
Ans: $\frac{1}{2}$

4. **2075 Set A Q.No. 3a** Using L Hospital's rule, evaluate: $\lim_{x \to 0} \frac{\tan x - x}{x - \sin x}$. [2]
Ans: 2

5. **2074 Set A Q.No. 4a** Using L Hospital's rule, evaluate: $\lim_{x \to 0} \frac{x^2 - \sin^2 x}{x^2}$. [2]
Ans: 0

6. **2073 Supp. Q.No. 3a** Evaluate, using L Hospital's rule: $\lim_{x \to 0} \frac{\ln(\tan x)}{\ln x}$. [2]
Ans: 1

7. **2073 Set C Q.No. 3a** Using L Hospital's rule, evaluate: $\lim_{x \to 0} \frac{x - \sin x \cos x}{x^3}$. [2]
Ans: $\frac{2}{3}$

8. **2073 Set D Q.No. 3a** Using L Hospital's rule, evaluate: $\lim_{x \to 0} \frac{x - \sin x \cos x}{x^3}$. [2]
Ans: $\frac{2}{3}$

9. **2072 Supp. Q.No. 3a** Using L Hospital's rule, evaluate: $\lim_{x \to 0} \frac{xe^x - \log(1 + x)}{x^2}$. [2]
Ans: 3/2

10. **2072 Set C Q.No. 3a** Evaluate, using L' Hospital's rule: $\lim_{x \to 0} \frac{\tan ax}{\tan bx}$. [2]
Ans: $\frac{a}{b}$

11. **2072 Set D Q.No. 3b** Using L' Hospital's rule, evaluate: $\lim_{x \to 0} \frac{e^x - x - 1}{x^2}$. [2]
Ans: $\frac{1}{2}$

12. **2071 Set D Q.No. 3 a** Using L Hospital's rule, evaluate: $\lim_{x \to 0} \frac{e^x + e^{-x} - 2\cos x}{\sin^2 x}$. [2]
Ans: 2

13. **2070 Set C Q.No. 3 a** Using L Hospital's rule, evaluate: $\lim_{x \to 0} \frac{\tan x - x}{x - \sin x}$. [2]
Ans: 2

14. **2069 (Set A) Q.No. 3a** Using L Hospital's rule, evaluate: $\lim_{x \to 0} \frac{e^x - x - 1}{x^2}$. [2]
Ans: $\frac{1}{2}$

15. **2069 (Set B) Q.No. 3a** Using L Hospital's rule, evaluate: $\lim_{x \to 0} \frac{x - \sin x}{x^3}$. [2]
Ans: $\frac{1}{6}$

III. ROLLE'S THEOREM AND MEAN VALUE THEOREM

FORMULAE

1. Rolle's Theorem
If f(x) be a function defined on [a, b] such that
i. f(x) is continuous in [a, b]
ii. f(x) is derivable in (a, b)
iii. f(a) = f(b),
then there exists at least one $c \in (a, b)$ such that f'(c)=0.
2. Lagrange's Mean Value Theorem
Let f(x) be a function defined in [a, b] such that
i. f(x) is continuous in [a, b]
ii. f(x) is derivable in (a, b)
then there exists at least one value $c \in (a, b)$ such that
$f'(c) = \frac{f(b) - f(a)}{b - a}$

4 Marks Questions

1. **2070 Supp. Q.No. 6 b OR** State Rolle's theorem. Verify that the function $f(x) = x(x - 3)^2$ on [0, 3] satisfies conditions of Rolle's theorem and find c prescribed in the theorem. [4]
Ans: c = 1

6 Marks Questions

2. **2077 Set G Q.No. 6 OR** State Rolle's theorem, interpret it geometrically. Verify Rolle's theorem for $f(x) = (x + 1)(x - 2)$ in [–1, 2].

3. **2076 GIE Set A Q.No. 11** State Rolle's theorem. Verify Rolle's theorem for the function $f(x) = \sqrt{1 - x^2}$ in the interval [– 1, 1]. [6]

4. **2076 GIE Set B Q.No. 11** State Mean Value Theorem. Interpret it geometrically. Verify Mean Value theorem for the function $f(x) = x^3 + x^2 - 6x$ in [– 1, 4]. [6]

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2076 Set B Q.No. 11 OR State Mean value theorem. Verify it for the function $f(x) = 2x^2 - 10x + 29$ in [2, 7]. [6]

Ans: $c = \frac{9}{2}$

2076 Set C Q.No. 11 OR Using Mean Value Theorem, find a point on the curve $f(x) = x^2 - 2x$, the tangent at which is parallel to the chord joining the points (1, – 1) and (4, 8). [6]

Ans: $\left(\frac{5}{2}, \frac{5}{4}\right)$

2075 GIE Q.No. 11 OR Using Lagrange's mean value theorem, find the point on the curve $f(x) = x^2 - 2x$, the tangent at which is parallel to the chord joining the points (1, –1) and (4, 8). [6]

Ans: $\left(\frac{5}{2}, \frac{5}{4}\right)$

2075 Set A Q.No. 11 State Rolle's theorem. Interpret it geometrically. Verify Rolle's theorem for the function $f(x) = (x - 1)(x - 2)(x - 3)$ in [1, 3]. [6]

2075 Set B Q.No. 10 OR State the mean value theorem and interpret it geometrically. Verify that the function $f(x) = \sqrt{x}$ on [1, 4] satisfies conditions of the mean value theorem and find c prescribed in the theorem. [6]

Ans: $c = \frac{9}{4}$

10. **2075 Set C Q.No. 11** State the mean value theorem. Interpret it geometrically. Verify the mean value theorem for the function $f(x) = (x - 1)(x - 2)(x - 3)$ in [1, 4]. [6]
11. **2074 Supp Q.No. 11** State mean value theorem. Interpret it geometrically. Verify mean value theorem for the function $f(x) = x(x-1)^2$ in [0, 2]. [6]
12. **2074 Set A Q.No. 11 OR** State the Mean value theorem. Use it to find a point on the parabola $f(x) = (x - 3)^2$, where the tangent is parallel to the chord joining the points (3, 0) and (4, 1). [6]

Ans: $\left(\frac{7}{2}, \frac{1}{4}\right)$

13. **2074 Set B Q.No. 11 OR** Define Lagrange's Mean value theorem. Also verify the theorem for the function $f(x) = 2x^2 - 10x + 29$ in [2, 7]. [6]

Ans: $c = \frac{9}{2}$

14. **2073 Supp Q.No. 11** Using Mean Value theorem, find a point on the parabola $y = (x - 3)^2$, where the tangent is parallel to the chord joining the points (3, 0) and (4, 1). [6]

Ans: $\left(\frac{7}{2}, \frac{1}{4}\right)$

15. **2073 Set C Q.No. 11 OR** State Rolle's theorem. Using Rolle's theorem find a point on the curve $f(x) = \cos 2x$ where the tangent is parallel to x-axis on $[-\pi, \pi]$. [6]

Ans: (0, 1)

16. **2073 Set D Q.No. 11** State Mean Value Theorem. Interpret it geometrically. Verify Lagrange's mean value theorem for the function $f(x) = x(x-1)^2$ in [0, 2]. [6]
17. **2072 Supp. Q.No. 11** State Rolle's theorem. Interpret it geometrically. Verify Rolle's theorem for the function $f(x) = \sin x$, $x \in [0, \pi]$. Also find a point in the curve represented by given function where the tangent is parallel to x-axis. [6]

Ans: $c = \frac{\pi}{2}$; $\left(\frac{\pi}{2}, 1\right)$

18. **2072 Set C Q.No. 11** State Rolle's theorem. Verify Rolle's theorem for the function $f(x) = 2x^2 - 3x + 1$ in $\left[\frac{1}{2}, 1\right]$. [6]

Ans: $c = \frac{3}{4}$

19. **2072 Set D Q.No. 11** State Mean Value theorem. Verify the mean value theorem for the function $f(x) = \sqrt{x^2 - 4}$, $x \in [2, 4]$. Ans: $c = \sqrt{6}$ [6]
20. **2072 Set E Q.No. 11** State Rolle's theorem. What is the geometrical interpretation of Rolle's theorem. Verify Rolle's theorem for the function $f(x) = \sqrt{1 - x^2}$, $x \in [-1, 1]$. [6]
21. **2071 Supp. Q.No. 11 OR** State Rolle's theorem. Verify that the function $f(x) = \sin x + \cos x$ on $[0, 2\pi)$ satisfies the conditions of Rolle's theorem and find the constant c prescribed by the theorem. If $f(x) = (x-1)^{-2}$, show that $f(0) = f(2)$, but there is no number c in (0,2) such that $f'(c) = 0$. Why does not this contradict Rolle's theorem? [6]
22. **2071 Set C Q.No. 11** State mean value theorem. Interpret it geometrically. Verify the mean value theorem for the function $f(x) = (x-1)(x-2)(x-3)$ in [1, 4]. [6]

Ans: c = 3

23. **2071 Set D Q.No. 11** State Rolle's Theorem. Interpret it geometrically. Verify Rolle's Theorem for the function $f(x) = x(x-3)^2$ for $x \in [0, 3]$ [6]

Ans: c = 1

24. **2070 Set C Q.No. 11** State Rolle's theorem. Interpret it geometrically. Verify Rolle's Theorem for the function $f(x) = x(x-3)^2$ for $x \in [0, 3]$. [6]
25. **2070 Set D Q.No. 11** State mean value theorem. Interpret it geometrically. Verify mean value theorem for the function $f(x) = x(x-1)^2$ in [0, 2]. [6]
26. **2069 (Set A) Q.No. 11** State mean value theorem. Interpret it geometrically. Verify mean value theorem for the function $f(x) = x^3 + x^2 - 6x$ in [–1, 4]. [6]
27. **2069 (Set B) Q.No. 11** State mean value theorem. Interpret it geometrically. Verify mean value theorem for the function $f(x) = (x-1)(x-2)(x-3)$ in [1, 4]. [6]

8. ANTIDERIVATIVES

FORMULAE

1. i. $\int x^n dx = \frac{x^{n+1}}{n+1} + c, n \neq -1$

   ii. $\int \frac{1}{x} dx = \ln|x| + c, x \neq 0$

   iii. $\int e^x dx = e^x + c$

iv. $\int a^x\,dx = \frac{a^x}{\ln a} + c$

2. i. $\int \sin x\,dx = -\cos x + c$
ii. $\int \cos x\,dx = \sin x + c$
iii. $\int \tan x\,dx = \ln \sec x + c$
iv. $\int \cot x\,dx = \ln \sin x + c$
v. $\int \sec x\,dx = \ln|\sec x + \tan x| + c$
$= \ln\left|\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)\right| + c$
vi. $\int \operatorname{cosec} x\,dx = \ln|\operatorname{cosec} x - \cot x| + c$
$= \ln \tan\frac{x}{2} + c$
vii. $\int \sec^2 x\,dx = \tan x + c$
viii. $\int \operatorname{cosec}^2 x\,dx = -\cot x + c$
ix. $\int \sec x \tan x\,dx = \sec x + c$
x. $\int \operatorname{cosec} x \cot x\,dx = -\operatorname{cosec} x + c$

3. i. $\int \frac{1}{\sqrt{1-x^2}}\,dx = \sin^{-1} x + c$

ii. $\int \frac{1}{1+x^2}\,dx = \tan^{-1} x + c$

iii. $\int \frac{1}{|x|\sqrt{x^2-1}}\,dx = \sec^{-1} x + c$

4. i. $\int (ax+b)^n\,dx = \frac{1}{a}\frac{(ax+b)^{n+1}}{n+1} + c,\ n \neq -1.$

ii. $\int \frac{1}{ax+b}\,dx = \frac{1}{a}\ln|ax+b| + c$

5. $\int (uv)\,dx = u\int v\,dx - \int\left\{\frac{d}{dx}(u)\int v\,dx\right\}dx$

6. i. $\int \frac{1}{x^2-a^2}\,dx = \frac{1}{2a}\ln\left|\frac{x-a}{x+a}\right| + c$

ii. $\int \frac{1}{a^2-x^2}\,dx = \frac{1}{2a}\ln\left|\frac{a+x}{a-x}\right| + c$

iii. $\int \frac{1}{x^2+a^2}\,dx = \frac{1}{a}\tan^{-1}\frac{x}{a} + c$

7. i. $\int \frac{1}{\sqrt{a^2-x^2}}\,dx = \sin^{-1}\frac{x}{a} + c$

ii. $\int \frac{1}{\sqrt{x^2-a^2}}\,dx = \ln\left|x+\sqrt{x^2-a^2}\right| + c$

iii. $\int \frac{1}{\sqrt{a^2+x^2}}\,dx = \ln\left|x+\sqrt{x^2+a^2}\right| + c$

8. i. $\int \sqrt{a^2-x^2}\,dx = \frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a} + c$

ii. $\int \sqrt{x^2-a^2}\,dx = \frac{x}{2}\sqrt{x^2-a^2} - \frac{a^2}{2}\ln\left|x+\sqrt{x^2-a^2}\right| + c$

iii. $\int \sqrt{x^2+a^2}\,dx = \frac{x}{2}\sqrt{x^2+a^2} + \frac{a^2}{2}\ln\left|x+\sqrt{x^2+a^2}\right| + c$

9. i. $\int \sinh x\,dx = \cosh x + c$
ii. $\int \cosh x\,dx = \sinh x + c$
iii. $\int \tanh x\,dx = \ln\cosh x + c$
iv. $\int \coth x\,dx = \ln\sinh x + c$
v. $\int \operatorname{sech} x\,dx = \tan^{-1}|\sinh x| + c$
vi. $\int \operatorname{cosech}\,dx = \ln\tanh\frac{x}{2} + c$
vii. $\int \operatorname{sech}^2 x\,dx = \tanh x + c$
viii. $\int \operatorname{cosech}^2 x\,dx = -\coth x + c$
ix. $\int \operatorname{sech} x \tanh x\,dx = -\operatorname{sech} x + c$
x. $\int \operatorname{cosech} x \coth x\,dx = -\operatorname{cosech} x + c$

2 Marks Questions

1. **2077 Set G Q.No. 2a** Evaluate: $\int \frac{dx}{x+\sqrt{x^2-1}}$ [2]

Ans: $\frac{x^2}{2} - \frac{1}{2}x\sqrt{x^2-1} + \frac{1}{2}\log\left(x+\sqrt{x^2-1}\right) + c$

2. **2077 Set I Q.No. 2a** Evaluate: $\int \frac{dx}{\sqrt{2ax-x^2}}$ [2]

Ans: $\sin^{-1}\left(\frac{x-a}{a}\right) + c$

3. **2076 GIE Set A Q.No. 3b** Evaluate $\int\sqrt{4x^2+4x+5}\,dx$ [2]

Ans: $\frac{1}{4}(2x+1)\sqrt{4x^2+4x+5} + \ln\left(2x+\sqrt{4x^2+4x+5}\right) + c$

4. **2076 GIE Set B Q.No. 3b** Evaluate: $\int \frac{dx}{e^x+e^{-x}}$ [2]

Ans: $\tan^{-1}(e^x) + c$

5. **2076 Set B Q.No. 3c** Evaluate: $\int \frac{x}{(x-a)(x-b)}\,dx$. [2]

Ans: $\frac{1}{a-b}\{a\log(x-a) - b\log(x-b)\} + c$

6. **2076 Set C Q.No. 3b** Evaluate: $\int \frac{dx}{1-2\cos x}$ [2]

Ans: $\frac{1}{\sqrt{3}}\log\left(\frac{\sqrt{3}\tan\frac{x}{2}-1}{\sqrt{3}\tan\frac{x}{2}+1}\right) + c$

7. **2075 GIE Q.No. 3b** Evaluate: $\int \frac{dx}{\sqrt{2ax-x^2}}$. [2]

Ans: $\sin^{-1}\left(\frac{x-a}{a}\right) + c$

8. **2075 Set A Q.No. 3b** Evaluate: $\int \frac{dx}{\sqrt{2ax-x^2}}$. [2]

Ans: $\sin^{-1}\left(\frac{x-a}{a}\right) + c$

9. **2075 Set B Q.No. 3b** Find the integral $\int \frac{dx}{1+3\cos^2 x}$. [2]

Ans: $\frac{1}{2}\tan^{-1}\left(\frac{\tan x}{2}\right) + c$

10. **2075 Set C Q.No. 3b** Evaluate: $\int \frac{dx}{\sqrt{1+e^{-2x}}}$. [2]

Ans: $\log\left(e^x+\sqrt{e^{2x}+1}\right) + c$

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11. **2075 Set C Q.No. 3c** Evaluate: $\int \frac{2x-11}{x^2+x-2}\,dx$. [2]

Ans: $5\log(x+2) - 3\log(x-1) + C$

12. **2074 Supp Q.No. 3b** Evaluate: $\int \frac{dx}{e^x + e^{-x}}$. [2]

Ans: $\tan^{-1}(e^x) + c$

13. **2074 Set A Q.No. 3b** Find the integral $\int \frac{dx}{\sqrt{x^2 - 6x + 13}}$. [2]

Ans: $\log(x - 3 + \sqrt{x^2 - 6x + 13}) + C$

14. **2074 Set B Q.No. 3b** Evaluate: $\int \frac{3x}{(x-a)(x-b)}\,dx$. [2]

Ans: $\frac{3}{a-b}\{a\log(x-a) - b\log(x-b)\} + C$

15. **2073 Supp Q.No. 3b** Evaluate: $\int \frac{\sin 2x}{(\sin x + \cos x)^2}\,dx$. [2]

Ans: $x + \frac{1}{\tan x + 1} + C$

16. **2073 Set C Q.No. 3b** Evaluate: $\int \frac{dx}{x + \sqrt{x^2-1}}$. [2]

Ans: $\frac{x^2}{2} - \frac{1}{2}x\sqrt{x^2-1} + \frac{1}{2}\log(x + \sqrt{x^2-1}) + C$

17. **2073 Set D Q.No. 3b** Evaluate: $\int \frac{dx}{x + \sqrt{x^2-1}}$. [2]

Ans: $\frac{x^2}{2} - \frac{1}{2}x\sqrt{x^2-1} + \frac{1}{2}\log(x + \sqrt{x^2-1}) + C$

18. **2072 Supp. Q.No. 3b** Evaluate: $\int \sqrt{2ax - x^2}\,dx$. [2]

Ans: $\frac{1}{2}(x-a)\sqrt{2ax-x^2} + \frac{a^2}{2}\sin^{-1}\left(\frac{x-a}{a}\right) + C$

19. **2072 Set C Q.No. 3b** Evaluate: $\int \frac{dx}{1 - 2\cos x}$. [2]

Ans: $\frac{1}{\sqrt{3}}\log\left(\frac{\sqrt{3}\tan\frac{x}{2} - 1}{\sqrt{3}\tan\frac{x}{2} + 1}\right) + C$

20. **2072 Set D Q.No. 3a** Compute the integral $\int \frac{\coth x\,dx}{\sinh x - 9\,\text{cosech}\,x}$. [2]

Ans: $\frac{1}{6}\log\left(\frac{\sinh x - 3}{\sinh x + 3}\right) + C$

21. **2072 Set E Q.No. 3b** Evaluate: $\int \frac{dx}{\sqrt{(x-\alpha)(x-\beta)}}\ (\beta > \alpha)$. [2]

Ans: $2\log\left(\sqrt{x-\alpha} + \sqrt{x-\beta}\right) + C$

22. **2071 Supp. Q.No. 3b** Find the integral $\int \frac{dx}{3 - 2x - x^2}$. [2]

Ans: $\frac{1}{4}\log\left(\frac{3+x}{1-x}\right) + C$

23. **2071 Set C Q.No. 3 b** Evaluate: $\int \frac{6x+1}{x^2+9}\,dx$. [2]

Ans: $3\log(x^2+9) + \frac{1}{3}\tan^{-1}\frac{x}{3} + C$

24. **2071 Set D Q.No. 3 b** Evaluate: $\int \frac{dx}{\sqrt{2ax + x^2}}$. [2]

Ans: $\log(x + a + \sqrt{2ax + x^2}) + C$

25. **2071 Old Q.No. 3 a** Show that: $\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\frac{x}{a} + c$. [2]

26. **2070 Supp. Q.No. 3 c** Find the integral $\int (2x-5)\sqrt{x^2 - 5x + 1}\,dx$. [2]

Ans: $\frac{2}{3}(x^2 - 5x + 1)^{3/2} + C$

27. **2070 Set C Q.No. 3 b** Evaluate: $\int \frac{2x+3}{4x^2+1}\,dx$. [2]

Ans: $\frac{1}{4}\log(4x^2+1) + \frac{3}{2}\tan^{-1}2x + C$

28. **2070 Set D Q.No. 3 b** Evaluate: $\int \frac{dx}{\sqrt{(x-\alpha)(x-\beta)}}$, $(\beta > \alpha)$. [2]

Ans: $2\log(\sqrt{x-\alpha} + \sqrt{x-\beta}$

29. **2070 (Old) Q.No. 3 a** Evaluate: $\int \frac{dx}{e^x + e^{-x}}$. [2]

Ans: $\tan^{-1}(e^x) + C$

30. **2069 (Set A) Q.No. 3b** Evaluate: $\int \frac{dx}{\sqrt{2ax - x^2}}$. [2]

Ans: $\sin^{-1}\left(\frac{x-a}{a}\right) + C$

31. **2069 (Set A) Old Q.No. 3a** Show that: $\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\frac{x}{a} + c$. [2]

32. **2069 (Set B) Q.No. 3b** Evaluate: $\int \frac{dx}{e^x + e^{-x}}$. [2]

Ans: $\tan^{-1}(e^x) + C$

33. **2068 Q.No. 3a** Evaluate: $\int \frac{dx}{\sqrt{2ax - x^2}}$. [2]

Ans: $\sin^{-1}\left(\frac{x-a}{a}\right) + C$

34. **2067 Q.No. 3a** Evaluate $\int \frac{1}{x^2} e^{\frac{-1}{x}dx}$. [2]

Ans: $e^{-1/x} + C$

35. **2066 C Q.No. 3 a** Evaluate: $\int \frac{dx}{\sqrt{2ax - x^2}}$. [2]

Ans: $\sin^{-1}\left(\frac{x-a}{a}\right) + C$

36. **2066 Q.No. 3 a** Integrate: $\int \frac{dx}{\sqrt{2ax + x^2}}$. [2]

Ans: $\log(x + a + \sqrt{2ax + x^2}) + C$

37. 2065 Q.No 3 a Evaluate: $\int \frac{dx}{e^x + e^{-x}}$ [2]

Ans: $\tan^{-1}(e^x) + c$

38. 2064 Q.No. 3 a Evaluate: $\int \frac{dx}{x^2 - 16}$ [2]

Ans: $\frac{1}{8} \log \frac{x-4}{x+4} + C$

39. 2063 Q.No. 3 a Integrate: $\int \frac{dx}{\sqrt{(x-\alpha)(x-\beta)}}$ ($\beta > \alpha$). [2]

Ans: $2\log(\sqrt{x-\alpha} + \sqrt{x-\beta}) + C$

40. 2062 Q.No. 3 a Integrate: $\int \frac{dx}{\sqrt{2ax - x^2}}$ [2]

Ans: $\sin^{-1}\frac{x-a}{a} + C$

41. 2061 Q.No. 3 a Evaluate: $\int \sqrt{\frac{1+x}{1-x}}\, dx$. [2]

Ans: $-\sqrt{1-x^2} + \sin^{-1}x + C$

42. 2060 Q.No. 3 a Evaluate: $\int \frac{dx}{\sqrt{a^2 - x^2}}$ [2]

Ans: $\sin^{-1}\frac{x}{a} + C$

43. 2058 Q.No. 3 a Prove that: $\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\frac{x}{a} + c$. [2]

44. 2057 Q.No. 3 a Prove: $\int \operatorname{cosec} x\, dx = \log\left|\tan\frac{x}{2}\right| + c$ [2]

4 Marks Questions

45. 2077 Set H Q.No. 4 Evaluate: $\int \frac{dx}{4 + 3\cos hx}$ [4]

Ans: $\frac{1}{\sqrt{7}} \ln\left(\frac{\sqrt{7} + \tanh^2\frac{x}{2}}{\sqrt{7} - \tanh^2\frac{x}{2}}\right) + c$

46. 2077 Set H Q.No. 4 OR Evaluate: $\int \frac{5}{(x+5)(2x^2+5)} dx$ [4]

Ans: $\frac{1}{11}\ln(x+5)\,dx - \frac{1}{22}\ln(2x^2+5)\,dx + \frac{\sqrt{10}}{11}\tan^{-1}\left(\sqrt{\frac{2}{5}}x\right) + c$

47. 2076 GIE Set A Q.No. 7a Evaluate: $\int \frac{dx}{3\sin x + 4\cos x}$ [4]

Ans: $\frac{1}{5}\log\tan\left(\frac{x}{2} + \frac{1}{2}\tan^{-1}\frac{4}{3}\right) + C$

48. 2076 GIE Set A Q.No. 7a OR Evaluate: $\int \frac{dx}{(x-1)(x^2+3)}$ [4]

Ans: $\frac{1}{4}\ln(x-1) - \frac{1}{8}\ln(x^2+3) - \frac{1}{4\sqrt{3}}\tan^{-1}\frac{x}{\sqrt{3}} + c$

49. 2076 GIE Set B Q.No. 7a Evaluate: $\int \frac{dx}{3\sin x - 4\cos x}$ [4]

Ans: $\frac{1}{5}\log\left(\frac{2\tan\frac{x}{2} - 1}{2\tan\frac{x}{2} + 4}\right) + c$

50. 2076 Set B Q.No. 7a Evaluate: $\int \frac{dx}{1 + \sin x + \cos x}$ [4]

Ans: $\log\left(1 + \tan\frac{x}{2}\right) + c$

51. 2076 Set C Q.No. 7a Evaluate: $\int \frac{x^2}{x^4 - 2x^2 - 15} dx$. [4]

Ans: $\frac{\sqrt{5}}{16}\log\frac{x-\sqrt{5}}{x+\sqrt{5}} + \frac{\sqrt{3}}{8}\tan^{-1}\frac{x}{\sqrt{3}} + C$

52. 2075 GIE Q.No. 7a Evaluate: $\int \frac{dx}{1 + \sin x + \cos x}$ [4]

Ans: $\log\left(1 + \tan\frac{x}{2}\right) + c$

53. 2075 Set A Q.No. 7a Evaluate: $\int \frac{dx}{\sin x + \cos x}$ [4]

Ans: $\frac{1}{\sqrt{2}}\log\tan\left(\frac{x}{2} + \frac{\pi}{8}\right) + c$

54. 2075 Set B Q.No. 7b Evaluate: $\int (2x+3)\sqrt{x^2 - 2x - 3}\, dx$. [4]

Ans: $\frac{2}{3}(x^2-2x-3)^{3/2} + \frac{5}{2}(x-1)\sqrt{x^2-2x-3} - 10\log(x-1-\sqrt{x^2-2x-3}) + c$

55. 2075 Set C Q.No. 7a Evaluate: $\int \frac{1}{2\sin t + 3\cos t} dt$. [4]

Ans: $\frac{1}{\sqrt{13}}\log\left\{\tan\left(\frac{t}{2} + \frac{1}{2}\tan^{-1}\frac{3}{2}\right)\right\} + c$

56. 2074 Supp Q.No. 7a Evaluate: $\int \frac{dx}{2 + 3\cos x}$ [4]

Ans: $\frac{1}{\sqrt{5}}\log\left(\frac{\sqrt{5} + \tan\frac{x}{2}}{\sqrt{5} - \tan\frac{x}{2}}\right) + c$

57. 2074 Set A Q.No. 7a Evaluate: $\int \frac{dx}{3 + 5\cos hx}$ [4]

Ans: $\frac{1}{2}\tan^{-1}\left(\frac{1}{2}\tanh\frac{x}{2}\right) + c$

58. 2074 Set B Q.No. 7a Evaluate: $\int \frac{dx}{3\sin x + 4\cos x}$ [4]

Ans: $\frac{1}{5}\log\tan\left(\frac{x}{2} + \frac{1}{2}\tan^{-1}\frac{4}{3}\right) + C$

59. 2074 Set B Q.No. 7a OR Evaluate: $\int \sqrt{\frac{1+x}{1-x}}\, dx$. [4]

Ans: $\sin^{-1}x - \sqrt{1-x^2} + C$

60. 2073 Supp Q.No. 7a Evaluate: $\int \frac{x^2}{x^4 - 2x^2 - 15} dx$. [4]

Ans: $\frac{\sqrt{5}}{16}\log\frac{x-\sqrt{5}}{x+\sqrt{5}} + \frac{\sqrt{3}}{8}\tan^{-1}\frac{x}{\sqrt{3}} + C$

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2073 Set C Q.No. 7a Evaluate: $\int \frac{dx}{1-2\cos x}$ [4]

Ans: $\frac{1}{\sqrt{3}} \log\left(\frac{\sqrt{3}\tan\frac{x}{2}-1}{\sqrt{3}\tan\frac{x}{2}+1}\right)+C$

2073 Set C Q.No. 7a OR Evaluate: $\int \frac{x^3\,dx}{2x^4-3x^2-5}$ [4]

Ans: $\frac{1}{14}\log(x^2+1)+\frac{5}{28}\log(2x^2-5)+C$

2073 Set D Q.No. 7a Evaluate: $\int \frac{dx}{1+\sin x+\cos x}$ [4]

Ans: $\log\left(\tan\frac{x}{2}+1\right)+C$

2072 Supp. Q.No. 7a Evaluate: $\int \frac{dx}{3\sin x+4\cos x}$ [4]

Ans: $\frac{1}{5}\log\tan\left(\frac{x}{2}+\frac{1}{2}\tan^{-1}\frac{4}{3}\right)+C$

2072 Set C Q.No. 7a Evaluate: $\int \frac{dx}{(x-2)^2(x-3)^3}$ [4]

Ans: $\frac{-1}{2}\frac{(x-2)^2}{(x-3)^2}+\frac{3(x-2)}{x-3}-3\log\frac{x-2}{x-3}-\frac{x-3}{x-2}+C$

2072 Set D Q.No. 7a Evaluate: $\int \frac{dx}{(x-1)^2(x-2)^3}$ [4]

Ans: $-\frac{1}{2}\frac{(x-1)^2}{(x-2)^2}+3\left(\frac{x-1}{x-2}\right)-3\log\left(\frac{x-1}{x-2}\right)-\frac{x-2}{x-1}+C$

2072 Set E Q.No. 7a Evaluate: $\int \frac{dx}{2+3\cos x}$ [4]

Ans: $\frac{1}{\sqrt{5}}\log\left(\frac{\sqrt{5}+\tan\frac{x}{2}}{\sqrt{5}-\tan\frac{x}{2}}\right)+C$

2071 Supp. Q.No. 7a Find the integral $\int \frac{dx}{5+4\sin x}$ [4]

Ans: $\frac{2}{3}\tan^{-1}\left(\frac{5\tan\frac{x}{2}+4}{3}\right)+C$

2071 Set C Q.No. 7 a Evaluate: $\int \frac{dx}{1-2\cos x}$ [4]

Ans: $\frac{1}{\sqrt{3}}\log\left[\frac{\sqrt{3}\tan\frac{x}{2}-1}{\sqrt{3}\tan\frac{x}{2}+1}\right]+C$

2071 Set D Q.No. 7 a Evaluate: $\int \frac{dx}{1-3\sin x}$ [4]

Ans: $\frac{1}{2\sqrt{2}}\log\left(\frac{\tan\frac{x}{2}-3-2\sqrt{2}}{\tan\frac{x}{2}-3+2\sqrt{2}}\right)+C$

2071 Old Q.No. 10 a Integrate $\int \sqrt{\frac{1-x}{1+x}}\,dx$ [4]

Ans: $\sin^{-1}x-\sqrt{1-x^2}+C$

2070 Supp. Q.No. 7 a Find the integral $\int \frac{dx}{3\sin x-5\cos x}$ [4]

Ans: $\frac{1}{\sqrt{34}}\log\tan\left(\frac{x}{2}+\frac{1}{2}\tan^{-1}\left(\frac{5}{3}\right)\right)+C$

2070 Set C Q.No. 7 a Evaluate: $\int \frac{dx}{2+\cos x}$ [4]

Ans: $\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{\tan x/2}{\sqrt{3}}\right)+C$

2070 Set D Q.No. 7 a Evaluate: $\int \frac{dx}{1+2\sin x}$ [4]

Ans: $\frac{1}{\sqrt{3}}\log\left(\frac{\tan\frac{x}{2}+2-\sqrt{3}}{\tan\frac{x}{2}+2+\sqrt{3}}\right)+C$

2070 (Old) Q.No. 11 b Evaluate: $\int \frac{\cos x-\sin x}{\sqrt{\sin 2x}}\,dx$ [4]

Ans: $\log(\cos x+\sin x+\sqrt{\sin 2x})+C$

2069 (Set A) Q.No. 7a Evaluate: $\int \frac{dx}{3\sin x-4\cos x}$ [4]

Ans: $\frac{1}{5}\log\left(\frac{2\tan\frac{x}{2}-1}{2\tan\frac{x}{2}+4}\right)+C$

2069 (Set A) Old Q.No. 11b Evaluate: $\int \frac{dx}{\sin x+\cos x}$ [4]

Ans: $\frac{1}{\sqrt{2}}\log\tan\left(\frac{x}{2}+\frac{\pi}{4}\right)+C$

2069 (Set B) Q.No. 7a Evaluate: $\int \frac{dx}{2+3\cos x}$ [4]

Ans: $\frac{1}{\sqrt{5}}\log\left(\frac{\sqrt{5}+\tan\frac{x}{2}}{\sqrt{5}-\tan\frac{x}{2}}\right)+C$

2069 Old (Set B) Q.No. 11b Evaluate: $\int (2-x)\sqrt{16-6x-x^2}\,dx$ [4]

Ans: $\frac{5}{2}(x+3)\sqrt{16-6x-x^2}+\frac{125}{2}\sin^{-1}\left(\frac{x+3}{5}\right)+\frac{1}{3}(16-6x-x^2)^{3/2}+C$

2068 Q.No. 11 b Evaluate: $\int \frac{dx}{1+\sin x+\cos x}$ [4]

Ans: $\log\left(\tan\frac{x}{2}+1\right)+C$

2067 Q.No. 10b Evaluate: $\int \frac{dx}{1+2\sin x}$ [4]

Ans: $\frac{1}{\sqrt{2}}\log\frac{\tan\frac{x}{2}+2-\sqrt{3}}{\tan\frac{x}{2}+2+\sqrt{3}}+C$

2066 C Q.No. 11 b Evaluate: $\int \frac{dx}{1+\sin x+\cos x}$ [4]

Ans: $\log(1+\tan x/2)+C$

83. 2066 Q.No.11 b Integrate: $\int \frac{x^2}{(x+2)(x+3)^2}\,dx$. [4]

Ans: $4\log(x+2) - 3\log(x+3) + \frac{9}{x+3} + C$

84. 2065 Q.No 11 b Integrate: $\int \frac{dx}{3+4\cos hx}$ [4]

Ans: $\frac{2}{\sqrt{7}}\tan^{-1}\left(\frac{\tan h\frac{x}{2}}{\sqrt{7}}\right) + c$

85. 2064 Q.No. 11 b Integrate: $\int \frac{\cos x - \sin x}{\sqrt{\sin 2x}}\,dx$ [4]

Ans: $\log\{(\sin x + \cos x) + \sqrt{\sin 2x}\} + C$

86. 2063 Q.No. 11 b Integrate: $\int \frac{dx}{1+\sin x+\cos x}$ [4]

Ans: $\log\left(1+\tan\frac{x}{2}\right) + C$

87. 2062 Q.No. 11 b Integrate: $\int \frac{dx}{\sin x+\cos x}$ [4]

Ans: $\frac{1}{\sqrt{2}}\log\left[\tan\left(\frac{x}{2}+\frac{\pi}{8}\right)\right] + C$

88. 2061 Q.No. 11 b Find the value of: $\int \frac{dx}{3\sin x - 4\cos x}$ [4]

Ans: $\frac{1}{5}\log\frac{\tan\frac{x}{2}-\frac{1}{2}}{\tan\frac{x}{2}+2} + C$

89. 2060 Q.No. 11 b Find the value of: $\int \frac{\sin x\,.\,\cos x}{(\sin x+\cos x)^2}\,dx$ [4]

Ans: $-\frac{1}{2}\frac{1}{(\tan x+1)} + C$

90. 2059 Q.No. 11 b $\int \frac{dx}{a+b\cos x}$, $a<b$ [4]

Ans: $\frac{1}{\sqrt{b^2-a^2}}\log\left(\frac{\sqrt{b+a}+\sqrt{b-a}\tan\frac{x}{2}}{\sqrt{b+a}-\sqrt{b-a}\tan\frac{x}{2}}\right) + C$

91. 2058 Q.No. 11 b Integrate: $\int \sqrt{\frac{1+x}{1-x}}\,dx$ [4]

Ans: $-\sqrt{1-x^2} + \sin^{-1}x + C$

92. 2057 Q.No. 11 b Integrate: $\int \frac{dx}{a+b\cos x}$ when $a>b$ [4]

Ans: $\frac{2}{\sqrt{a^2-b^2}}\tan^{-1}\left(\sqrt{\frac{a-b}{a+b}}\tan\frac{x}{2}\right) + C$

9. DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS

FORMULAE

1. Separation of variables
If the equation $Mdx + Ndy = 0$ can be put in the form $f_1(x)\,dx + f_2(y)\,dy = 0$,
then it can be solved by integrating each term separately. Thus, the solution of the above equation is $\int f_1(x)\,dx + \int f_2(y)\,dy = c$

2. Homogeneous Equations
$\frac{dy}{dx} = F\left(\frac{y}{x}\right)$
To solve such equations, we put $y = vx$, where v is a function of x. Then,
$\frac{dx}{x} = \frac{dv}{F(v)-v}$

3.
i. $y\,dx + x\,dy = d(xy)$
ii. $\frac{y\,dx - x\,dy}{y^2} = d\left(\frac{x}{y}\right)$
iii. $\frac{x\,dy - y\,dx}{x^2} = d\left(\frac{y}{x}\right)$
iv. $\frac{y\,dx - x\,dy}{x^2+y^2} = \frac{\frac{y\,dx - x\,dy}{y^2}}{1+\left(\frac{x}{y}\right)^2} = d\left[\tan^{-1}\frac{x}{y}\right]$
v. $\frac{x\,dy - y\,dx}{x^2+y^2} = \frac{\frac{x\,dy - y\,dx}{x^2}}{1+\left(\frac{y}{x}\right)^2} = d\left[\tan^{-1}\frac{y}{x}\right]$

4. Linear equation
The expression $e^{\int P dx}$ is called the Integrating Factor (I.F.) of linear equation $\frac{dy}{dx} + Py = Q$. The solution of this equation is of the form:
$y(I.F.) = \int Q(I.F.)\,dx + c$

2 Marks Questions

1. 2077 Set G Q.No. 2b Solve: $\sqrt{1-x^2}\,dy + \sqrt{1-y^2}\,dx = 0$ [2]
Ans: $x\sqrt{1-y^2} + y\sqrt{1-x^2} = c$

2. 2076 GIE Set A Q.No. 4a Solve: $(x^2 - ay)\,dx - (ax - y^2)\,dy = 0$ [2]
Ans: $x^3y^3 - 3axy = c$

3. 2076 GIE Set B Q.No. 4a Solve: $\frac{dy}{dx} = \frac{e^x+1}{y}$ [2]
Ans: $y^2 = 2e^x + 2x + C$

4. 2076 Set B Q.No. 4a Solve: $\frac{dy}{dx} + \frac{1+\cos 2y}{1-\cos 2x} = 0$. [2]
Ans: $\cot x = \tan y + C$

5. 2076 Set C Q.No. 4a If $\frac{dx}{1+x^2} + \frac{dy}{1+y^2} = 0$, show that $\frac{x+y}{1-xy} = c$ where c is constant. [2]

6. 2075 GIE Q.No. 4a Solve: $(x+y^2)\,dx - 2xy\,dy = 0$. [2]
Ans: $y^2 = x(\ln x + C)$

7. 2075 Set A Q.No. 4a Solve: $xdy + (x+y)dx = 0$. [2]
Ans: $x^2 + 2xy = C$

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8. **2075 Set B Q.No. 3c** Solve: $\sec^2 x \tan x\, dx + \sec^2 y \tan x\, dy = 0$. [2]
Ans: tanx + tany = C

9. **2075 Set C Q.No. 4a** Solve: $\frac{dy}{dx} = \frac{e^x}{e^y} + \frac{x^3}{e^y}$. [2]
Ans: $e^y = e^x + \frac{x^4}{4} + C$

10. **2074 Supp Q.No. 4a** Solve $\frac{dy}{dx} = e^{x-y} + x^3.e^{-y}$. [2]
Ans: $e^y = e^x + \frac{x^4}{4} + C$

11. **2074 Set A Q.No. 3c** Solve: $\frac{dy}{dx} = \frac{e^x + 1}{y}$ [2]
Ans: $y^2 = 2e^x + 2x + C$

12. **2074 Set B Q.No. 4a** Solve: $(1 + x^2)\frac{dy}{dx} = 1$. [2]
Ans: $y = \tan^{-1} x + C$

13. **2073 Supp Q.No. 4a** Solve: $\frac{dy}{dx} = \frac{1 + y^2}{1 + x^2}$. [2]
Ans: x – y = C(1 + xy)

14. **2073 Set C Q.No. 4a** Solve: $\frac{dx}{1 + x^2} + \frac{dy}{1 + y^2} = 0$ [2]
Ans: x + y = C(1 – xy)

15. **2073 Set D Q.No. 4a** Solve: ydx – xdy = xy dy. [2]
Ans: $\log\left(\frac{x}{y}\right) = y + C$

16. **2072 Supp. Q.No. 4a** Solve: $\frac{dy}{dx} + 4x = 2e^{2x}$. [2]
Ans: $y = e^{2x} – 2x^2 + C$

17. **2072 Set C Q.No. 4a** Solve: $\frac{dy}{dx} + \frac{y}{x} = 1$. [2]
Ans: $xy = \frac{x^2}{2} + C$

18. **2072 Set D Q.No. 4a** Solve: $\frac{dy}{dx} + \frac{1 + \cos 2y}{1 – \cos 2y} = 0$. [2]
Ans: x + tan y – y = C

19. **2072 Set E Q.No. 4a** Solve: $x\frac{dy}{dx} + y – 1 = 0$. [2]
Ans: x(y – 1) = C

20. **2071 Supp. Q.No. 3c** Solve $\frac{dy}{dx} + \sqrt{\frac{1 – y^2}{1 – x^2}} = 0$. [2]
Ans: $x\sqrt{1 – y^2} + y\sqrt{1 – x^2} = C$

21. **2071 Set C Q.No. 4 a** Solve: $e^{x-y}.dx + e^{y-x}dy = 0$ [2]
Ans: $e^{2x} + e^{2y} = C$

22. **2071 Set D Q.No. 4 a** Solve: $\frac{dy}{dx} + 4x = 2e^{2x}$ [2]
Ans: $y = e^{2x} – 2x^2 + C$

23. **2071 Old Q.No. 6 a** Solve: 2xydy – y^2dx = 0 [2]
Ans: $y^2 = Cx$

24. **2070 Supp. Q.No. 4 a** Solve the differential equation: $\frac{dy}{dx} = \frac{2x + 1}{5y^4 + 1}$ [2]
Ans: $x^2 + x – y^5 – y = C$

25. **2070 Set C Q.No. 4 a** Solve : $\frac{dy}{dx} = \frac{e^x + 1}{y}$ [2]
Ans: $y^2 = 2e^x + 2x + C$

26. **2070 Set D Q.No. 4 a** Solve : $x^2dy – y^2dx = 0$. [2]
Ans: x – y = Cxy

27. **2070 (Old) Q.No. 5 c** Solve: $(1 + x^2)\frac{dy}{dx} = 1$. [2]
Ans: $y = \tan^{-1}x + C$

28. **2069 (Set A) Q.No. 4a** Solve $\frac{dy}{dx} = e^{x-y} + x^3.e^{-y}$ [2]
Ans: $e^y = e^x + \frac{x^4}{4} + C$

29. **2069 (Set A) Old Q.No. 6c** Solve: $\frac{dy}{dx} = \frac{e^x + 1}{y}$. [2]
Ans: $y^2 = 2e^x + 2x + C$

30. **2069 (Set B) Q.No. 4a** Solve: $e^{x-y}dx + e^{y-x}.dy = 0$ [2]
Ans: $e^{2x} + e^{2y} = C$

31. **2069 Old (Set B) Q.No. 2b** Solve : 2xydx – x^2dy = 0 [2]
Ans: $x^2 = Cy$

32. **2068 Q.No. 6c** Solve: $x^2dy – y^2dx = 0$ [2]
Ans: x – y = Cxy

33. **2066 C Q.No. 6 c** Solve: $\sqrt{1 – x^2}\,dy + \sqrt{1 – y^2}dx = 0$ [2]
Ans: $x\sqrt{1–y^2} + y\sqrt{1–x^2} = C$

34. **2066 Q.No. 6 c** Solve the differential equation $(x + 2y – 3)\,dy – (2x – y + 1)\,dx = 0$ [2]
Ans: $xy + y^2 – x^2 – 3y – x = C$

35. **2065 Q.No 6 c** Solve: $(xy^2 + x)\,dx + (yx^2 + y)\,dy = 0$ [2]
Ans: $(x^2 + 1)(y^2 + 1) = C$

36. **2064 Q.No. 6 c** Solve: $x\,dy + (x + y)\,dx = 0$ [2]
Ans: $x^2 + 2xy = C$

37. **2063 Q.No. 6 c** Solve: $e^{x-y}\,dx + e^{y-x}\,dy = 0$ [2]
Ans: $e^{2x} + e^{2y} = C$

38. **2062 Q.No. 6 c** Solve: $x^2dy – y^2dx = 0$ [2]
Ans: y – x = Cxy

39. **2061 Q.No. 6 c** Solve: $x^2dy – y^2dx = 0$ [2]
Ans: y – x = Cxy

40. **2060 Q.No. 6 c** Solve: $\sqrt{1 – x^2}\,dy + \sqrt{1 – y^2}\,dx = 0$. [2]
Ans: $y = \tan^{-1} x + C$

41. **2059 Q.No. 2 b** Solve: x dy – y dx = 0 [2]
Ans: y = Cx

42. **2058 Q.No. 6 c** Solve: $\frac{dy}{dx} = \frac{x^3 + 1}{y^3 + 1}$. [2]
Ans: $\frac{y^4}{4} + y = \frac{x^4}{4} + x + C$

43. **2057 Q.No. 6 c** Solve: $\frac{dy}{dx} = \frac{x^2 + x + 1}{y^2 + y + 1}$ [2]
Ans: $\frac{y^3}{3} + \frac{y^2}{2} + y = \frac{x^3}{3} + \frac{x^2}{2} + x + C$

4 Marks Questions

44. **2077 Set I Q.No. 5** Solve: $\cos^2 x\frac{dy}{dx} + y = 1$ [4]
Ans: $y = 1 + Ce^{-\tan x}$

45. **2077 Set I Q.No. 5 OR** Solve: $\frac{dy}{dx} + \frac{y}{x} = \frac{y^2}{x^2}$ [4]
Ans: $y = cx^2(2x + y)$

46. **2076 GIE Set A Q.No. 7b** Solve: $\frac{dy}{dx} + \frac{2xy}{1 + x^2} = \frac{1}{(1 + x^2)^2}$ [4]
Ans: $(1 + x^2)y = \tan^{-1}x + C$

47. **2076 GIE Set B Q.No. 7b** Solve: $\tan x\frac{dy}{dx} + y = \sec x$ [4]
Ans: y sinx = x + C

48. 2076 GIE Set B Q.No. 7b OR Solve: $x^2\frac{dy}{dx} + y^2 = xy$ [4]

Ans: $x = y(\log x + C)$

49. 2076 Set B Q.No. 7b Solve: $\cos^2 x\frac{dy}{dx} + y = 1$. [4]

Ans: $y = 1 + Ce^{-\tan x}$

50. 2076 Set B Q.No. 7b OR Solve: $(1 + x)\frac{dy}{dx} - xy = 1 - x$. [4]

Ans: $y(1 + x) = x + Ce^x$

51. 2076 Set C Q.No. 7b Solve: $\sin x\frac{dy}{dx} + y\cos x = x\sin x$. [4]

Ans: $y \sin x = \sin x - x\cos x + C$

52. 2076 Set C Q.No. 7b OR Solve: $(1 + x^2)\frac{dy}{dx} + y = e^{\tan^{-1}x}$. [4]

Ans: $y = \frac{1}{2}e^{\tan^{-1}x} + Ce^{-\tan^{-1}x}$

53. 2075 GIE Q.No. 7b Solve: $(1 + x^2)\frac{dy}{dx} + y = e^{\tan^{-1}x}$. [4]

Ans: $y = \frac{1}{2}e^{\tan^{-1}x} + ce^{-\tan^{-1}x}$

54. 2075 GIE Q.No. 7b OR Solve: $\cos^2 x\frac{dy}{dx} + y = 1$. [4]

Ans: $y = 1 + Ce^{-\tan x}$

55. 2075 Set A Q.No. 7b Solve: $\frac{dy}{dx} = \frac{y}{x} + \tan\frac{y}{x}$. [4]

Ans: $\sin\left(\frac{y}{x}\right) = Cx$

56. 2075 Set A Q.No. 7b OR Solve: $\frac{dy}{dx} + \frac{y}{x^2} = \frac{1}{x^3}$ [4]

Ans: $xy = 1 + x + Cxe^{1/x}$

57. 2075 Set B Q.No. 8a Solve: $\frac{dy}{dx} + \frac{x^2 - y^2}{3xy} = 0$ [4]

Ans: $(x^2 + 2y^2)^{3/4} = C\sqrt{x}$

58. 2075 Set B Q.No. 8a OR Solve: $\frac{dy}{dx} + 2y\tan x = \sin x$. [4]

Ans: $y\sec^2 x = \sec x + C$

59. 2075 Set C Q.No. 7b Solve: $\frac{dy}{dx} = \frac{(y - x)(y + x)}{2xy}$. [4]

Ans: $x^2 + y^2 = Cx$

60. 2075 Set C Q.No. 7b OR Solve: $y + (x^2 + 1)\frac{dy}{dx} = e^{\text{arc}(\tan x)}$ [4]

Ans: $y = \frac{1}{2}e^{\tan^{-1}x} + Ce^{-\tan^{-1}x}$

61. 2074 Supp Q.No. 7b Solve: $x^2\frac{dy}{dx} + y^2 = xy$. [4]

Ans: $x = y(\log x + C)$

62. 2074 Supp Q.No. 7b OR Solve: $\cos^2 x\frac{dy}{dx} + y = 1$. [4]

Ans: $y = 1 + Ce^{-\tan x}$

63. 2074 Set A Q.No. 7b Solve: $(xy - x^2)dy = y^2dx$ [4]

Ans: $y = ce^{y/x}$

64. 2074 Set A Q.No. 7b OR Solve: $x \ln x\frac{dy}{dx} + y = 2\ln x$. [4]

Ans: $y \ln x = (\ln x)^2 + C$

65. 2074 Set B Q.No. 7b Solve: $(1 + x)\frac{dy}{dx} - xy = 1 - x$. [4]

Ans: $(1 + x)y = x + Ce^x$

66. 2073 Supp Q.No. 7b Define exact differential equation hence solve $\frac{dy}{dx} = \frac{y - x + 1}{y - x + 5}$. [4]

Ans: $x^2 + y^2 - 2xy - 2x + 10y = C$

67. 2073 Supp Q.No. 7b OR $\frac{dy}{dx} + 2y\tan x = \sin x$. [4]

Ans: $y\sec^2 x = \sec x + C$

68. 2073 Set C Q.No. 7b Solve $x\frac{dy}{dx} + 2y = x^2\log x$. [4]

Ans: $y = \frac{1}{4}x^2\log x - \frac{1}{16}x^2 + \frac{C}{x^2}$

69. 2073 Set D Q.No. 6b Solve: $\frac{dy}{dx} - 2xy = x$. [4]

Ans: $y = -\frac{1}{2} + Ce^{x^2}$

70. 2073 Set D Q.No. 6b OR Solve : $x^2\frac{dy}{dx} + y^2 = xy$ [4]

Ans: $x = y(\log x + C)$

71. 2072 Supp. Q.No. 7b Solve: $(x + 1)\frac{dy}{dx} + 2y = \frac{e^x}{x + 1}$. [4]

Ans: $y(1 + x)^2 = e^x + C$

72. 2072 Supp. Q.No. 7b OR Solve: $\frac{dy}{dx} = \frac{y}{x} - \sin^2\frac{y}{x}$. [4]

Ans: $\cot\left(\frac{y}{x}\right) = \log x + C$

73. 2072 Set C Q.No. 7b Solve: $\frac{dy}{dx} = y\tan x - 2\sin x$ [4]

Ans: $y\cos x = \frac{1}{2}\cos 2x + C$

74. 2072 Set C Q.No. 7b OR Solve: $xy\frac{dy}{dx} - y^2 = x^2$ [4]

Ans: $y^2 = 2x^2(\log x + C)$

75. 2072 Set D Q.No. 7b Reduce the equation $\frac{dy}{dx} + \frac{y}{x} = y^2$ in linear form hence solve it. [4]

Ans: $1 + xy\log x = Cxy$

76. 2072 Set D Q.No. 7b OR Solve: $\frac{dy}{dx} = \frac{y + 1}{x + y + 1}$ [4]

Ans: $y + 1 = Ce^{\frac{x}{y+1}}$

77. 2072 Set E Q.No. 7b Solve: $\frac{dy}{dx} = \frac{y}{x} - \sin^2\frac{y}{x}$. [4]

Ans: $\cot\left(\frac{y}{x}\right) = \log x + C$

78. 2072 Set E Q.No. 7b OR Solve: $\sin x\frac{dy}{dx} + \cos x.y = x\sin x$. [4]

Ans: $y\sin x = -x\cos x + \sin x + C$

79. 2071 Supp. Q.No. 7b Solve $x^2\ y\ dx = (x^3 + y^3)\ dy$ [4]

Ans: $x^3 = 3y^3\log\left(\frac{y}{C}\right)$

80. 2071 Supp. Q.No. 7b OR Solve $\frac{dy}{dx} + \frac{y}{x} = \sin x^2$ [4]

Ans: $xy + \frac{1}{2}\cos x^2 = C$

81. 2071 Set C Q.No. 7 b Solve : $\frac{dy}{dx} = \frac{x^2 + y^2}{2x^2}$ [4]

Ans $2x = (x - y)\log Cx$

82. 2071 Set C Q.No. 7 b OR Solve: $\sin x\frac{dy}{dx} + (\cos x)y = \sin x\cos x$ [4]

Ans: $y\sin x + \frac{1}{4}\cos 2x = C$

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83. 2071 Set D Q.No. 7 b Solve: $xy\frac{dy}{dx} = x^2 + y^2$ [4]
Ans: $y^2 = 2x^2(\log x + C)$

84. 2071 Set D Q.No. 7 b OR Solve: $\frac{dy}{dx} + \frac{2x}{1+x^2}y = \frac{1}{(1+x^2)^2}$ [4]
Ans: $(1+x^2)y = \tan^{-1}x + C$

85. 2071 Old Q.No. 10 a OR Solve: $\tan x \frac{dy}{dx} + y = \sec x$ [4]
Ans: $y \sin x = x + C$

86. 2070 Supp. Q.No. 7 b Solve: $x^2dy + y(x+y)dx = 0$. [4]
Ans: $x^2y = C(y + 2x)$

87. 2070 Set C Q.No. 7 b Solve: $\cos^2 x \frac{dy}{dx} + y = 1$. [4]
Ans: $y = 1 + Ce^{-\tan x}$

88. 2070 Set C Q.No. 7 b or Solve: $\frac{dy}{dx} = \frac{y}{x} - \sin^2\frac{y}{x}$. [4]
Ans: $\cot(y/x) = \log x + C$

89. 2070 Set D Q.No. 7 b Solve $(1+x^2)\frac{dy}{dx} + 2xy = 4x^2$. [4]
Ans: $(1+x^2)y = \frac{4}{3}x^3 + C$

90. 2070 Set D Q.No. 7 b Or Solve: $(x^2+y^2)dy = xy\,dx$. [4]
Ans: $x^2 = 2y^2 \log Cy$

91. 2070 (Old) Q.No. 11 b Or Solve : $(1+x)\frac{dy}{dx} = xy - x + 1$ [4]
Ans: $(1+x)y = x + Ce^x$

92. 2069 (Set A) Q.No. 7b Solve: $\tan x \frac{dy}{dx} + y = \sec x$ [4]
Ans: $y \sin x = x + C$

93. 2069 (Set A) Q.No. 7b or Solve: $xy\frac{dy}{dx} = x^2 + y^2$ [4]
Ans: $y^2 = 2x^2(\log x + C)$

94. 2069 (Set A) Old Q.No. 11b or Solve: $\cos^2 x \frac{dy}{dx} + y = 1$. [4]
Ans: $y = 1 + Ce^{-\tan x}$

95. 2069 (Set B) Q.No. 7b Solve: $(1+x^2)\frac{dy}{dx} + 2xy = 4x^2$ [4]
Ans: $y(1+x^2) = \frac{4}{3}x^3 + C$

96. 2069 (Set B) Q.No. 7b Or Solve: $\frac{dy}{dx} = \frac{y}{x} + \tan\frac{y}{x}$ [4]
Ans: $\sin\left(\frac{y}{x}\right) = Cx$

97. 2069 Old (Set B) Q.No. 11b Or Solve: $\frac{dy}{dx} + \frac{y}{x^2} = \frac{1}{x^2}$ [4]
Ans: $y = 1 + Ce^{1/x}$

98. 2068 Q.No. 11 b OR Solve: $\sin x \frac{dy}{dx} + \cos x.y = x \sin x$ [4]
Ans: $y\sin x = \sin x - x\cos x + C$

99. 2067 Q.No. 6c Solve: $xdy + (x+y)dx = 0$ [4]
Ans: $x^2 + 2xy = C$

100. 2067 Q.No. 10b OR Solve: $(1-x^2)\frac{dy}{dx} = 1 + xy$ [4]
Ans: $y\sqrt{1-x^2} = \sin^{-1}x + C$

101. 2066 C Q.No. 11 b OR Solve: $(x^2 - y^2)\frac{dy}{dx} = xy$ [4]
Ans: $x^2 + 2y^2 \log Cy = 0$

102. 2066 Q.No.11 b OR Solve the differential equation: $(1+x^2)\frac{dy}{dx} + y = e^{\tan^{-1}x}$ [4]
Ans: $y = \frac{1}{2}e^{\tan^{-1}x} + Ce^{-\tan^{-1}x}$

103. 2065 Q.No 11 b OR Solve: $\frac{dy}{dx} + y\cot x = x$ [4]
Ans: $y \sin x = -x\cos x + \sin x + C$

104. 2064 Q.No. 11 b OR Solve: $2\frac{dy}{dx} = \frac{y}{x} + \frac{y^2}{x^2}$ [4]
Ans: $(y-x)^2 = Cxy^2$

105. 2063 Q.No. 11 b OR Solve: $\frac{dy}{dx} = \frac{y}{x} + \tan\frac{y}{x}$ [4]
Ans: $\sin\frac{y}{x} = Cx$

106. 2062 Q.No. 11 b OR Solve: $\frac{dy}{dx} + \frac{1}{x}y = x^2$ [4]
Ans: $xy = \frac{x^4}{4} + C$

107. 2061 Q.No. 11 b OR Solve: $(x^2 - y^2)\frac{dy}{dx} = xy$ [4]
Ans: $x^2 + 2y^2 \log Cy = 0$

108. 2060 Q.No. 11 b OR Solve: $\tan x \frac{dy}{dx} + y = \sec x$ [4]
Ans: $y \sin x = x + C$

109. 2059 Q.No. 11 b OR Solve: $\frac{dy}{dx} = \frac{y^2 - x^2}{2xy}$ [4]
Ans: $y^2 + x^2 = Cx$

110. 2058 Q.No. 11 b OR Solve: $\cos^2 x \frac{dy}{dx} + y = 1$ [4]
Ans: $y = 1 + Ce^{-\tan x}$

111. 2057 Q.No. 11 b OR Solve: $\tan x \frac{dy}{dx} + y = \sec x$. [4]
Ans: $y \sin x = x + C$

10. DISPERSION, CORRELATION AND REGRESSION

A. DISPERSION

FORMULAE

1. Arithmetic Mean (AM)

For individual series

$\bar{X} = \frac{\Sigma X}{n}$

$\bar{X} = A + \frac{\Sigma d}{n}$, $d = X - A$ where A, the assumed mean.

For discrete series

$\bar{X} = \frac{\Sigma fX}{N}$,

$\bar{X} = A + \frac{\Sigma fd}{N}$

$\bar{X} = A + \frac{\Sigma fd'}{N} \times h$ where $d' = \frac{X - A}{h}$

For continuous series

$\bar{X} = \frac{\Sigma fX}{N}$, $N = \Sigma f$ and X-mid value

$\bar{X} = A + \frac{\Sigma fd}{N}$, $d = X - A$

$\bar{X} = A + \frac{\Sigma fd'}{N} \times h$, where $d' = \frac{X - A}{h}$

Combined mean

$\bar{X}_{12} = \frac{n_1\bar{X}_1 + n_2\bar{X}_2}{n_1 + n_2}$

2. Median

Individual series

$M_d = \left(\frac{n+1}{2}\right)^{th}$ item

Discrete series

$M_d = \left(\frac{N+1}{2}\right)^{th}$ item

Continuous series

To find the median class, the median lies in $\left(\frac{N}{2}\right)^{th}$ item

then

$M_d = l + \frac{\frac{N}{2} - c.f.}{f} \times h$

3. Mode

Continuous series

$M_0 = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$

4. Quartiles

For individual and discrete series

$Q_i = \left[\frac{i(N+1)}{4}\right]^{th}$ item, $i = 1, 2, 3$

For continuous series

$Q_i = l + \frac{\frac{iN}{4} - c.f.}{f} \times h$; $i = 1, 2, 3$

5. Empirical relation

Mode = 3 Median – 2 Mean

6. Measures of Dispersion

i. Range = L – S

Coefficient of range = $\frac{L - S}{L + S}$

ii. Inter quartile range = $Q_3 - Q_1$

Quartile deviation or semi-inter quartile = $\frac{Q_3 - Q_1}{2}$

Coefficient of Quartile Deviation = $\frac{Q_3 - Q_1}{Q_3 + Q_1}$

iii. Mean Deviation (MD)

Calculate the mean deviation from 'M' as

$MD = \frac{1}{n}\sum_{i=1}^{n}|x_i - M| = \frac{1}{n}\sum_{i=1}^{n}|d_i|$

When we have grouped data with frequency, mean deviation is calculated using the formula

$MD = \frac{1}{N}\sum_{i=1}^{n} f_i(|x_i - M|) = \frac{1}{N}\sum_{i=1}^{n} f_i|d_i|$

Coefficient of MD from mean/median/mode

$= \frac{\text{Mean Deviation from Mean/ Median/ Mode}}{\text{Mean/ Median/ Mode}}$

iv. Root Mean Square Deviation (S) = $\sqrt{\frac{1}{N}\Sigma f_i (x_i - A)^2}$

v. Standard Deviation

Individual Series

$\sigma = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$ Direct method

$\sigma = \sqrt{\frac{\Sigma d^2}{n} - \left(\frac{\Sigma d}{n}\right)^2}$ Shortcut method

$\sigma = \sqrt{\frac{\Sigma d'^2}{n} - \left(\frac{\Sigma d'}{n}\right)^2} \times h$ Step deviation method

Discrete/ Continuous Series

$\sigma = \sqrt{\frac{\Sigma fx^2}{N} - \left(\frac{\Sigma fx}{N}\right)^2}$ Direct method

$\sigma = \sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2}$ Shortcut method

$\sigma = \sqrt{\frac{\Sigma fd'^2}{N} - \left(\frac{\Sigma fd'}{N}\right)^2} \times h$ Step deviation method

vi. Variance

$\sigma^2 = (SD)^2$

vii. Variance of the combined series

$(\sigma_{A+B})^2 = \frac{1}{n_A + n_B}[n_A(\sigma_A^2 + d_A^2) + n_B(\sigma_B^2 + d_B^2)]$

viii. Coefficient of Variation (C.V.) = $\frac{\sigma}{\bar{x}} \times 100$

2 Marks Questions

1. **2077 Set H Q.No. 2b** Calculate the semi-inter Quartile Range of 2, 5, 9, 10, 10, 9, 4. [2]

Ans: 3

2. **2076 Set B Q.No. 4b** Calculate the mean deviation from mean of the data: 3, 5, 9, 11, 7, 6 [2]

Ans: 2.17

3. **2076 Set C Q.No. 4b** Which of the following distribution is consistent from the information given below. [2]

	Distribution 'A'	Distribution 'B'
A.M.	95	90
S.d.	10	9

Ans: Distribution B

4. **2075 Set B Q.No. 4a** Find the mean deviation from mean of the data: 6, 8, 10, 13, 5. [2]

Ans: 2.48

5. **2075 Set C Q.No. 4b** If total items (n) = 10, sum of items (Σx) = 120 and the sum of square of items (Σx^2) = 1530, find the standard deviation and coefficient of variation. [2]

Ans: S.D. = 3, C.V. = 25%

6. **2074 Supp Q.No. 4b** Following are the information about the marks of two students A and B.

	A	B
Average marks	84	92
Variance of marks	16	25

Examine who has got the uniform mark. [2]

Ans: A

7. **2073 Supp Q.No. 4b** In the distribution of two sets of data, which of the distribution is consistent? [2]

	Distribution X	Distribution Y
AM	100	90
S.D.	10	18

Ans: Distribution X

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2072 Set C Q.No. 4b The information about the daily temperature of two cities X and Y are as follows:

	X	Y
Average temp. (°F)	84	92
Variance of temp.	16	25

Determine which city has greater consistency in climate. [2]
Ans: City X

2072 Set D Q.No. 4b In the distribution of data 20, 25, 30, 35, 32, 43, find standard deviation. [2]
Ans: 7.4

2071 Supp. Q.No. 4a The mean of two samples of size 50 and 100 are 54.1 and 50.3 respectively and the standard deviations are 8 and 7 respectively. Obtain the mean and the standard deviation of the sample of size 150 obtained by combining the two samples. **Ans: 51.57; 7.56** [2]

2071 Set D Q.No. 4 b If $n = 10$, $\Sigma x = 120$, $\Sigma x^2 = 1530$, find the standard deviation and the coefficient of variation. [2]
S.D. = 3, C.V. = 25%

2071 Old Q.No. 4 b Find the mean deviation of the data 10, 5, 6, 12, 7 from median. [2]
Ans: 2.2

2070 Supp. Q.No. 4 b Calculate the quartile deviation from the data: 15, 7, 25, 12, 4, 22, 19, 10 [2]
Ans: 6.75

2070 (Old) Q.No. 3 c Find the coefficient of mean deviation from median of the data 5, 4, 2, 8 and 6. [2]
Ans: 0.32

2066 C Q.No. 4 b The coefficient of variation and mean of a certain frequency distribution are 50.2% and 22.8 respectively. Find the standard deviation. [2]
Ans: 11.45

2066 Q.No. 4 b Find the standard deviation from the following data: [2]

x	10	11	12	13	14
f	3	12	18	12	2

Ans: 0.93

2064 Q.No. 4 b The information about the wages distribution of the firms A and B are given below:

	Firm A	Firm B
No. of workers	500	600
Average monthly wages	Rs. 586	Rs. 575
Variance of wages distribution	81	100

In which firm is the wages distribution uniform? [2]
Ans: Firm A

2062 Q.No. 4 b Find the standard deviation of the following data: 10, 15, 20, 25, 30, 35, 40 [2]
Ans: 10

2061 Q.No. 4 b Find the mean deviation from mean of the following data: 6, 8, 10, 13 and 5. [2]
Ans: 2.48

2061 Q.No. 12 a Find out the mean and Standard Deviation from the following data: [2]

Variable	5–10	10–15	15–20	20–25	25–30	30–35
Frequency	2	9	29	54	11	5

Ans: 21.05; 4.87

21. **2060 Q.No. 4 b** Find the mean deviation from median of the numbers 5, 7, 10, 12 and 6. [2]
Ans: 2.2

22. **2059 Q.No. 4 c** The coefficient of variation and mean of a certain frequency distribution are 50.2% and 22.8 respectively. Find the s.d. [2]
Ans: 11.4456

23. **2058 Q.No. 4 b** Find the standard deviation of the following data: 100, 150, 200, 250, 300 [2]
Ans: 70.7

4 Marks Questions

24. **2074 Set B Q.No. 8a** Following are the marks obtained by the two students in 6 tests.

A	56	72	48	69	64	81
B	63	74	45	57	82	63

Which of the student will get performance award for the consistency in tests? [4]
Ans: A

25. **2069 (Set A) Q.No. 8a** Determine the standard deviation and the coefficient of variation from the following distribution. [4]

Profit (in Rs.)	0–10	10–20	20–30	30–40	40–50
No. of shops	8	13	16	8	5

Ans: Rs. 11.88 and 52.11%

26. **2069 (Set A) Old Q.No. 12a** Find the mean and the standard deviation from the following data. [4]

Marks	0–10	10–20	20–30	30–40	40–50
No. of students	5	8	15	16	6

Ans: 27 and 11.49

27. **2069 Old (Set B) Q.No. 12b** Find out the mean and standard deviation from the following data: [4]

x	10	11	12	13	14
f	3	12	18	12	2

Ans: 11.96; 0.93

28. **2068 Q.No. 12 a** Weights of a group of individuals are given below. Find out the mean and the standard deviation. [4]

Weight (in kg)	0-10	10-20	20-30	30-40	40-50
Frequency	12	33	30	15	10

Ans: 22.8, 11.45

29. **2067 Q.No. 12b** Define standard deviation. Also prove that the root mean square deviation is not less than the standard deviation. [4]

30. **2060 Q.No. 12 a** Find the mean and S.D. from the following table: [4]

Wages (Rs.)	10–20	10–30	10–40	10–50	10–60
No. of workers	15	33	63	83	100

Ans: Mean = 35.6 and S.D. = 12.87

31. **2060 Q.No. 12 b** Prove that in a discrete distribution the standard deviation is not less than the mean deviation from the mean. [4]

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B. SKEWNESS

FORMULAE

Absolute measure of skewness

1. Based on median, S_k = Mean − Median
2. Based on mode, S_k = Mean − Mode
3. Based on quartiles, $S_k = (Q_3 - Q_2) - (Q_2 - Q_1)$

Relative measure of skewness

4. Based on Karl Pearson's coefficient of skewness,

$$S_K(P) = \frac{\text{Mean} - \text{Mode}}{\sigma}$$

Also,

$$S_K(P) = \frac{3(\text{Mean} - \text{Median})}{\sigma}$$

[∵ Mode = 3 Median − 2 Mean]

Karl Pearson's coefficient of skewness lies between −3 and 3.

5. Based on Bowley's coefficient of skewness,

$$S_K(B) = \frac{(Q_3 + Q_1) - 2Q_2}{Q_3 - Q_1}$$

Bowley's coefficient of skewness lies between −1 and 1.

Interpretation:

1. If $S_K = 0$, then frequency distribution is symmetrical.
2. If $S_K > 0$, then distribution is positive or right skewed.
3. If $S_K > 0$, then distribution is negative or left skewed.

2 Marks Questions

1. **2075 Set A Q.No. 4b** For a group of 50 items, $\Sigma x^2 = 600$, $\Sigma x = 150$ and $M_0 = 1.75$, find the pearsonian coefficient of skewness. [2]
   Ans: 0.72
2. **2075 Set B Q.No. 4b** Find the Pearson's coefficient of skewness when $\Sigma x = 735$, $\Sigma x^2 = 28730$, mode = 35.25, n = 20. [2]
   Ans: 0.16
3. **2074 Set A Q.No. 4b** Find Skewness and C.V. if mean, median and S.D. are respectively 56.80, 59.50 and 12.40. [2]
   Ans: S_K = −0.653, C.V. = 21.83%
4. **2074 Set B Q.No. 4b** The C.V, S.D. and mode of a distribution are 5%, 2 and 39 respectively. Calculate the Karl Pearson's coefficient of Skewness of the distribution. [2]
   Ans: 0.5
5. **2073 Set C Q.No. 4b** A frequency distribution gives the following results. C.V. = 5%, Mean = 40 and Mode = 39. Calculate Karl Pearson's coefficient of skewness of the distribution. [2]
   Ans: 0.5
6. **2072 Set E Q.No. 4b** For a group of 50 items; circle $\Sigma x^2 = 600$, $\Sigma x = 150$ and $m_0 = 1.75$, find the Pearsonian coefficient of skewness. [2]
   Ans: 0.72
7. **2071 Supp. Q.No. 4c** In a distribution, the difference of the two quartiles is 20 and their sum is 70 and the median is 36. Find the coefficient of skewness. [2]
   Ans: −0.1
8. **2067 Q.No. 4b** In a frequency distribution of a set of data C.V. = 5%, σ = 2 and karl Pearson coefficient of skewness = 0.5; find the mean of the data. [2]
   Ans: 40
9. **2063 Q.No. 4 b** Consider the following distribution.

	Distribution a	Distribution b
Arithmetic mean:	100	90
Median:	90	80
Standard deviation	10	10

Is the distribution A same as the distribution B regarding the skewness? [2]
Ans: Same

4 Marks Questions

10. **2073 Set D Q.No. 8a** If $\Sigma fx = 110$, $\Sigma fx^2 = 1650$, N = 10 and $M_0 = 12.45$, find Karl Pearson's coefficient of skewness. [4]
    Ans: -0.22
11. **2072 Supp. Q.No. 8a** Calculate the coefficient of skewness based on mean, mode and the standard deviation from the following data: [4]

Wages (in Rs.)	100	110	120	130	140
No. of person	2	6	10	8	4

Ans: 0.18

12. **2071 Set C Q.No. 8 a** Calculate the coefficient of Skewness based on mean, mode and standard deviation from the following data. [4]

Wages (in Rs.)	100	110	120	130	140
No. of persons	2	6	10	8	4

Ans: 0.18

13. **2070 Supp. Q.No. 8 a** Find Karl Pearson's coefficient of skewness from the given data [4]

Income	10	12	14	16	20
Frequency	5	8	15	7	5

Ans: 0.071

14. **2070 Set C Q.No. 8 a** If $\Sigma fx = 110$, $\Sigma fx^2 = 1650$, N = 10 and $M_0 = 12.45$, find the skewness based on mean, mode and standard deviation. [4]
    Ans: −0.22
15. **2070 Set D Q.No. 8 a** Consider the following distribution.

	Distribution A	Distribution B
Arithmetic mean	100	90
Median	90	80
Standard deviation	10	10

Is the distribution A same as the distribution B regarding the degree of variation and skewness? [4]
Ans: C.V (A) = 10%, C.V.(B) = 11.11%, $S_K(A) = 3$, $S_K(B) = 3$

16. **2069 (Set A) Old Q.No. 12 b** For a group of 10 items, $\Sigma x = 452$, $\Sigma x^2 = 24270$ and mode = 43.7, find the Pearsonian coefficient of Skewness. [4]
    Ans: 0.077
17. **2069 (Set B) Q.No. 8a** If $\Sigma fx = 110$, $\Sigma fx^2 = 1650$, N = 10 and $M_0 = 12.45$, find the skewness based on mean, mode and standard deviation. [4]
    Ans: −0.22

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2068 Q.No. 12 b Consider the following distribution:

	Distribution A	Distribution B
Arithmetic mean	100	90
Median	90	80
Standard deviation	10	10

Is the distribution A same as the distribution B regarding the degree of variation and skweness? [4]

2066 Q.No.12 b Calculate the coefficient of skewness from the following frequency distribution: [4]

Investment	10–20	20–30	30–40	40–50	50–60	60–70	70–80
Frequency	12	18	20	15	10	3	2

Ans: 0.227

2065 Q.No 12 a Calculate Karl Pearson's coefficient of skewness of the data: [4]

Marks	above 0	above 10	above 20	above 30	above 40
Frequency	150	140	100	80	80

Ans: –0.89

2064 Q.No. 12 a For a group of 10 items, $\Sigma x = 452$, $\Sigma x^2 = 24{,}270$ and mode = 43.7, find the Pearson's coefficient of skewness. [4]

Ans: 0.077

2061 Q.No. 12 b The median, mode and coefficient of skewness for a certain distribution are respectively 17.4, 15.3 and 0.35. Calculate mean and C.V. [4]

Ans: 18.45 and 48.78%

C. CORRELATION

FORMULAE

1. Karl Pearson's Coefficient of Correlation

i. $r = \frac{Cov(X, Y)}{\sqrt{Var(X)}\sqrt{Var(Y)}}$

ii. $r = = \frac{n\Sigma XY - \Sigma X\,\Sigma Y}{\sqrt{n\Sigma X^2 - (\Sigma X)^2}\sqrt{n\Sigma Y^2 - (\Sigma Y)^2}}$

iii. $r = \frac{\Sigma xy}{n\sigma_x\sigma_y}$

iv. $r = \frac{n\Sigma XY - \Sigma X\,\Sigma Y}{\sqrt{n\Sigma X^2 - (\Sigma X)^2}\sqrt{n\Sigma Y^2 - (\Sigma Y)^2}}$

v. $r = \frac{n\Sigma uv - \Sigma u\Sigma v}{\sqrt{n\Sigma u^2 - (\Sigma u)^2}\sqrt{n\Sigma v^2 - (\Sigma v)^2}}$

2. The value of r lies between –1 and +1.

2 Marks Questions

1. **2076 GIE Set A Q.No. 4b** For a group of 50 items; $\Sigma x^2 = 600$, $\Sigma x = 150$ and mode (Mo) = 1.75, find Pearson's coefficient of skewness. [2]

Ans: 0.72

2. **2076 GIE Set B Q.No. 4b** Find the correlation coefficient between two variables x and y under the following conditions: [2]

n = 10, $\Sigma x = 60$, $\Sigma y = 60$, $\Sigma x^2 = 400$, $\Sigma y^2 = 580$ and $\Sigma xy = 415$

Ans: 0.59

3. **2075 GIE Q.No. 4b** Calculate the correlation coefficient between the two variables with the information n = 10, $\bar{x} = 5$, $\bar{y} = 3$, $\Sigma x^2 = 290$, $\Sigma y^2 = 300$, $\Sigma xy = 115$. [2]

Ans: –0.38

4. **2073 Set D Q.No. 4b** If $\Sigma(x - \bar{x})^2 = 40$, $\Sigma(y - \bar{y})^2 = 63$ and $\Sigma(x - \bar{x})(y - \bar{y}) = 35$, find the correlation coefficient between the two variables x and y. [2]

Ans: 0.697

5. **2072 Supp. Q.No. 4b** If n = 10, $\Sigma X = 18$, $\Sigma Y = 25$, $\Sigma X^2 = 90$, $\Sigma Y^2 = 120$ and $\Sigma XY = 65$, find the correlation coefficient between two variables. [2]

Ans: 0.35

6. **2071 Set C Q.No. 4 b** If n = 15, $\sigma_x = 3.2$, $\sigma_y = 3.4$ and $\Sigma(X - \bar{X})(Y - \bar{Y}) = 122$, find the correlation coefficient between the two variables. [2]

Ans: 0.75

7. **2070 Set C Q.No. 4 b** If $\Sigma(X - \bar{X})^2 = 40$, $\Sigma(Y - \bar{Y})^2 = 63$ and $\Sigma(X - \bar{X})(Y - \bar{Y}) = 35$, find the correlation coefficient between the two variables. [2]

Ans: 0.697

8. **2070 Set D Q.No. 4 b** If n = 10, $\Sigma X = 60$, $\Sigma Y = 60$, $\Sigma X^2 = 400$, $\Sigma Y^2 = 580$ and $\Sigma XY = 415$, find the correlation coefficient between the two variables. [2]

Ans: 0.59

9. **2069 (Set A) Old Q.No. 4b** If the covariance between the two variables x and y is 18, and the variances of x and y are 16 and 81 respectively, find the coefficient of correlation between them. [2]

Ans: 0.5

10. **2068 Q.No. 4b** Calculate the correlation coefficient between two variables from the following data:

$\Sigma x^2 = 114$, $\Sigma y^2 = 422$ and $\Sigma xy = 174$ [2]

Ans: 0.79

11. **2065 Q.No 4 b** If the covariance between the variable x and y is 18 and the variances of x and y are 16 and 81 respectively, find the coefficient of correlation between them. [2]

Ans: 0.5

12. **2057 Q.No. 4 b** Calculate r_{xy} if $\Sigma x^2 = 114$, $\Sigma y^2 = 442$; $\Sigma xy = 174$. [2]

Ans: 0.793

4 Marks Questions

13. **2077 Set G Q.No. 5** Calculate Karl Pearson's coefficient of correlation from the following data. [4]

X	12	9	8	10	13	7
Y	14	8	6	9	12	3

Ans: 0.946

14. **2076 GIE Set B Q.No. 8a** The following distribution gives the weights of 40 person. Find the Pearson's coefficient of skewness for the following distribution: [4]

Weight (in kg)	40-50	50-60	60-70	70-80	80-90
No. of person	5	10	15	8	2

Ans: – 0.11

15. **2076 Set B Q.No. 8a** Find correlation coefficient of the following two sets of data A and B: [4]

A	56	72	48	64	81	69
B	63	74	45	82	66	57

Ans: 0.51

16. **2076 Set C Q.No. 8a** Calculate the coefficient of correlation between the price and sales. [4]

Price	25	21	28	26	20	30
Sales	60	54	66	68	70	50

Ans: –0.32

17. **2075 Set A Q.No. 8a** Find the correlation coefficient between the two variables x and y from the following data. [4]

x	5	7	1	3	4
y	2	3	4	5	6

Ans: –0.42

18. **2074 Set A Q.No. 8a** From the following table calculate the correlation coefficient by Karl Pearson's method. [4]

X	10	12	20	?	16	14
Y	9	12	15	18	14	16

AM of X = 15.

Ans: 0.78

19. **2073 Supp Q.No. 8a** Find the karl Pearson's Coefficient of correlation from the following distribution. [4]

X	10	11	18	15	25	20	14	22
Y	9	14	15	16	22	20	18	24

Ans: 0.87

20. **2073 Set C Q.No. 8a** Calculate Karl Pearson's coefficient of correlation from the following data using product moment formula. [4]

X	12	9	8	10	11
Y	12	8	6	9	10

Ans: 0.99

21. **2072 Set D Q.No. 8a** Define correlation. Find Karl Pearson's coefficient of correlation of the marks of the following distribution. [4]

X	20	30	40	50	60
Y	50	46	30	24	8

Ans: –0.34

22. **2071 Supp. Q.No. 8a** Using the product moment formula, calculate correlation coefficient for the following series of ages of husbands (X) and wives (Y). [4]

X	41	44	45	48	40	42	44
Y	22	24	25	27	21	22	23

Ans: 0.976

23. **2071 Set D Q.No. 8 a** Calculate Karl Pearson's correlation coefficient between the two variables height (in cms) and weight (in kg) from the data given below: [4]

Height	160	162	165	161	163
Weight	63	62	64	60	61

Ans: 0.41

24. **2071 Old Q.No. 12 a** Calculate the coefficient of correlation between x and y series from the following data

	Series x	Series y
No. of observations	15	15
s.d	3.01	3.03

$\Sigma(x - \bar{x})(y - \bar{y}) = 122$ [4]

Ans: 0.89

25. **2070 (Old) Q.No. 12 b** Compute correlation and interpret about the ages of husband and wife given below: [4]

Age of husband	23	22	20	24	23	26	27	28	30	20
Age fo wife	20	18	23	20	21	21	22	24	25	26

Ans: 0.198

26. **2066 C Q.No. 12 a** Calculate the Karl Pearson's coefficient of correlation between the age and blood pressure of 8 patients: [4]

Age	23	48	43	68	70	28	35	26
Blood Pressure	115	127	123	140	145	118	121	120

Ans: 0.98

27. **2063 Q.No. 12 b** From the following table, calculate the coefficient of correlation by Karl Pearson's method.

X	6	2	10	4	8
Y	9	11	–	8	7

Arithmetic means of X and Y series are 6 and 8 respectively. [4]

Ans: – 0.92

28. **2059 Q.No. 12 b** Calculate Karl Pearson's coefficient of correlation from the following data: [4]

X	12	9	8	10	11	13	7
y	14	8	6	9	11	12	3

Ans: 0.95

D. REGRESSION

FORMULAE

1. Regression equation of Y on X

$Y - \bar{Y} = b_{YX}(X - \bar{X})$,

where, $b_{YX} = \dfrac{n\Sigma XY - \Sigma X\,\Sigma Y}{n\Sigma X^2 - (\Sigma X)^2}$

2. Regression equation of X on Y

$X - \bar{X} = b_{XY}(Y - \bar{Y})$

where, $b_{XY} = \dfrac{n\Sigma XY - \Sigma X\,\Sigma Y}{n\Sigma Y^2 - (\Sigma Y)^2}$

3. Relation between r and b

The correlation coefficient r is the geometric mean of two regression coefficients

$r = \sqrt{b_{YX} b_{XY}}$.

Also, the regression coefficients can be expressed in terms of r and σ as,

$b_{XY} = r\dfrac{\sigma_X}{\sigma_Y}$ and $b_{YX} = r\dfrac{\sigma_Y}{\sigma_X}$.

2 Marks Questions

1. **2069 (Set A) Q.No. 4b** Find the regression equation of y on x when: $\Sigma x = 15$, $\Sigma y = 25$, $\Sigma x^2 = 55$, $\Sigma y^2 = 140$, $\Sigma xy = 78$, $n = 5$. [2]

Ans: $y = 0.3x + 4.1$

2068 (Set B) Q.No. 4b The regression coefficient of y on x is 0.32. If the arithmetic means of x and y series are 42 and 36 respectively, find the regression equation of y on x. [2]

Ans: y = 0.32x + 22.56

4 Marks Questions

2076 GIE Set A Q.No. 8a Find the regression equation y on x for the following data: [4]

x	5	7	9	10	11
y	1	2	3	4	5

Also estimate the value of y when x = 6

Ans: y = – 2.46 + 0.65x, 1.44

2075 GIE Q.No. 8a Find the regression equation of X on Y from the following data. [4]

X	5	9	13	17	21
Y	3	8	13	18	23

Ans: X = 0.8Y + 2.6

2075 Set C Q.No. 8a The regression coefficients, b_{XY} = 1.5, b_{YX} = 0.65 and arithmetic means $(\bar{X})$ = 36, $(\bar{Y})$ = 52. Find the regression equations X on Y and Y on X. Also, find the estimated value of Y when X = 60. [4]

Ans: Y = 0.65X + 28.6, X = 1.5Y – 42, 67.6

2074 Supp Q.No. 8a From the following pair of regression equations, find the correlation coefficient between the two variables x and y. [4]

4x – 5y + 33 = 0 and 20x – 9y – 107 = 0.

Ans: 0.6

2072 Set C Q.No. 8a Define regression and lines of regression. Find the correlation coefficients between the two variables when b_{xy} = 1.8 and b_{yx} = 0.35 [4]

Ans0.79

2072 Set E Q.No. 8a The regression coefficients of x on y and y on x are 0.84 and 0.32 respectively. If the arithmetic means of x and y series are 42 and 26 respectively, find two equations of lines of regression. [4]

Ans: y = 0.32x + 12.56, x= 0.84 y + 20.16

2071 Supp. Q.No. 8a OR From the following data, compute the line of regression for estimating age on weight and estimate the most probable age on a weight of 37 Kg. [4]

Age (X)	5	15	30	45	50	60
Weight (Y)	10	35	50	65	55	45

Ans: x = 0.85 y – 2.66, 28.79

2070 Supp. Q.No. 8 a OR From the following data, compute the line of regression for estimating age on weight and estimate the most probable age of a weight of 37 kg: [4]

Age (x)	5	15	30	45	50	60
Weight (y)	10	35	50	65	55	45

Ans: x = 0.85 y – 2.66, 28.79

8 Marks Questions

2075 Set B Q.No. 11 The equations of two regression lines are 3X + 4Y = 65, 3X + Y = 32

Find,

i. the mean of X and the mean of Y.
ii. the regression coefficients.
iii. the correlation coefficients between X and Y.
iv. the ratio of standard deviations of X and Y. [6]

Ans: (I) 7, 11 (II) $-\frac{3}{4}$, $-\frac{1}{3}$ (III) $-\frac{1}{2}$ (IV) 2:3

11. PROBABILITY

A. PROBABILITY (SIMPLE CASES)

FORMULAE

1. $P(E) = p = \frac{\text{Favourable number of cases}}{\text{Total number of cases}} = \frac{m}{n}$
2. Properties of Probability
   If p denotes the probability of happening of an event, then the following properties of the probability are always true.
   i. $p + q = 1$
   ii. p(certain event) = 1
   iii. p(impossible event) = 0
   iv. $0 \leq p \leq 1$.
3. Addition Theorem
   $P(A \cup B) = P(A \text{ or } B) = P(A) + P(B) - P(A \cap B)$
4. Multiplication Theorem
   $P(A \cap B) = P(A \text{ and } B) = P(A) \times P(B)$,
   where A and B are independent events.
5. Conditional Probability
   $P(A/B) = \frac{P(A \cap B)}{P(B)}$, provided $P(B) \neq 0$
   $P(B/A) = \frac{P(A \cap B)}{P(A)}$, provided $P(A) \neq 0$
6. $P(\bar{A}) = 1 - P(A)$

2 Marks Questions

1. **2077 Set I Q.No. 2b** Two dice are rolled simultaneously. Determine the probability of turning up the number whose sum is less than six. [2]

   Ans: $\frac{5}{18}$

2. **2076 GIE Set A Q.No. 4c** A dice is thrown once. Determine the probability of getting a number greater than or equal to 3. [2]

   Ans: $\frac{2}{3}$

3. **2076 GIE Set B Q.No. 4c** If a dice is thrown 16 times, find the mean and the standard deviation for the binomial distribution of even numbers. [2]

   Ans: 8, 2

4. **2076 Set B Q.No. 4c** The chance that A can solve the problem is $\frac{1}{3}$ and the chance that B can solve is $\frac{2}{3}$. Find the probability that the problem is solved by A and B. [2]

   Ans: $\frac{2}{9}$

5. **2076 Set C Q.No. 4c** If three coins are tossed simultaneously, what is the probability that it turns two heads? [2]

   Ans: $\frac{3}{8}$

6. **2075 GIE Q.No. 4c** Two dice are rolled simultaneously. Determine the probability turning up the number whose sum is ten. [2]

   Ans: $\frac{1}{12}$

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7. **2075 Set B Q.No. 4c** An urn contains 4 white, 8 black, 6 red and 2 green marbles. If three balls are drawn at random, find the probability of getting 2 red and 1 green marbles. [2]

Ans: $\frac{1}{38}$

8. **2075 Set C Q.No. 4c** If A and B are two independent events with $P(A) = \frac{3}{4}$ and $P(B) = \frac{1}{5}$, find $P(A \cup B)$. [2]

Ans: $\frac{4}{5}$

9. **2074 Supp Q.No. 4c** If A and B are two independent events with $P(A) = \frac{2}{3}$ and $P(B) = \frac{3}{5}$, find $P(A \cup B)$. [2]

Ans: $\frac{13}{15}$

10. **2074 Set B Q.No. 4c** A class consists of 30 boys and 20 girls. If two students are chosen at random what is the probability that one is boy and another is girl? [2]

Ans: $\frac{24}{49}$

11. **2073 Supp Q.No. 4c** Three coins are tossed simultaneously. Find the sample space. Find the probability that all are heads. [2]

Ans: $\frac{1}{8}$

12. **2073 Set C Q.No. 4c** The chance that A can solve the problem is $\frac{2}{3}$ and the chance that B can solve the problem is $\frac{1}{3}$. Find the probability that the problem is solved by A and B. [2]

Ans: $\frac{2}{9}$

13. **2072 Supp. Q.No. 4c** An urn contains 4 white and 8 red balls. If two balls are drawn at random, find the probability of getting one of each colour. [2]

Ans: 16/33

14. **2072 Set C Q.No. 4c** In rolling a pair of dice, determine the probability of obtaining a sum of 10. [2]

Ans: $\frac{1}{12}$

15. **2072 Set D Q.No. 4c** In a draw of a card from well shuffled deck of 52 cards what is the probability that it is a king or a queen? [2]

Ans: $\frac{2}{13}$

16. **2072 Set E Q.No. 4c** Two dice are rolled once. What is the probability of getting a total of 8 or 7? [2]

Ans: $\frac{11}{36}$

17. **2071 Supp. Q.No. 4b** Two dice are thrown together. Find the probability of getting both odd digits. [2]

Ans: $\frac{1}{4}$

18. **2071 Set C Q.No. 4 c** The chance that A can solve the problem is 3/5 and the chance that B can solve the problem is 2/3. Find the probability that the problem is solved. [2]

Ans: $\frac{13}{15}$

19. **2071 Set D Q.No. 4 c** Two coins are tossed simultaneously. Find the sample space. Find the probability that both are heads. [2]

Ans: {HH, HT, TH, TT}, $\frac{1}{4}$

20. **2071 Old Q.No. 4 c** A coin is tossed successively three times. Determine the probability of getting 2 heads and one tail. [2]

Ans: $\frac{3}{8}$

21. **2070 Supp. Q.No. 4 c** A bag contains 24 balls numbered from 1 to 24. One ball is drawn at random. What is the probability that it is a multiple of 4 and 6? [2]

Ans: $\frac{1}{12}$

22. **2070 Set C Q.No. 4 c** A class consists of 60 boys and 40 girls. If two students are chosen at random, what is the probability that one is boy and one girl? [2]

Ans: $\frac{16}{33}$

23. **2070 Set D Q.No. 4 c** A card is drawn from a well-shuffled deck of 52 cards. What is the probability that it is a King or a Diamond? [2]

Ans: 4/13

24. **2070 (Old) Q.No. 4 c** If three coins are tossed simultaneously, find the probability of turning all head. [2]

Ans: $\frac{1}{8}$

25. **2069 (Set A) Q.No. 4c** From 20 tickets marked from 1 to 20, one is drawn at random. Find the probability that it is a multiple of 4 or 5. [2]

Ans: $\frac{2}{5}$

26. **2069 (Set A) Old Q.No. 4c** What is the probability that an English alphabet selected at random is (i) a vowel (ii) a consonant? [2]

Ans: (i) $\frac{5}{26}$ (ii) $\frac{21}{26}$

27. **2069 Old (Set B) Q.No. 3c** A card is drawn at random from a well shuffled deck of 52 cards. What is the probability that it is a spade? [2]

Ans: $\frac{1}{4}$

28. **2068 Q.No. 4c** A card is drawn at random from a well-shuffled deck of 52 cards. What is the probability that is a red 8, a red 9 or a red 10? [2]

Ans: $\frac{3}{26}$

29. **2067 Q.No. 4c** Define mutually exclusive events and dependent cases with example while performing an experiment. [2]

30. **2066 Q.No. 4 c** The chance that A can solve a problem is $\frac{1}{4}$, the chance that B can solve it is $\frac{2}{3}$. Find the probability that the problems will be solved if both of them try. [2]

Ans: 3/4

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31. **2068 Q.No. 4c** A card is drawn at random from a well-shuffled deck of 52 cards. What is the probability that is a red 8, a red 9 or a red 10? [2]
Ans: $\frac{3}{26}$

32. **2067 Q.No. 4c** Define mutually exclusive events and dependent cases with example while performing an experiment. [2]

33. **2066 Q.No. 4 c** The chance that A can solve a problem is $\frac{1}{4}$ the chance that B can solve it is $\frac{2}{3}$. Find the probability that the problems will be solved if both of them try. [2]
Ans: $\frac{3}{4}$

34. **2065 Q.No 4 c** Given P (A) = 0.4, P (A∪B) = 0.56, P (B) = 0.3. Are A & B independent? [2]
Ans: Not independent

35. **2064 Q.No. 4 c** A bag contains 9 red, 7 white and 4 black balls. A ball is drawn at random. Find the probability of drawing (i) a white ball (ii) not a black ball. [2]
Ans: (i) $\frac{7}{20}$ (ii) $\frac{4}{5}$

36. **2063 Q.No. 4 c** The chance that A can solve a certain problem is $\frac{1}{4}$ and the chance that B can solve it is $\frac{2}{3}$. Find the chance that the problem will be solved if they both try. [2]
Ans: $\frac{3}{4}$

37. **2062 Q.No. 4 c** What is the probability that an English alphabet selected at random is (i) a vowel (ii) a consonant? [2]
Ans: (i) $\frac{5}{26}$ (ii) $\frac{21}{26}$

38. **2060 Q.No. 4 c** Two dice are thrown. Determine the probability of getting a sum ≤ 5. [2]
Ans: $\frac{5}{18}$

39. **2059 Q.No. 3 c** Two letters are selected at random from the word "examination". Find the probability that both of them are same letters. [2]
Ans: $\frac{3}{31}$

40. **2058 Q.No. 4 c** If A and B are two independent events with P(A) = $\frac{2}{3}$ and P(B) = $\frac{3}{5}$, find P(A∪B). [2]
Ans: $\frac{13}{15}$

41. **2057 Q.No. 4 c** A card is drawn at random from a well shuffled deck of 52 cards. Find the probability of being it (i) a red card (ii) a heart. [2]
Ans: (i) $\frac{1}{2}$ (ii) $\frac{1}{4}$

4 Marks Questions

42. **2076 GIE Set B Q.No. 8b** The chance that A can solve the problem is 3/5 and the chance that B can solve the problem is 2/3 find the probability that? [4]
i. the problem is solved
ii. none of them can solve the problem.
Ans: (i) $\frac{13}{15}$ (ii) $\frac{2}{15}$

43. **2076 Set C Q.No. 8b** The chance that A can solve the problem is 3/5 and the chance that B can solve the problem is 2/3, find the probability that:
i. the problem is solved
ii. none of them can solve the problem [4]
Ans: (i) $\frac{13}{15}$ (ii) $\frac{2}{15}$

44. **2075 Set A Q.No. 8b** A lot contains 10 items of which 3 are defective. Three items are chosen from the lot at random one after another without replacement. Find the probability that (i) all three are defective (ii) only first one is defective. [4]
Ans: (i) $\frac{1}{120}$, (ii) $\frac{7}{40}$

45. **2073 Set D Q.No. 8b** A class consists of 60 boys and 40 girls. If two students are chosen at random, what is the probability that (i) both are boys (ii) one boy and one girl. [4]
Ans: (i) $\frac{59}{165}$, (ii) $\frac{16}{33}$

46. **2071 Old Q.No. 12 b** State and prove the theorem of compound probability. [4]

47. **2070 (Old) Q.No. 8 a** State and prove theorem on compound probability. [4]

48. **2069 (Set A) Old Q.No. 8a** Suppose 4 cards are drawn at random from a well-shuffled deck of 52 cards.
i. What is the probability that all 4 are spade?
ii. What is the probability that all 4 are black? [4]
Ans: (i) $\frac{11}{4165}$ (ii) $\frac{46}{833}$

49. **2069 (Set B) Q.No. 8b** A bag contains 5 red and 6 white balls. Two balls are drawn at random. Find the probability that (i) both are red (ii) both are of the same colour. [4]
Ans: (i) $\frac{2}{11}$, (ii) $\frac{5}{11}$

50. **2069 Old (Set B) Q.No. 8a** State and prove the theorem of "Compound probability". [4]

51. **2068 Q.No. 8b** The chance that A can solve a certain problem is $\frac{1}{4}$. The chance that B can solve it is $\frac{2}{3}$, find the chance that the problem will be solved if they both try. [4]
Ans: $\frac{3}{4}$

52. **2067 Q.No. 8a** A class consists of 40 boys and 60 girls. If two students are chosen at random, what will be the probability that (a) both are boys (b) both are girls (c) one boy and one girl? [4]
Ans: (a) $\frac{26}{165}$ (b) $\frac{59}{165}$ (c) $\frac{16}{33}$

53. **2066 C Q.No. 8 a** State and prove the theorem of total probability. [4]

54. **2066 C Q.No. 8 a OR** If A, B, C are three mutually exclusive events with $\frac{1}{3}$ P(A) = $\frac{2}{3}$ P(B) = $\frac{1}{6}$ P(C). Find P(A), P(B) and P(C). [4]
Ans: P (A) = $\frac{2}{7}$, P (B) = $\frac{1}{7}$, P(C) = $\frac{4}{7}$

55. 2066 Q.No. 8 a OR Five men in a group of 20 are graduates. If three men are chosen out of 20 at random, what is the probability of at least one being graduates? [4]
Ans: $\frac{137}{228}$

56. 2068 Q.No. 8b The chance that A can solve a certain problem is $\frac{1}{4}$. The chance that B can solve it is $\frac{2}{3}$, find the chance that the problem will be solved if they both try. [4]
Ans: $\frac{3}{4}$

57. 2067 Q.No. 8a A class consists of 40 boys and 60 girls. If two students are chosen at random, what will be the probability that (a) both are boys (b) both are girls (c) one boy and one girl? [4]
Ans: (a) $\frac{26}{165}$ (b) $\frac{59}{165}$ (c) $\frac{16}{33}$

58. 2066 C Q.No. 8 a State and prove the theorem of total probability. [4]

59. 2066 C Q.No. 8 a OR If A, B, C are three mutually exclusive events with $\frac{1}{3}P(A) = \frac{2}{3}P(B) = \frac{1}{6}P(C)$. Find P(A), P(B) and P(C). [4]
Ans: $P(A) = \frac{2}{7}$, $P(B) = \frac{1}{7}$, $P(C) = \frac{4}{7}$

60. 2066 Q.No. 8 a OR Five men in a group of 20 are graduates. If three men are chosen out of 20 at random, what is the probability of at least one being graduates? [4]
Ans: $\frac{137}{228}$

61. 2065 Q.No 8 a State and prove the theorem of compound probability. [4]

62. 2064 Q.No. 8 a If P(A) and P(B) are the probabilities of the happening of the events A and B respectively, prove that: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$, where $P(A \cup B)$ and $P(A \cap B)$ have the usual meanings. What will be the form of the above formula if A and B are independent events? [4]

63. 2063 Q.No. 8 a If P(A) and P(B) be the probabilities of the independent events A and B respectively, prove that: $P(A \cap B) = P(A).P(B)$ where $P(A \cap B)$ has the usual meaning. [4]

64. 2062 Q.No. 8 a State and prove "The Theorem of Total Probability". [4]

65. 2062 Q.No. 8 a OR A lot contains 10 items of which 3 are defective. Three items are chosen from the lot at random one after another without replacement. Find the probability that:
i. All three are defective.
ii. None of them are defective. [4]
Ans: (i) $\frac{1}{120}$ (ii) $\frac{119}{120}$

66. 2061 Q.No. 8 a State and prove the "Theorem of Compound Probability". [4]

67. 2061 Q.No. 8 a OR A class consists of 60 boys and 40 girls. If two students are chosen at random, what will be the probability that (a) both are boys (b) both are girls (c) one boy and one girl? [4]
Ans: (a) $\frac{59}{165}$, (b) $\frac{26}{165}$, (c) $\frac{16}{33}$

68. 2060 Q.No. 8 a State and prove the "Theorem of total probability." [4]

69. 2059 Q.No. 8 a If A, B, C are three mutually exclusive events with $\frac{1}{3}P(A) = \frac{2}{3}P(B) = \frac{1}{6}P(C)$, find P(A); P(B); and P(C). [4]
Ans: $\frac{2}{7}, \frac{1}{7}, \frac{4}{7}$

70. 2058 Q.No. 8 a State and prove the "Theorem of total probability" [4]

71. 2057 Q.No. 8 b State and prove the "Theorem of Total probability" [4]

B. BINOMIAL DISTRIBUTION

FORMULAE

1. Total probability for r success in n independent trials $P(r) = {}^nC_r p^r q^{n-r}$
2. Mean of the distribution is given by np.
3. Variance of the distribution is given by npq.
   Then, S.D. $= \sqrt{npq}$
4. Binomial distribution $= (q + p)^n$

2 Marks Questions

1. 2075 Set A Q.No. 4c The mean of a binomial distribution is 80 and standard deviation is 8, find the value of p, the probability of a success. [2]
Ans: $\frac{1}{6}$

2. 2074 Set A Q.No. 4c In 8 throws of a dice, turning of 1 or 6 is considered to be a success. Find the mean and standard deviation. [2]
Ans: $\frac{8}{3}, \frac{4}{3}$

3. 2073 Set D Q.No. 4c A dice is rolled 4 times. Getting an even number is considered as a success. Find the probability of getting two successes. [2]
Ans: $\frac{3}{8}$

4. 2069 (Set B) Q.No. 4c A dice is thrown 3 times. Getting a 2 or 3 is numbered as a success. Find the probabilities of getting two successes. [2]
Ans: $\frac{2}{9}$

5. 2066 C Q.No. 4 c If three dice are thrown, what is the probability of getting exactly 3 sixes? [2]
Ans: $\frac{1}{216}$

6. 2066 C Q.No. 4 c If three dice are thrown, what is the probability of getting exactly 3 sixes? [2]
Ans: $\frac{1}{216}$

7. 2061 Q.No. 4 c Find the binomial distribution having mean = 12 and variance = 8. [2]
Ans: $\left(\frac{2}{3} + \frac{1}{3}\right)^{36}$

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4 Marks Questions

2077 Set H Q.No. 5 A certain manufacturing plant produces electric fuses of which 20% are defective. Find the probability that in a sample of 8 fuses selected at random there will be atleast one defective and not more that one defective. [4]

Ans: $\frac{325089}{390625}, \frac{196608}{390625}$

2076 GIE Set A Q.No. 8b The average percentage of a failure in a certain examination is 25%. What is the probability that out of 5 students.

i. 2 students will pass the examination?
ii. 1 or more students will pass the examination? [4]

Ans: (i) $\frac{135}{512}$ (ii) $\frac{781}{1024}$

2076 Set B Q.No. 8b Find the probability of getting three heads in six tosses of a coin. [4]

Ans: $\frac{5}{16}$

11. **2075 GIE Q.No. 8b** In five tosses of a coin successively, find the probability of getting (i) two heads, (ii) at least two heads. [4]

Ans: (i) $\frac{5}{16}$ (ii) $\frac{13}{16}$

12. **2075 Set B Q.No. 8b** A company produces electronics chips by a process that manufactures normally average 20% defective products. Sample of four chips is selected at random and the parts are tested for certain characteristics, what is the probability that (i) no chip is defective (ii) one chip is defective (iii) more than one chip are defective. [4]

Ans: (i) $\frac{256}{625}$ (ii) $\frac{256}{625}$ (iii) $\frac{113}{625}$

13. **2075 Set C Q.No. 8b** The mean and variance of binomial distribution are 4 and $\frac{4}{3}$ respectively. Find $P(x \geq 1)$. [4]

Ans: $\frac{728}{729}$

14. **2074 Supp Q.No. 8b** Out of 32 students in a class, 8 students are girls. If 3 students are selected, find the probability that [4]

i. one student is a boy
ii. 2 students are boys and one girl.

Ans: (i) $\frac{9}{64}$ (ii) $\frac{27}{64}$

15. **2074 Set A Q.No. 8b** A company produces electronic chips by a process that manufactures normally average 20% defective products. A sample of four chips is selected at random and the parts are tested for certain characteristics, what is the probability that (i) no chip is defective (ii) one chip is defective (iii) more than one chips are defective. [4]

Ans: (i) $\frac{256}{625}$ (ii) $\frac{256}{625}$ (iii) $\frac{113}{625}$

16. **2074 Set B Q.No. 8b** The average percentage of failure in a certain examination is 70. What is the probability that out of 5 candidates at least 3 will pass? [4]

Ans: 0.16308

17. **2073 Supp Q.No. 8b** The probability of hitting a target is 0.2. If six hits are made, find the probability that (i) exactly one will hit the target (ii) exactly two will hit the target. [4]

Ans: (i) 0.39 (ii) 0.25

18. **2073 Set C Q.No. 8b** If 4 dice are rolled simultaneously, what is the probability of getting (i) exactly 3 sixes (ii) exactly 2 sixes? [4]

Ans: (i) $\frac{5}{324}$ (ii) $\frac{25}{216}$

19. **2072 Supp. Q.No. 8b** A certain manufacturing process produce electrical fuses of which 15% are defective. Find the probability that in a sample of 10 fuses selected at random there will be (i) no defective (ii) not more than one defective. [4]

Ans: (i) 0.1969 (ii) 0.5443

20. **2072 Set C Q.No. 8b** Define Binomial distribution. Find the probability of getting (i) two heads (ii) at least two heads in 5 tosser of a coin. [4]

Ans: (i) $\frac{5}{16}$ (ii) $\frac{13}{16}$

21. **2072 Set D Q.No. 8b** The probability of hitting a target is found to be 0.25. If eight hits are made, find the probability that (i) none will hit the target (ii) exactly two will hit the target. [4]

Ans: (i) 0.1, (ii) 0.62

22. **2072 Set E Q.No. 8b** Four coins are tossed simultaneously. What is the probability of getting (i) 2 heads (ii) 4 heads. [4]

Ans: (i) $\frac{3}{8}$ (ii) $\frac{1}{16}$

23. **2071 Supp. Q.No. 8b** The probability of a man's hitting a target is $\frac{1}{4}$. If he fires 5 times, what is the probability of his hitting the target (i) exactly thrice (ii) none (iii) at least thrice. [4]

Ans: (i) 0.0879; (ii) 0.2373; (iii) 0.1035

24. **2071 Set C Q.No. 8 b** A dice is rolled 3 times. Getting 5 or 6 is numbered as success. Find the probability of getting (i) 2 successes (ii) 3 successes. [4]

Ans: (i) $\frac{2}{9}$ (ii) $\frac{1}{27}$

25. **2071 Set D Q.No. 8 b** Suppose that in a certain city 60% of all recorded births are males, suppose we select 5 birth records from the population. What is the probability that: (i) three of them are males (ii) more than 4 are males. [4]

Ans: (i) $\frac{216}{625}$ (ii) $\frac{343}{3125}$

26. **2071 Old Q.No. 12 b OR** If 20% of the electric bulbs manufactured by a company are defective, find the probability that out of 4 bulbs chosen at random (i) 1 (ii) 0 (iii) at most 2 bulbs will be defective. [4]

Ans: (i) $\frac{256}{625}$ (ii) $\frac{256}{625}$ (iii) $\frac{608}{625}$

27. **2070 Supp. Q.No. 8 b** The probability of a man's hitting a target is $\frac{1}{4}$. If he fires 5 times, what is the probability of his hitting the target. (i) exactly thrice (ii) at least thrice [4]

Ans: (i) 0.0879 (ii) 0.1035

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28. **2070 Set C Q.No. 8 b** A certain manufacturing process produces electrical fuses of which 15% are defective. Find the probability that in a sample of 10 fuses selected at random there will be (i) no defective (ii) not more than one defective. [4]

Ans: (I) 0.1969 (II) 0.6443

29. **2070 Set D Q.No. 8 b** A coin is tossed 5 times. Find the probability of getting(i) two heads (ii) at least two heads. [4]

Ans: (I) $\frac{5}{16}$ (II) $\frac{13}{16}$

30. **2070 (Old) Q.No. 8 a or** If 20% of the electric bulbs manufactured by a company are defective, find the probability that out of 4 bulbs chosen at random (i) one (ii) zero (iii) at most 2 bulbs will be defective. [4]

Ans: (I) $\frac{256}{625}$ (II) $\frac{256}{625}$ (III) $\frac{608}{625}$

31. **2069 (Set A) Q.No. 8b** If 20% of the electric bulbs manufactured by a company are defective, find the probability that out of 4 bulbs chosen at random (i) 1 (ii) at most 2 bulbs will be defective. [4]

Ans: (I) $\frac{256}{625}$ (II) $\frac{608}{625}$

32. **2069 (Set A) Old Q.No. 8a or** If 20% of the electric bulbs manufactured by a company are defective, find the probability that out of 4 bulbs chosen at random (i) 1 (ii) 2 bulbs will be defective. [4]

Ans: (I) $\frac{256}{625}$ (II) $\frac{96}{625}$

33. **2069 Old (Set B) Q.No. 8a Or** If 4 dice are thrown, what is the probability of getting (i) exactly 3 sixes and (ii) no sixes.[4]

Ans: (I) $\frac{5}{324}$ (II) $\frac{625}{1296}$

34. **2068 Q.No. 8b Or** A dice is thrown 3 times. Getting a '5' or '6' is numbered a success. Find the probability of getting (i) 3 successes (ii) exactly 2 successes. [4]

Ans: (I) $\frac{1}{27}$ (II) $\frac{2}{3}$

35. **2067 Q.No. 8a Or** Define Binomial distribution, and its mean and variance, hence find the probability of getting three heads in five tosses of two coins. [4]

Ans: $\frac{45}{512}$

36. **2066 Q.No. 8 a** The probability of hitting a target is $\frac{1}{6}$, if eight hittings are made find the probability that (i) none will strike the target, (ii) exactly two will strike the target. [4]

Ans: (I) $\frac{390625}{1679616}$ (II) $\frac{109375}{419904}$

37. **2068 Q.No. 8b Or** A dice is thrown 3 times. Getting a '5' or '6' is numbered a success. Find the probability of getting (i) 3 successes (ii) exactly 2 successes. [4]

Ans: (I) $\frac{1}{27}$ (II) $\frac{2}{9}$

38. **2067 Q.No. 8a Or** Define Binomial distribution, and its mean and variance, hence find the probability of getting three heads in five tosses of two coins. [4]

Ans: $\frac{45}{512}$

39. **2066 Q.No. 8 a** The probability of hitting a target is $\frac{1}{6}$, if eight hittings are made find the probability that (i) none will strike the target, (ii) exactly two will strike the target. [4]

Ans: (I) $\frac{390625}{1679616}$ (II) $\frac{109375}{419904}$

40. **2065 Q.No 8 a OR** If three dices are thrown what is the probability of getting (i) exactly 3 sixes (ii) exactly 2 sixes [4]

Ans: (I) $\frac{1}{216}$ (II) $\frac{5}{72}$

41. **2064 Q.No. 8 a OR** Suppose that in a certain city 60% of all recorded births are males. If we select 5 births from the population, what will be the probability that:

i. none of them is male
ii. exactly three of them are male. [4]

Ans: (I) $\frac{32}{3125}$ (II) $\frac{216}{625}$

42. **2063 Q.No. 8 a OR** The incidence of occupation disease in an industry is such that the workmen have a 20% chance of suffering from it. What is the probability that out of six workmen four or more will contact the disease? [4]

Ans: $\frac{53}{3125}$

43. **2060 Q.No. 8 a OR** A sample of 100 fuses is known to have an average 5 defective fuses. Three fuses of sample are tested. What is the probability that (i) none of them is defective (ii) exactly one of them is defective? [4]

Ans: (I) $\frac{6859}{8000}$ (II) $\frac{1083}{8000}$

44. **2059 Q.No. 8 a OR** If 4 dice are thrown, what is probability of getting (i) exactly 3 sixes (ii) exactly 2 sixes and (iii) no sixes.[4]

Ans: (I) $\frac{5}{324}$ (II) $\frac{25}{216}$ (III) $\frac{625}{1296}$

45. **2058 Q.No. 8 a OR** The probability of hitting a target is 1/5. If six hittings are made, find the probability that: (i) none will strike the target (ii) exactly 2 will strike the target. [4]

Ans: (I) $\frac{4096}{15625}$ (II) $\frac{768}{3125}$

46. **2057 Q.No. 8 b OR** A dice is thrown 3 times. Getting a '5' or '6' is numbered a success. Find the probability of getting (a) 3 successes and (b) exactly 2 successes. [4]

Ans: (a) $\frac{1}{27}$ (b) $\frac{2}{9}$

12. STATICS

FORMULAE

1. Resultant of Two Forces Acting at A Point

$R^2 = P^2 + Q^2 + 2PQ\cos\alpha$

$\theta = \tan^{-1}\left(\frac{Q\sin\alpha}{P + Q\cos\alpha}\right)$

2. Resolution of a Given Force in Two Given Directions

$P = \frac{F\sin\beta}{\sin(\alpha+\beta)}$, $Q = \frac{F\sin\alpha}{\sin(\alpha+\beta)}$

3. Resolved Parts of a Number of Coplanar Concurrent Forces

$R\cos\theta = P_1\cos\alpha_1 + P_2\cos\alpha_2 + P_3\cos\alpha_3 + \ldots = X$

$R\sin\theta = P_1\sin\alpha_1 + P_2\sin\alpha_2 + P_3\sin\alpha_3 + \ldots = Y$

$R = \sqrt{X^2 + Y^2}$

$\theta = \tan^{-1}\left(\frac{Y}{X}\right)$

4. Triangle of Forces: If three forces acting at a point be represented in magnitude and direction by the sides of a triangle, taken in order, they are in equilibrium.
5. Converse of the Triangle of Forces: If three forces acting at a point be in equilibrium, they can be represented in magnitude and direction by the three sides of a triangle taken in order.
6. Lami's Theorem: If three forces acting at a point are in equilibnum, then each force is proportional to the sine of the angle between the other two.

4 Marks Questions

1. **2077 Set G Q.No. 7** Find the resultant and the angle subtended by it with P when the forces P and Q act at right angle. [2]
   Ans: $R = \sqrt{P^2 + Q^2}$, $\theta = \tan^{-1}\left(\frac{Q}{P}\right)$
2. **2076 GIE Set A Q.No. 12a** If the resultant of two forces P and Q acting at a point is at right angle to P, Prove that $R^2 = Q^2 - P^2$ [2]
3. **2076 GIE Set A Q.No. 12b** A particle weighing 6N is suspended freely from the ceiling by a weightless in extensible cord. Find the tension in the cord. [2]
   Ans: 18 N
4. **2076 GIE Set B Q.No. 12a** A heavy chain has weights of 10 and 16kg wt attached to its ends and hangs in equilibrium over a smooth pulley. If the greatest tension of the chain is 20kg weight, find the weight of the chain. [2]
   Ans: 14 Kg
5. **2076 Set B Q.No. 12a** If the resultant of two equal forces is equal to the given force, find angle between the forces. [2]
   Ans: 120°
6. **2076 Set C Q.No. 12a** Two forces acting at an angle 45° have a resultant equal to $\sqrt{10}$ N.
   If one of the forces be $\sqrt{2}$ N, find the other force. [2]
   Ans: 2 N
7. **2075 GIE Q.No. 12a** Two forces acting at an angle 45° have a resultant equal to $\sqrt{10}$ N, if one of the forces be $\sqrt{2}$ N, find the other force. [2]
   Ans: 2 N
8. **2075 Set A Q.No. 12a** A force equal to 10N is inclined at an angle of 30° to the horizontal. Find its resolved parts in horizontal and vertical directions. [2]
   Ans: $5\sqrt{3}$ N, 5 N
9. **2075 Set B Q.No. 12a** Find the angle between the forces P+Q and P–Q such that their resultant may be $\sqrt{P^2 + 3Q^2}$. [2]
   Ans: 120°
10. **2075 Set C Q.No. 12a** Forces equal to 7p, 5p and 8p acting on a particle are in equilibrium. Find the angle between the latter pair of forces. [2]
    Ans: 120°
11. **2075 Set C Q.No. 12b** A particle weighing 6N is suspended freely from the ceiling by a weightless in extensible cord. Find the tension in the cord. [2]
    Ans: 18 N
12. **2074 Supp Q.No. 12a** A heavy chain has weights of 10 kg and 16 kg attached to its ends and hangs in equilibrium over a smooth pulley. If the greatest tension of the chain is 20 kg. wt., find the weight of the chain. [2]
    Ans: 14 Kg
13. **2074 Set A Q.No. 12a** Two forces 4 N and $2\sqrt{2}$ N act at an angle of 45°. Find their resultant. [2]
    Ans: $2\sqrt{10}$ N at $\tan^{-1}\left(\frac{1}{3}\right)$ with the force of 4 N
14. **2074 Set B Q.No. 12a** If the resultant R of two forces P and Q acting at a point is at right angle to P, prove that: $R^2 = Q^2 - P^2$. [2]
15. **2073 Supp Q.No. 12a** If the resultant of two equal forces is equal to the given force, find angle between the forces. [2]
    Ans: 120°
16. **2073 Set C Q.No. 12a** If the resultant of two equal forces is equal to the given force, find angle between the forces. [2]
    Ans: 120°
17. **2073 Set D Q.No. 12a** Two forces P and 2P acting at a point have a resultant $\sqrt{3}$ P. Find the angle between the two forces. [2]
    Ans: 120°
18. **2072 Supp. Q.No. 12a** Two forces P and 2P acting at a point have the resultant $\sqrt{3}$ P, find the angle between the two given forces. [2]
    Ans: 120°
19. **2072 Set C Q.No. 12 a** Find the resultant and the angle subtended by it with P when the forces P and Q act at right angle. [2]
    Ans: $R = \sqrt{P^2 + Q^2}$, $\theta = \tan^{-1}\left(\frac{Q}{P}\right)$
20. **2072 Set D Q.No. 12a** Show that the resultant of two equal forces bisects the angle between them. [2]
21. **2072 Set E Q.No. 12a** Two forces P and 2P acting at a point have the resultant $\sqrt{3}$ P. Find the angle between the two given forces. [2]
    Ans: 120°
22. **2071 Set C Q.No. 12 a** Three forces acting on a particle are in equilibrium: The angle between the first and second is 90° and that between the second and third is 120°, find the ratios of the forces. [2]
    Ans: $\sqrt{3} : 1 : 2$
23. **2071 Set D Q.No. 12 a** Forces equal to 7p, 5p and 8p acting on a particle are in equilibrium. Find the angle between latter pair of forces. [2]
    Ans: 120°
24. **2071 Old Q.No. 5 a** If a force P be resolved into two forces making angles 45° and 15° with its direction, show that the latter force is $\frac{\sqrt{6}}{3}$ P. [2]
25. **2070 Set C Q.No. 12 a** At what angle do the force equal to P+Q and P – Q act so that the resultant may be $\sqrt{P^2+Q^2}$? [2]
    Ans: $\cos^{-1}\left\{\frac{-(P^2+Q^2)}{2(P^2-Q^2)}\right\}$

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26. 2070 Set D Q.No. 12 a Two forces acting at an angle of 45° have a resultant equal to $\sqrt{10}$ N; if one of the forces be $\sqrt{2}$ N, find the other force. [2]
Ans: 2 N

27. 2070 (Old) Q.No. 5 a If the resultant R of two forces P and Q acting at a point is right angle to P, then prove that $R^2 = Q^2 - P^2$ [2]

28. 2069 (Set A) Q.No. 12a Two forces whose magnitudes are P and $P\sqrt{2}$ N act on a particle in direction inclined at an angle 135° to each other, find the magnitude and the direction of the resultant. [2]
Ans: The resultant is PN acting at right angle with the first force

29. 2069 (Set A) Old Q.No. 5a Find the resultant of two forces equal to 3N and 6N acting at an angle of 120°. [2]
Ans: The resultant is a force $3\sqrt{3}$ N making an angle of 90° with the direction of force 3 N.

30. 2069 (Set B) Q.No. 12a If a force P be resolved into two forces making angles 45° and 15° with its direction; show that the latter force is $\frac{\sqrt{6}}{3}$ P. [2]

31. 2069 Old (Set B) Q.No. 5a Find the least resultant of two forces of magnitudes 12 N and 8 N respectively. [2]
Ans: 4 N

32. 2069 Old (Set B) Q.No. 5c A particle weighing 5N is suspended freely from the ceiling by a Weightless inextensible cord. Find the tension in the cord. [2]
Ans: 15 N

33. 2068 Q.No. 5a Two forces acting at an angle of 45^0 have a resultant equal to $\sqrt{10}$ N; if one of the forces be $\sqrt{2}$ N, find the other force. [2]
Ans: 2 N

34. 2067 Q.No. 5a Find the resultant of two forces equal to 3N and 6N respectively such that their diagonal is perpendicular to the first force. [2]
Ans: $3\sqrt{3}$ N

35. 2066 C Q.No. 5 b The resultant of two forces P and Q is R. If Q is doubled the new resultant is perpendicular to P. Prove that Q = R. [2]

36. 2066 Q.No. 5 a The resultant of two forces P and Q is R. If Q is doubled, the new resultant is perpendicular to P. Prove that Q = R. [2]

37. 2065 Q.No 4 b The sum of two forces is 18 and the resultant whose direction is perpendicular to the smaller of the two forces is 12, find the magnitude of the forces. [2]
Ans: 5 and 13

38. 2064 Q.No. 5 b Forces equal to 7P, 5P and 8P acting on a particle are in equilibrium. Find the angle between the latter pair of forces.
Ans: 120° [2]

39. 2063 Q.No. 5 b At what angle of forces equal to (P + Q) Newton and (P – Q) newton act so that the resultant may be $\sqrt{P^2 + Q^2}$ newton? [2]
Ans: $\cos^{-1}\left\{-\frac{(P^2+Q^2)}{2(P^2-Q^2)}\right\}$

40. 2062 Q.No. 6 b Two forces whose magnitudes are P and $P\sqrt{2}$ act on a particle in directions inclined at an angle of 135° to each other; find the magnitude and direction of the resultant. [2]
Ans: P Newton, 90° with P

41. 2061 Q.No. 5 a If a force P be resolved into two forces making angles of 45° and 15° with its directions. Show that the latter force is $\frac{\sqrt{6}}{3}$ P. [2]

42. 2060 Q.No. 5 a At what angle do forces equal to (P + Q) and (P – Q) act so that the resultant may be $\sqrt{P^2 + Q^2}$? [2]
Ans: $\cos^{-1}\left\{\frac{(P^2+Q^2)}{2(P^2-Q^2)}\right\}$

43. 2059 Q.No. 5 a The resultant of two forces P and Q is R. If Q is doubled the new resultant is perpendicular to P. Prove that Q = R. [2]

44. 2059 Q.No. 5 c State 'Triangle of forces'. [2]

45. 2058 Q.No. 5 a At what angle do forces equal to (P + Q) N and (P – Q) N act so that the resultant may be $\sqrt{P^2 + Q^2}$? [2]
Ans: $\text{Cos}^{-1}\left\{\frac{(P^2+Q^2)}{2(P^2-Q^2)}\right\}$

46. 2057 Q.No. 5 a Write the expression for the magnitude and the direction of the resultant of two forces acting at a given angle. [2]
Ans: $R = \sqrt{P^2 + Q^2 + 2PQ\cos\alpha}$ and $\theta = \tan^{-1}\frac{Q\sin\alpha}{P + Q\cos\alpha}$

4 Marks Questions

47. 2077 Set G Q.No. 8 Two forces of magnitude 3P, 2P respectively have a resultant R. If the first force be doubled, the magnitude of the resultant is doubled, find the angle between the forces. [4]
Ans: 120°

48. 2077 Set G Q.No. 8 OR Two forces P and Q acting parallel to the length and base of an inclined plane respectively, would each of them singly support a weight w on the plane, prove that: $\frac{1}{P^2} - \frac{1}{Q^2} = \frac{1}{w^2}$.

49. 2077 Set H Q.No. 8 Three forces P, Q, R acting at O along OA, OB, OC; where O is the incenter of ΔABC, are in equilibrium. Show that: $\frac{P}{\cos\frac{A}{2}} = \frac{Q}{\cos\frac{B}{2}} = \frac{R}{\cos\frac{C}{2}}$ [4]

50. 2077 Set H Q.No. 8 OR State and prove converse of the triangle of forces. [4]

51. 2076 GIE Set A Q.No. 13a State and prove λ – μ theorem. [4]

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2076 GIE Set A Q.No. 13a OR Two forces equal to '2p' and 'p' respectively act on a particle. If the first be double and the second increased by 12N, the direction of the resultant is unaltered. Find the value of p. [4]
Ans: 12 N

2076 GIE Set B Q.No. 13a The resultant of two forces P and Q is equal to $\sqrt{3}$ Q and makes an angle of 30° with the direction of P. Show that P is either equal to Q or is double of Q. [4]

2076 Set B Q.No. 13a Two men carry a weight 50N between two strings fixed to the weight, one string is inclined at 30° to the vertical and the other at 60°, find the tension of each string. [4]
Ans: $25\sqrt{3}$ N and 25 N

2076 Set C Q.No. 13a State and prove triangle of forces. [4]

2076 Set C Q.No. 13a OR Forces 1 N, 2 N, 3 N act at a point in direction parallel to the sides of an equilateral triangle taken in order. Find their resultant. [4]
Ans: $\sqrt{3}$ N perpendicular to the second force

2075 GIE Q.No. 13a State and prove converse of the triangle of forces. [4]

2075 GIE Q.No. 13a OR A heavy has weights of 10 kg and 16 kg attached to its ends and hangs in equilibrium over a smooth pulley. If the greatest tension of the chain is 20 kg wt, find the weight of the chain. [4]
Ans: 14 kg

2075 Set A Q.No. 13a A body of weight 68 N is suspended by two strings of lengths 8 m and 15 m respectively and the other ends of the strings are attached to two fixed points in a horizontal line 17m apart. Find the tensions of the strings. [4]
Ans: 60 N, 32 N

2075 Set B Q.No. 13a Forces 2, 4, 6 units act at a point in directions parallel to the sides of an equilateral triangle taken in order. Find their resultant. [4]
Ans: $2\sqrt{3}$ units at an angle of 210° with 2 units force

2075 Set C Q.No. 13a OR State and prove λ – μ theorem.

2075 Set B Q.No. 13a OR A body of weight 45 N is suspended by two strings of length 30 cm and 40 cm respectively and the other ends of the strings are attached to the extremities of a rod of length 50 cm. The rod is so held that the body hangs immediately below its middle point. Find the tensions of the strings. [4]
Ans: 36 N, 27 N

2074 Supp Q.No. 13a Forces of 2, $\sqrt{3}$, 5, $\sqrt{3}$ and 2 N respectively act at one of the angular points of a regular hexagon towards the five other points. Find the magnitude and direction of the resultant. [4]
Ans: 10 N towards the opposite angular points

2074 Supp Q.No. 13a OR Find the resultant of two forces P and Q acting at a point when the angle between them is α. [4]
Ans: $R^2 = P^2 + Q^2 + 2PQ\cos\alpha$; $\theta = \tan^{-1}\left(\frac{Q\sin\alpha}{P + Q\cos\alpha}\right)$

2074 Set A Q.No. 13a State and prove 'Triangle Law of forces'. [4]

2074 Set B Q.No. 13a State and prove Lami's theorem. [4]

2074 Set B Q.No. 13a OR A body of weight 10kg is suspended by two strings of lengths 7 m and 24 m, their other ends being fastened to the extremities of a rod of length 25m. If the rod be so held that the body hangs immediately below its middle point, find the tensions of the strings. [4]
Ans: $\frac{14}{5}$ kg wt and $\frac{48}{5}$ kg wt

2073 Supp Q.No. 13a If a force P be resolved into two forces making angles 45° and 15° with its directions, show that the later force is $\sqrt{\frac{2}{3}}$ P. [4]

2073 Set C Q.No. 13a State and prove triangle of forces. [4]

2073 Set C Q.No. 13a OR ABCD is a square. Forces 1, 2, 3, 4 and $2\sqrt{2}$ newton's act at a point in directions AB, BC, CD, DA and AC respectively. Find the resultant. [4]
Ans: The forces are in equilibrium

2073 Set D Q.No. 13a A body of weight 100 kg is suspended by two things 7m and 24 m in length; their other ends being fastened to the extremeties of a rod of length 25m. If the rod is so held that the body hangs immediately below its middle point, find the tensions of the strings. [4]
Ans: 28 kg wt and 96 kg wt

2073 Set D Q.No. 13a OR Find the resultant of two forces P and Q acting at a point when the angle between them is α. [4]

2072 Supp. Q.No. 13a Forces of 2, $\sqrt{3}$, 5, $\sqrt{3}$, 2 N respectively act at one of the angular points of a regular hexagon towards the five other points. Find the magnitude and the direction of the resultant. [4]
Ans: 10 N towards the opposite angular points

2072 Supp. Q.No. 13a OR State and prove Lami's theorem. [4]

2072 Set C Q.No. 13a Two men carry a weight 50N supported by two strings; one string is inclined at 30° to the vertical and other at 60°, find the tension of each string. [4]
Ans: 25 N, $25\sqrt{3}$ N

2072 Set D Q.No. 13a State and prove Lami's theorem. [4]

2072 Set D Q.No. 13a OR A body of weight 68 N is suspended by two strings of length 8 m and 15 m respectively, and the other ends of the strings are attached to two fixed points in a horizontal line 17 m apart, find the tensions of the strings. [4]
Ans: 60 N, 32 N

2072 Set E Q.No. 13a A body of weight 65 N is suspended by two strings of lengths 5 and 12 m attached to two points in the same horizontal line whose distance apart is 13m; find the tensions of the string. [4]
Ans: 60 N and 25 N

2071 Set C Q.No. 13 a The resultant of two forces P and Q acting at an angle α is equal to $(2m + 1)\sqrt{P^2 + Q^2}$. When they act at an angle $(90° - \alpha)$ the resultant is $(2m - 1)\sqrt{P^2 + Q^2}$. Prove that: $\tan\alpha = \frac{m-1}{m+1}$ [4]

80. **2071 Set D Q.No. 13 a** The resultant of two forces P and Q is equal to $\sqrt{3}$ Q and makes an angle of 30° with the direction of P; show that P is either equal to Q or is double of Q. [4]

81. **2071 Set D Q.No. 13 a OR** State and prove Lami's theorem.[4]

82. **2071 Old Q.No. 13 a** State and prove Lami's theorem. [4]

83. **2071 Old Q.No. 13 a OR** O is the circumcentre of the triangle ABC. Forces P, Q and R acting along OA, OB and OC are in equilibrium. Show that: $\frac{P}{\sin 2A} = \frac{Q}{\sin 2B} = \frac{R}{\sin 2C}$ [4]

84. **2070 Set C Q.No. 13 a** Forces of $2, \sqrt{3}, 5, \sqrt{3}$ and 2N respectively act at one of the angular points of a regular hexagon towards the five other points. Find the magnitude and direction of the resultant. [4]

Ans: 10 N towards the opposite angular points

85. **2070 Set D Q.No. 13 a** A body of weight 65 N is suspended by two strings of lengths 5 and 12 m attached to two points in the same horizontal line whose distance apart is 13 m; find the tensions of the string. [4]

Ans: 60 N and 25 N

86. **2070 Set D Q.No. 13 a Or** State and prove Lami's theorem.[4]

87. **2070 (Old) Q.No. 13 a Or** If the resultant R of two focus P and Q inclined to one another at any given angle, makes an angle θ with the direction of P, show that the resultant of the forces P + R and Q acting at the same given angle, will make an angle θ/2 with the direction of P + R. [4]

88. **2069 (Set A) Q.No. 13a** The resultant of two forces P and Q acting at an angle α is equal to $(2m + 1)\sqrt{P^2 + Q^2}$. When they act at an angle $(90° - \alpha)$ the resultant is $(2m - 1)\sqrt{P^2 + Q^2}$. Prove that: $\tan\alpha = \frac{m-1}{m+1}$. [4]

89. **2069 (Set A) Old Q.No. 13a** State and prove Lami's theorem. [4]

90. **2069 (Set A) Old Q.No. 13a or** Forces of 2, $\sqrt{3}$, 5, $\sqrt{3}$, 2 newtons respectively act at one of the angular points of a regular hexagon towards the five other points. Find the magnitude and the direction of the resultant. [4]

Ans: The resultant is 10N towards the opposite angular point.

91. **2069 (Set B) Q.No. 13a** A body of weight 65N is suspended by two strings of lengths 5m and 12m attached to two points in the same horizontal line whose distance apart is 13m, find the tension of the strings. [4]

Ans: 60N and 25N

92. **2069 (Set B) Q.No. 13a Or** Find the resultant of two forces P and Q acting at a point when the angle between them is α. [4]

Ans: $R^2 = P^2 + Q^2 + 2PQ\cos\alpha$ and $\theta = \tan^{-1}\frac{Q\sin\alpha}{P + Q\cos\alpha}$

93. **2069 Old (Set B) Q.No. 13a** State and prove "Lami's theorem". [4]

94. **2069 Old (Set B) Q.No. 13a Or** If the resultant of two forces acting on a particle be at right angle to one of them and its magnitude be half of the magnitude of the other, show that the ratio of the greater force to the smaller is 2: $\sqrt{3}$. [4]

95. **2068 Q.No. 13 a** Find the resultant of two forces P and Q when the angle between them is α. [4]

Ans: $R^2 = P^2 + Q^2 + 2PQ\cos\alpha$; $\theta = \tan^{-1}\left(\frac{Q\sin\alpha}{P + Q\cos\alpha}\right)$

96. **2068 Q.No. 13 a Or** A body of weight 65 N is suspended by two strings of length 5 m and 12 m attached to two points in the same horizontal line whose distance apart is 13 m; find the tension of the strings. [4]

Ans: 60 N, 25 N

97. **2067 Q.No. 13a** If a force P be resolved into two forces making angles of 45° and 15° with its direction; show that the latter force is $\sqrt{\frac{2}{3}}$P. [4]

98. **2067 Q.No. 13a OR** State and prove converse of the Triangle of forces. [4]

99. **2066 C Q.No. 13 a** State and prove converse of triangle of forces. [4]

100. **2066 C Q.No. 13 a OR** A body of weight 10 kg is suspended by two strings 7 and 24 metres in length, their other ends being fastened to the extremities of a rod of length 25 metres. If the rod be so hold that the body hangs immediately below its middle point. Find the tensions of the strings. [4]

Ans: $T_1 = \frac{14}{5}$ kg wt.; $T_2 = \frac{48}{5}$ kg wt

101. **2066 Q.No.13 a** Forces 2, $\sqrt{3}$, 5, $\sqrt{3}$, 2 newtons respectively act at one of the angular points of a regular hexagon towards the five other points. Find the magnitude and direction of the resultant. [4]

Ans: 10 N towards the opposite angular point.

102. **2066 Q.No.13 a OR** State and prove the theorem on Triangle of forces for three forces acting at a point. [4]

103. **2065 Q.No 13 a** Two forces P & Q acting parallel to the length and base of an inclined plane respectively, would each of them singly support a weight W on the plane, prove that: $\frac{1}{P^2} - \frac{1}{Q^2} = \frac{1}{W^2}$ [4]

104. **2065 Q.No 13 a OR** State and prove: λ – μ theorem. [4]

105. **2064 Q.No. 13 a** The resultant of two forces P & Q acting at an angle α is equal to $(2m + 1)\sqrt{P^2 + Q^2}$, when they act at an angle 90° – α, the resultant is $(2m - 1)\sqrt{P^2 + Q^2}$. Prove that $\tan\alpha = \frac{m-1}{m+1}$. [4]

106. **2064 Q.No. 13 a OR** State and prove Lami's theorem. [4]

107. **2063 Q.No. 13 a** Forces of 2, $\sqrt{3}$, 5, $\sqrt{3}$ and 2 newtons respectively act at one of the angular points of a regular hexagon towards the five other angular points. Find the magnitude and direction of the resultant. [4]

Ans: 10 N towards the opposite angular point.

108. **2063 Q.No. 13 a OR** Find the resultant of two forces P and Q acting at a point. [4]

Ans: Magnitude = $\sqrt{P^2 + Q^2 + 2PQ\cos\alpha}$ **and direction =** $\frac{Q\sin\alpha}{P + Q\cos\alpha}$

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110. **2062 Q.No. 13 a** State and prove converse of triangle of forces. [4]

111. **2062 Q.No. 13 a OR** A uniform plane lamina in the form of a rhombus, one of whose angle is 120°, is supported by two forces applied at the centre in the directions of the diagonals so that one side of the rhombus is horizontal; show that if P and Q be the forces and P be the greater then $P^2 = 3Q^2$. [4]

112. **2061 Q.No. 13 a** The resultant of two forces P & Q is equal to $\sqrt{3}Q$ and making an angle of 30° with the direction of P. Show that P is either equal to Q or is double of Q. [4]

113. **2060 Q.No. 13 a** Find the resultant of n number of coplanar forces acting at a point. [4]

114. **2060 Q.No. 13 a OR** The resultant of two forces P and Q is R. If Q is doubled, the new resultant is perpendicular to P, prove that R = Q. [4]

115. **2059 Q.No. 13 b** A uniform sphere of weight 3 N rests in contact with a smooth vertical wall. It is supported by a string whose length equals the radius of the sphere joining a point on the surface of the sphere to a point of the wall. Calculate the tension in the string and the reaction of the wall. [4]

Ans: $T = 2\sqrt{3}$ N and $R = \sqrt{3}$ N

116. **2059 Q.No. 13 b OR** Two forces equal to 2 P and P respectively act on a particle. If the first be doubled and the second is increased by 12N, the direction of the resultant is unaltered. Find the value of P. [4]

Ans: P = 12 N

117. **2058 Q.No. 13 a** State and prove "Triangle of forces" [4]

118. **2058 Q.No. 13 a OR** Two forces P and Q act at a point. Their resultant R is at right angles to P. Show that $Q^2 - P^2 = R^2$ and the angle between the forces is $\cos^{-1}\left(-\frac{P}{Q}\right)$. [4]

119. **2057 Q.No. 13 a** State and prove "Lami's Theorem". [4]

120. **2057 Q.No. 13 a OR** The resultant of two forces P and Q acting at an angle α is $(2m + 1)\sqrt{P^2 + Q^2}$ when they act at an angle $(90° - \alpha)$ the resultant is $(2m - 1)\sqrt{P^2 + Q^2}$. Prove that $\tan\alpha = \frac{m-1}{m+1}$. [4]

6 Marks Questions

121. **2071 Supp. Q.No. 14** Prove that if three forces acting on a particle are in equilibrium, then each is proportional to the sine of the angle between the other two. Also, if a body of weight w is suspended by strings of length 3 m and 4 m attached to two points in the same horizontal line whose distance apart is 5m, find the tensions along the strings. [6]

Ans: $\frac{4W}{5}$ N and $\frac{3W}{5}$ N

122. **2071 Supp. Q.No. 14 OR** Let force F make angles α and β with directions OX and OY respectively. Prove that if F_x and F_y are the components of the force in the directions of OX and OY respectively then $F_x = \frac{F\sin\beta}{\sin(\alpha+\beta)}$, $F_y = \frac{F\sin\alpha}{\sin(\alpha+\beta)}$.

Also, if Q is doubled and the new resultant is perpendicular to P, prove that Q = R, where R is the resultant of forces P and Q. [6]

123. **2070 Supp. Q.No. 14** Two forces equal to 2P and P respectively act on a particle. If the first be doubled and the second increased by 12 N, the direction of the resultant is unaltered. Find the value of P. [6]

Ans: 12 N

124. **2070 Supp. Q.No. 14 OR** Let P and Q be two forces acting on a particle, whose directions include an angle of $\alpha(\neq 0 \text{ or } \pi)$. Derive the magnitude and direction of their resultant. [6]

13. STATICS (CONTINUED)

FORMULAE

1. Varignon's Theorem
   The algebraic sum of the moments of two forces about any point in their plane is equal to the moment of their resultant about the same point.
2. Moment of a force:
   $F \cdot OA = F \cdot p$

2 Marks Questions

1. **2076 Set C Q.No. 12b** Two parallel forces of 25 kg weight and 20 kg weight are acting at a distance 25cm apart. Find the point at which their resultant acts. [2]

   Ans: The resultant is 45 kg wt acting at a distance of $\frac{100}{9}$ cm from the force 25 kg wt.

2. **2075 GIE Q.No. 12b** Two parallel forces of 30 kg wt and 20 kg wt are acting at a distance 80 cms apart. Find their resultant if forces are like. [2]

   Ans: 50 kg wt

3. **2075 Set B Q.No. 12b** A straight uniform beam 1m long, when a load of 24 kg is placed at one end, it balances about a point 30 cm from that end. Find the weight of the beam. [2]

   Ans: 36 kg

4. **2074 Supp Q.No. 12b** Two like parallel forces P and Q act at points 18 m apart; if the resultant force be 9 N and acts at a distance 6m from P, find Q. [2]

   Ans: 3 N

5. **2074 Set A Q.No. 12b** Forces equal to 5N, 2N, 5N, 2N act along the sides AB, CB, CD and AD of a square ABCD whose side is 3m. Find the moment of the couple that will give equilibrium. [2]

   Ans: 9 Nm

6. **2074 Set B Q.No. 12b** A uniform beam AB is 8 m long and weights 25 kg. Weights of 10 kg and 25 kg are suspended from A and B respectively. At what point must the beam be supported so that it may rest horizontally? [2]

   Ans: At a distance of 9m from A

7. **2073 Set D Q.No. 12b** Two like parallel forces P and Q act at points 18 m apart, if the resultant force be 9 N and acts at a distance 6m from P, find Q. [2]

   Ans: 3 N

8. **2072 Supp. Q.No. 12c** Two like parallel forces P and Q act at points 18 m apart, if the resultant force be 9 N and acts at a point 6 m from P, find Q. [2]

   Ans: 3 N

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9. 2072 Set C Q.No. 12b Two like parallel forces P and Q act at points 18 m apart, if the resultant force is 9 N and acts at a distance 12 m from Q, find P. [2]
Ans: 6 N

10. 2072 Set D Q.No. 12b A uniform beam AB is 16 m long and weighs 50 kg weights of 20 kg and 50 kg are suspended from A and B respectively. At what point must the beam be supported so that it may rest horizontally? [2]
Ans: 10 m

11. 2071 Supp. Q.No. 12a If one of two like parallel forces and their resultant are 18 N and 36 N respectively, find the ratio of distances of the resultant from the forces. [2]
Ans: 1: 1

12. 2071 Set D Q.No. 2 b Two unlike parallel forces, the greater of which is 75 N, have a resultant 25 N. Find the ratio of the distances of the resultant from the component forces. [2]
Ans: 2:3

13. 2071 Old Q.No. 5 b Two parallel forces of 40kg wt and 10 kg wt are acting at a distance 40 cm apart. Find their resultant if forces are unlike. [2]
Ans: 30 kg wt

14. 2070 Supp. Q.No. 12 a If two like parallel forces are 16 N and 12 N, find their resultant acting at a distance of 90 cm from the greater force and the distance between the forces. [2]
Ans: 28N, 2.1 m

15. 2070 Set D Q.No. 12 b Find two like parallel forces acting at a distance of 2.5 m apart, which are equivalent to a given force of 30 N. The lines of action of one being at a distance of 50 cm from the given force. [2]
Ans: 24 N and 6 N

16. 2069 (Set A) Q.No. 12b A straight uniform rod is 3 m long. When a load of 10 N is placed at one end it balances about a point 25 cm from that end. Find the weight of the rod. [2]
Ans: 2 N

17. 2069 (Set A) Old Q.No. 6a Two like parallel forces P and Q act at points 18 m apart. If the resultant force be 9 N and acts at a distance of 6 m from P, find Q. [2]
Ans: 3 N

18. 2069 (Set B) Q.No. 12b Replace a force of magnitude 48 kg wt by two unlike parallel forces, one at a distance of 2m and other at 8m from the given force. [2]
Ans: 64 kg.wt. and 16 kg. wt.

19. 2069 Old (Set B) Q.No. 5b Two parallel forces of 30 kg wt and 20 kg wt are acting at a distance 40 cm apart. Find their resultant and its position if forces are like. [2]
Ans: The resultant is 50 kg. wt. parallel to the given forces and acting at a distance of 16 cm from the weight of 30 kg.

20. 2068 Q.No. 6a Find two unlike parallel forces acting at a distance of 12 cm which are equivalent to a force of 20 N, the greater of the two forces being at a distance of 6 cm from the given force. [2]
Ans: 30 N, 10 N

21. 2067 Q.No. 6a Find the resultant of two parallel forces of 15 kg wt. and 10 kg wt acting at a distance 20 cm apart in the same direction. [2]
Ans: 25 kg wt at a distance of 8 cm from 15 kg wt.

22. 2066 C Q.No. 6 b Define a couple. What do you mean by arm of a couple? [2]

23. 2066 Q.No. 6 b A straight weightless rod, 48 cm in length, rests in a horizontal position between two pegs placed at a distance of 6 cm apart, one peg being at one end of the rod, and a weight of 2 kg is suspended from the other end. Find the pressures on the pegs. [2]
Ans: 14 kg wt; 16 kg wt

24. 2065 Q.No 6 b A uniform bar 4m long and weighting 3N passes over a prop and is supported in a horizontal position by a force of 1N acting vertically upwards at the other end. Find the distance of the prop from the centre of the bar. [2]
Ans: 1 m

25. 2064 Q.No. 6 b A straight uniform rod is 3 m long. When a load of 5N is placed at one end, it balances about a point 25 cm from that end. Find the weight of the rod. [2]
Ans: 1 N

26. 2063 Q.No. 6 b Find the two unlike parallel forces acting at a distance of 12 cm which are equivalent to a force of 20 N, the greater of the two forces being at a distance of 6 cm from the given force. [2]
Ans: 10 N and 30 N

27. 2062 Q.No. 5 a Define moment of a force about a point. Give the geometrical meaning of the moment of a force about a point. [2]

28. 2061 Q.No. 6 a A straight uniform rod is 3m long. When a load of 5 N is placed at one end it balances about a point 25 cm from that end. Find the weight of the rod. [2]
Ans: 1 N

29. 2061 Q.No. 6 b Forces equal to 3, 5, 3 and 5 newtons respectively act along the sides of a square taken in order, find their resultant. [2]
Ans: Couple of moment 8a Nm, where a is side of the square

30. 2060 Q.No. 6 a Find two like parallel forces, acting at a distance of 2.5 m apart, which are equivalent to a given force of 30 N, the line of action of one being at a distance of 50 cm from the given force. [2]
Ans: 24 N and 6 N

31. 2060 Q.No. 6 b Define arm of a couple and the moment of a couple. [2]

32. 2059 Q.No. 6 b A uniform bar 4 m long and weighting 3N passes over a prop and is supported in horizontal position by a force of 1 N vertically upwards at the other end. Find the distance of the prop from the centre of the bar. [2]
Ans: 1m

33. 2058 Q.No. 6 a Define a couple. What do you mean by arm of a couple? [2]

34. 2058 Q.No. 6 b A straight uniform rod is 3 m long, when a load of 5 N is placed at one end it balances about a point 25 cm from that end. Find the weight of the road. [2]
Ans: 1 N

35. 2057 Q.No. 6 a Define a couple and the moment of a couple. Express the moment of a couple mathematically. [2]
Ans: Magnitude of one of the forces × arm of the couple

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2057 Q.No. 6 b Replace a force of magnitude 50 kg wt by two like parallel forces one at a distance of 2m and other at 8 m from the given force. [2]

Ans: P = 40 kg wt and Q = 10 kg wt

Marks Questions

7. 2075 Set C Q.No. 13a Two like parallel forces of magnitudes P and Q are acting at the end points A and B of a rod AB of length ℓ. If two opposite forces each of magnitude S are added to P and Q, then prove that the line of action at the new resultant will be displaced through a distance $\frac{S\ell}{P+Q}$. [4]

8. 2071 Supp. Q.No. 13a Forces 1, 2, 4, 5 kg wt act along the sides of a square taken in order. Prove that their resultant is parallel to a diagonal and find where it cuts the side along which the first force acts. [4]

9. 2071 Old Q.No. 13 b Prove that the algebraic sum of the moments of any two parallel forces about any point in their plane is equal to the moment of their resultant about the same point. [4]

10. 2070 Supp. Q.No. 13 a Forces of 6, 5, 4, 3 kg – wts respectively act along the sides of a square ABCD taken in order. Find the magnitude, direction and line of action of their resultant. [4]

Ans: $2\sqrt{2}$ kg wt. parallel to diagonal AC meets at E where BE = $\frac{7a}{2}$ where a = side of a square

11. 2070 (Old) Q.No. 6 a The resultant of two like parallel forces is 12 N and it acts at a distance 2 meter from the larger force equal to 8 N. Find the distance of the resultant from the smaller force. **Ans: 4 m** [4]

12. 2070 (Old) Q.No. 14 a Forces equal to 3,4,5,6 N respectively act along the sides of a square ABCD taken in order, find the magnitude, direction and line of action of their resultant. [4]

Ans: $2\sqrt{2}$ N, 225, x = $\frac{9}{2}$, a = side of square

13. 2069 (Set A) Old Q.No. 14a ABC is an isosceles triangle whose angle A is 120° and forces of magnitude 1, 1 and $\sqrt{3}$ N act along AB, AC and BC, show that the resultant bisects BC and is parallel to one of the other sides of the triangle. [4]

14. 2069 Old (Set B) Q.No. 13b A man carries a bundle at the end of a stick which is placed over his shoulder. If the distance between his hand and shoulder be changed, how does the pressure on his shoulder change? [4]

15. 2068 Q.No. 14 a A light rod of length 72 cm has equal weights attached to it, one at 18 cm from one end and the other at 30 cm from the other end; if it be supported by two vertical strings attached to its ends and if the strings cannot support a tension greater than the weight of 50 kg, what is the greatest magnitude of the equal weight? [4]

Ans: 42.86 kg

16. 2067 Q.No. 14a Define parallel forces. Deduce the resultant of two like parallel forces. [4]

17. 2066 C Q.No. 14 a Prove that the algebraic sum of the moments of any two forces, meeting at a point, about any point in their plane is equal to the moment of their resultant about the same point. [4]

18. 2066 Q.No.14 a Three forces P, 2P and 3P act along the sides AB, BC and CA of an equilateral triangle ABC of side a. Find the magnitude, direction and line of action of the resultant. [4]

Ans: $P\sqrt{3}$ in the direction at right angles to BC and cutting BC produced at D where CD = $\frac{a}{2}$

19. 2065 Q.No 14 a Forces equal to 3P, 4P, 5P act along the sides AB, BC and CA of an equilateral triangle ABC, find the magnitude, direction and line of action of the resultant. [4]

Ans: $P\sqrt{3}$, 90°, passes through at a distance of 3/2 BC from C.

20. 2064 Q.No. 14 a A light rod of length 72 cms has equal weight attached to it, one at 18 cms from one end and the other at 30 cms from the other end. If it is supported by two vertical strings attached to its ends and if the string can not support a tension greater than the weight of 50 kg, what is the greatest magnitude of the equal weights? [4]

Ans: $42\frac{6}{7}$ kg.

21. 2063 Q.No. 14 a Prove that the algebraic sum of the moments of any two like parallel forces about a point in their is equal to the moment of their resultant force about the same point. [4]

22. 2062 Q.No. 14 a The wire passing round a telegraph pole is horizontal and the two portion attached to the pole are inclined at an angle 60° to one another. The pole is supported by a wire attached to the middle point of the pole and inclined at 60° to the horizon; show that the tension of this wire is $4\sqrt{3}$ times that of the telegraph wire. [4]

23. 2061 Q.No. 13 a OR Find the resultant of like parallel forces. [4]

24. 2061 Q.No. 14 a ABCD is a square along AB, CB, AD and DC equal forces, P act. Show that the magnitude of their resultant is equal to double of any component and acts along DC. [4]

25. 2060 Q.No. 14 a Prove that the algebraic sum of moments of two intersecting forces about any point in their plane is equal to the moment of their resultant about the same point. [4]

26. 2059 Q.No. 13 a Find the resultant of two like parallel forces acting on a rigid body. [4]

27. 2058 Q.No. 14 a Prove that the algebraic sum of moments of two like parallel forces, about any point in their plane is equal to the moment of their resultant about the same point. [4]

28. 2057 Q.No. 14 a Prove that the algebraic sum of the moments of any two forces, meeting at a point, about any point in their plane is equal to the moment of their resultant about the same point. [4]

6 Marks Questions

59. 2077 Set G Q.No. 9 Define moment of a force. Also interpret it geometrically. State and prove Varignon's theorem for intersecting forces. [6]

60. 2076 GIE Set A Q.No. 14 ABC is an isosceles triangle where angle A is 120° and force of magnitudes 1N, 1N and $\sqrt{3}$N act along AB, AC and BC; show that the resultant bisects BC and is parallel to one of the two sides of the triangle. [6]

61. 2076 GIE Set B Q.No. 15 Find the resultant of two like parallel forces. [6]

62. 2076 GIE Set B Q.No. 15 OR ABC is an isosceles triangle whose angle A is 120° and forces of magnitudes 1N, 1N and $\sqrt{3}$ N act along AB, AC and BC. Show that the resultant bisects BC and is parallel to one of the other sides of the triangle. [6]

63. 2076 Set B Q.No. 15 Deduce the resultant of two parallel forces. [6]

64. 2076 Set B Q.No. 15 OR Define Moment geometrically. Also state and prove the Varignon's theorem for two intersecting forces. [6]

65. 2076 Set C Q.No. 14 Forces equal to P, 2P, 3P and 4P act along the sides of a square ABCD taken in order, find the magnitude, direction and the line of action of the resultant. [6]

Ans: $2\sqrt{2}$ P, resultant is parallel to CA, $x = \frac{3a}{2}$

66. 2075 GIE Q.No. 14 Define moments of a force. Give its geometrical interpretation. Also state and prove Varignon's theorem for parallel forces. [6]

67. 2075 Set A Q.No. 15 P and Q (P>Q) are two like parallel forces acting at A and B. Show that if they interchange positions, the point of application of the resultant is displaced a distance $\frac{P-Q}{P+Q}$ AB. [6]

68. 2075 Set A Q.No. 15 OR Three forces P, 2P and 3P act along the sides AB, BC and CA of an equilateral triangle ABC of side a; find the magnitude, direction and the line of action of the resultant. [6]

Ans: $P\sqrt{3}$ in the direction at right angles to BC and cutting BC produced at D where CD = $\frac{a}{2}$, a = side of an equilateral triangle

69. 2075 Set B Q.No. 14 Prove that the algebraic sum of the moments of two intersecting forces about a point in their plane is equal to the moment of their resultant about the same point. [6]

70. 2075 Set B Q.No. 14 OR Define the moment of a force, Forces 1, 2, 4, 5 kg wt act along the sides of a square taken in order. Prove that their resultant is parallel to a diagonal and find where it cuts the side along which the first force acts. [6]

71. 2074 Supp Q.No. 15 Define moment of a force about a point. Prove that the algebraic sum of the moments of two like parallel forces about any point in their plane is equal to the moment of their resultant about the same point. [6]

72. 2074 Set A Q.No. 14 Define the moment of a force. Prove that the algebraic sum of the moments of two parallel forces about a point in their plane is equal to the moment of their resultant about the same point. [6]

73. 2074 Set B Q.No. 14 Define moment of a force about a point. State and prove Varignon's theorem for two interesting forces. [6]

74. 2073 Supp Q.No. 14 Define parallel forces. Deduce the resultant of two parallel forces. [6]

75. 2073 Supp Q.No. 14 OR Geometrically interpret moment of a force. Also state and prove Varignon's theorem. [6]

76. 2073 Set C Q.No. 15 Define like and unlike parallel forces. A man carries a bundle at the end of a stick which is placed over his shoulder, if the distance between his hand and shoulder be changed how does the pressure on his shoulder change? [6]

77. 2073 Set D Q.No. 15 Forces equal to P, 2P, 3P and 4P act along the sides of a square ABCD taken in order. Find the magnitude, direction and the line of action of the resultant. [6]

Ans: $2\sqrt{2}$ P, resultant is parallel to CA, $x = \frac{3a}{2}$

78. 2072 Supp. Q.No. 15 Define moment of a force about a point. What does it represent geometrically? Prove that the algebraic sum of the moments of two intersecting forces about any point in their plane is equal to the moment of their resultant about the same points. [6]

79. 2072 Set C Q.No. 14 Three forces P, 2P and 3P act along the sides AB, BC and CA of an equilateral triangle of side a, find the magnitude, direction and line of action of the resultant. [6]

Ans: $P\sqrt{3}$ in the direction at right angles to BC and cutting BC produced at D where CD = $\frac{a}{2}$, a = side of an equilateral triangle

80. 2072 Set C Q.No. 14 OR Define moment. State and prove Varignon's theorem. [6]

81. 2072 Set D Q.No. 14 Define coplanar forces. Forces equal to P, 2P, 3P and 4P act along the sides of a square ABCD taken in order, find the magnitude, direction and the line of action of the resultant. [6]

Ans: $2\sqrt{2}$ P, resultant is parallel to CA, $x = \frac{3a}{2}$

82. 2072 Set E Q.No. 15 Find the resultant of two like parallel forces. [6]

83. 2072 Set E Q.No. 15 OR ABCD is a square; along AB, CB, AD and DC equal forces P act; show that the magnitude of their resultant is equal to double of any components and acts along DC. [6]

84. 2071 Set C Q.No. 15 Three forces p, 2p and 3p act along the sides AB, BC and CA of an equilateral triangle ABC. Find the magnitude, direction and line of action of the resultant. [6]

Ans: $p\sqrt{3}$ in the direction at right angles to BC and cutting BC produced at D where CD = $\frac{a}{2}$, a = side of an equilateral triangle

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85. **2071 Set C Q.No. 15 OR** Find the resultant of two unlike parallel forces. A man carries a bundle at the end of a stick 75 cm long which is placed on his shoulder. What should be the distance between his hand and shoulder, in order that the pressure on the shoulder may be three times the weight of the bundle? [6]

Ans: 25 cm

86. **2071 Set D Q.No. 15** Define moment of a force about a point. Prove that the algebraic sum of the moments of two intersecting forces about any point in their plane is equal to the moment of their resultant about the same point. [6]

87. **2070 Set C Q.No. 15** Define moment of a force about a point. Prove that the algebraic sum of the moments of two intersecting forces about any point in their plane is equal to the moment of their resultant about the same point. [6]

88. **2070 Set C Q.No. 15 or** P and Q are like parallel forces. If P is moved parallel to itself through a distance x, show that the resultant of P and Q moves a distance $\frac{P.x}{P+Q}$. [6]

89. **2070 Set D Q.No. 15** Define moment of a force about a point. Prove that the algebraic sum of the moments of the moment of two like parallel forces about any point in their plane is equal to the moment of their resultant about the same point. [6]

90. **2069 (Set A) Q.No. 15** ABC is an isosceles triangle whose angle A is 120° and forces of magnitudes, 1, 1 and $\sqrt{3}$ N act along AB, AC and BC; show that the resultant bisects BC and is parallel to one of the other side of the triangle. [6]

91. **2069 (Set A) Q.No. 15 or** Find the resultant of two like parallel forces. [6]

92. **2069 (Set B) Q.No. 15** Forces equal to 3p, 4p and 5p and along the sides AB, BC and CA of an equilateral triangle ABC, find the magnitude, direction and the line of action of the resultant. [6]

Ans: Resultant = $p\sqrt{3}$ in the direction at right angle to BC. If the resultant cuts BC at D then line of action is given by CD = $\frac{3BC}{2}$

14. DYNAMICS

A. MOTION IN A STRAIGHT LINE

FORMULAE

1. $a = \frac{v-u}{t}$
2. $v = u + at$
3. $s = ut + \frac{1}{2}at^2$
4. $v^2 = u^2 + 2as$
5. $s_t = u + \frac{2t-1}{2}a$

2 Marks Questions

1. **2075 GIE Q.No. 12c** A motor cyclist increases its velocity at the rate of 5 ms^{-2} to 30 ms^{-1} in 4 seconds. Find the initial velocity. [2]

Ans: 10 ms^{-1}

2. **2075 Set C Q.No. 12c** A car moving with a velocity of 20 ms^{-1} has a uniform acceleration of 2 ms^{-2}. If it moves for 2.5 sec, find the final velocity. [2]

Ans: 25 ms^{-1}

3. **2073 Set D Q.No. 12c** An aeroplane land on the runway with a velocity of 108 km/hr. If then its velocity slows down at the rate of 25 m/s^2; find the distance covered by the aeroplane before coming to rest. [2]

Ans: 18 m

4. **2072 Supp. Q.No. 12b** A cyclist travelling with a velocity of 72 km/hr accelerates at the rate of 4m/s^2 until it describes a distance of 48 m. Find the time taken. [2]

Ans: 2 secs

5. **2069 Old (Set B) Q.No. 6a** A car moving with a velocity of 15 ms^{-1} has a uniform acceleration of 2 ms^{-2}. If it moves for 2.5 sec, find its final velocity. [2]

Ans: 20m/s

6. **2063 Q.No. 5 a** A train moving with a velocity of 360 km/hr has the uniform acceleration 40 m/s^2. Obtain the distance covered by the train in $\frac{1}{2}$ minute. [2]

Ans: 18.3 km

4 Marks Questions

7. **2075 Set B Q.No. 13b** A car starting from rest, moves with uniform acceleration and describes the first kilometer in 3 minutes. If it now moves with uniform velocity, how long will it take to describe another kilometer? [4]

Ans: 1 minute 30 seconds

8. **2070 Set D Q.No. 13 b** If a, b, c be the spaces described by a particle during the p^{th}, q^{th}, r^{th} seconds of its motion respectively, prove that: $a(q-r) + b(r-p) + c(p-q) = 0$ [4]

9. **2070 (Old) Q.No. 13 b** A body moves along a straight line with uniform acceleration. The body covers a distance of 18 m in the first three seconds and 22 m in the next 5 seconds. Find the velocity at the end of 10 seconds and the distance covered in 10^{th} second. [4]

Ans: 2.6 m/sec, 2.8 m

10. **2069 (Set A) Old Q.No. 13b** Prove that for a particle moving with uniform acceleration 'a' in a straight line is $a = \frac{2\left(\frac{s'}{t'} - \frac{s}{t}\right)}{t + t'}$ where s is the space described in t sec. and s' during the next t' seconds. [4]

11. **2068 Q.No. 13 b** If a, b, c be the spaces described by a particle during the p^{th}, q^{th} and r^{th} second of its motion respectively, prove that: $a(q-r) + b(r-p) + c(p-q) = 0$ [4]

12. **2066 C Q.No. 13 b** If a, b, c be the space described by a particle during the p^{th}, q^{th} and r^{th} seconds of its motion respectively, prove that: $a(q-r) + b(r-p) + c(p-q) = 0$. [4]

13. 2065 Q.No. 13 b Prove that for a particle moving with uniform acceleration a in a straight line

$a = \frac{2\left(\frac{s'}{t'} - \frac{s}{t}\right)}{t + t'}$, where s is the space described in t seconds and s' during the next t' seconds [4]

14. 2064 Q.No. 13 b If a, b, c, are the spaces described by the particles during the p^{th}, q^{th}, r^{th} seconds of its motion respectively, prove that: $a(q - r) + b(r - p) + c(p - q) = 0$. [4]

15. 2062 Q.No. 13 b A railway train goes from one station to another moving during the first part of the journey with uniform acceleration f, when steam is shut off and the breaks are applied, it moves with retardation f', if 'a' be the distance between the stations, show that the time the train takes is: $\sqrt{\frac{2a(f + f')}{ff'}}$ [4]

16. 2060 Q.No. 13 b A body moves for 3 seconds with a constant acceleration during which it describes 24.30 metres, the acceleration then ceases and during the next 3 seconds, it describes 21.60 metres. Find the initial velocity and the acceleration. [4]

Ans: 9m/s and – 0.6 m/s²

17. 2059 Q.No. 14 a Prove that for a particle moving with uniform acceleration f in a straight line $f = \frac{2\left(\frac{s'}{t'} - \frac{s}{t}\right)}{t + t'}$ where s is the space described in t secs and s' during the next t' secs. [4]

18. 2057 Q.No. 13 b If a, b, c be the space described by a particle during the p^{th}, q^{th} and r^{th} seconds of its motion respectively, prove that $a(q - r) + b(r - p) + c(p - q) = 0$. [4]

6 Marks Questions

19. 2076 GIE Set A Q.No. 15 Prove that for a particle moving with uniform acceleration 'a' in a straight line $a = \frac{2\left(\frac{s'}{t'} - \frac{s}{t}\right)}{(t + t')}$ where 's' is the space described in 't' seconds and s' during the next t' seconds. [6]

20. 2076 GIE Set B Q.No. 14 A car starts from rest and accelerates uniformly for 10 second to a velocity of 8m/s. It then runs at a constant velocity and is finally brought to rest in 64m with a constant retardation. The total distance covered by the car is 584m. Find the acceleration, retardation and total time taken. [6]

Ans: 0.8 ms^{-2}, 0.5 ms^{-2}, 86 seconds

21. 2075 Set A Q.No. 14 A point moving with uniform acceleration describes in the last second of its motion $\frac{9}{25}$ of the whole distance. If it started from rest, how long was it in motion and through what distance did it move, if it described 15 cms in the first second? [6]

Ans: 5 sec, 375 cms

22. 2074 Set A Q.No. 15 A bus starts from station A and stops at station B. The Velocity increases uniformly till it reaches maximum velocity v and then decreases uniformly. Show that the time taken by the bus to run from A to B is 2x/v where x is the distance between the two stations. [6]

23. 2075 Set C Q.No. 14 A point moving in a straight line with uniform acceleration describes a and b metres in successive intervals at time t_1 and t_2 seconds. Prove that the acceleration is $\frac{2(bt_1 - at_2)}{t_1t_2(t_1 + t_2)}$. [6]

24. 2071 Supp. Q.No. 15 A bus starts from station A and stops at station B. The velocity increases uniformly till it reaches maximum velocity v and then decrease uniformly, show that the time taken by the bus to run from A to B is $\frac{2x}{v}$ where x is the distance between the two stations. [6]

25. 2071 Set C Q.No. 14 If a, b, c be the spaces described by a particle during the p^{th}, q^{th}, r^{th} seconds of its motion respectively, prove that: $a(q - r) + b(r - p) + c(p - q) = 0$ [6]

26. 2070 Supp. Q.No. 15 A body starting with initial velocity of 15m/sec, moves with a uniform acceleration of 5 m/sec².
i. What is the velocity after 10 sec?
ii. How far will it in 10 sec?
iii. What will be its velocity when it has traveled 10m?
iv. What will be the distance moved in the 10^{th} second? [6]

Ans: (i) 65 m/s (ii) 400 m (iii) $5\sqrt{13}$ m/s (iv) 62.5 m

27. 2070 Set C Q.No. 14 A railway train goes from one station to another moving during the first part of the journey with uniform acceleration a; when steam is shut off and the brakes are applied, it moves with retardation a^1. If s be the distance between the stations, show that the time, the train takes is $\sqrt{\frac{2s(a + a^1)}{aa^1}}$. [6]

B. MOTION UNDER GRAVITY

FORMULAE

1. Vertically downward motion
   $v = u + gt$; $v^2 = u^2 + 2gh$;
   $h = ut + \frac{1}{2}gt^2$; $h_t = u + \frac{2t - 1}{2}g$
2. Vertically upward motion
   $v = u - gt$; $v^2 = u^2 - 2gh$;
   $h = ut - \frac{1}{2}gt^2$; $h_t = u - \frac{2t - 1}{2}g$

2 Marks Questions

1. 2076 GIE Set B Q.No. 12c A ball thrown up vertically returns to the thrower after 6 seconds. Find the height ascended. [2]

Ans: 45 m

2. 2076 Set B Q.No. 12b A ball is thrown vertically upwards at a rate of 40 ms^{-1}. Find the time taken to attain the maximum height. ($g = 10ms^{-2}$) [2]

Ans: 45

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2075 Set B Q.No. 12c A body falls from rest from the top of a tower and after 5 sec it reaches the ground. Find the striking velocity of the body and height of the tower. [g = 9.8 m/s²] [2]
Ans: 49 m/sec, 122.5 m

2074 Supp Q.No. 12c A stone is projected vertically upwards from the foot of the tower with a velocity just sufficient to carry it to 78.4 m. Find the velocity of the stone with which it is projected. (g = 9.8 m/s²) [2]
Ans: 39.2m/sec

2074 Set B Q.No. 12c If a ball is projected vertically upward at a rate of 40ms^{-1}, find the time taken to attain the maximum height. (g = 10 sm^{-2}) [2]
Ans: 4 sec

2073 Supp Q.No. 12b If a ball is thrown vertically upwards at a rate of 20ms^{-1}, find the time taken to attain the maximum height. (g = 10ms^{-2}) [2]
Ans: 2 sec

7. **2072 Set C Q.No. 12 c** A ball is thrown vertically upwards at a rate of 40 ms^{-2}. Find the time taken to attain the maximum height. (g = 10 ms^{-2}) [2]
Ans: 4 sec

8. **2071 Set D Q.No. 12 c** A ball is thrown vertically upwards with a velocity of 30m/s. Find the time taken by the ball to reach the ground again. (g = 10m/s²) [2]
Ans: 6 sec

9. **2070 Set D Q.No. 12 c** A ball is projected vertically upwards with a velocity of 40 m/s. Find its velocity and position at the end of 3s. (g = 10 m/s²). [2]
Ans: 10m/sec, 75 m

10. **2069 (Set A) Q.No. 12c** A body is projected vertically upwards from the foot of the tower with a velocity just sufficient to carry it to 78.4m. Find the velocity of the stone with which it is projected. (g = 9.8 m/s²) [2]
Ans: u = 39.2 ms^{-1}

11. **2069 (Set A) Old Q.No. 6b** A ball thrown up vertically upwards returns to the thrower after 6 seconds. Find its position after 4 sec. (g = 10 m/s²) [2]
Ans: 5 m below the highest point

12. **2069 (Set B) Q.No. 12c** A ball thrown up vertically return to the thrower after 6 secs. Find the velocity with which it was thrown up. [2]
Ans: 30 m/sec

13. **2069 Old (Set B) Q.No. 6b** A ball is thrown vertically upward at a speed of 4ms^{-1}. Find the maximum height reached and the time taken to attain this height. [2]
Ans: $\frac{4}{5}$m; $\frac{2}{5}$ sec

14. **2068 Q.No. 6b** A stone is projected vertically upwards from the foot of the tower with a velocity just sufficient to carry it to 78.4m. Find the velocity of the stone with which it is projected. (g = 9.8m/s²) [2]
Ans: 39.2 m/sec

15. **2066 Q.No. 5 b** A stone is dropped from a balloon at a height 116.4 m above the ground and it reaches the ground in 6 sec. Find the velocity with which the balloon was rising. [2]
Ans: 10ms^{-1}

16. **2064 Q.No. 5 a** A ball thrown up vertically returns to the thrower after 6 seconds. Find the velocity with which it was thrown up. (g) = 10 m/s²). [2]
Ans: 30 m/sec

17. **2062 Q.No. 5 b** A stone is projected vertically upwards from the foot of the tower with a velocity just sufficient to carry it to 78.4 m. Find the velocity of the stone with which it is projected. (g = 9.8 m/s²). [2]
Ans: 39.2 m/s

18. **2058 Q.No. 5 b** A body is projected vertically with a velocity of 9.8 ms^{-1}, how long it takes to return to the point of projection? (g = 9.8 ms^{-2}). [2]
Ans: 2 sec

4 Marks Questions

19. **2077 Set I Q.No. 8** A particle is projected up from the bottom of an inclined plane with a velocity of 25m/s, while another is dropped from the highest point to slide down the plane as the same moment. If the length of the plane be 200 m and the angle of inclination of the plane with the horizon is 30°, find when and where the two particles will meet. (g = 10m/s²) [4]
Ans: 8 seconds at 40 m from the top

20. **2076 GIE Set A Q.No. 13b** A particle is projected from the bottom up and inclined plane with a velocity of 20m/s while another is dropped from the highest point to slide down the plane at the same moment. If the length of the plane be 120 m and the angle of inclination of the plane with the horizon be 30°, find when and where the two particles will meet. (g = 10m/s²). [4]
Ans: 6 seconds at 30 m from the bottom

21. **2076 Set B Q.No. 13b OR** A stone is dropped into a well and the sound of its striking the water is heard in $4\frac{2}{9}$ seconds. If the velocity of the sound is 352.8 ms^{-1}, find the depth of the well. (g = 9.8 ms^{-2}) [4]
Ans: 78.4 m

22. **2076 Set C Q.No. 13b** A stone is dropped from the top of a tower 200 m high and at the same time another is projected vertically upwards from the ground with a velocity 50ms^{-1}. Find where and when the two will meet? (g = 9.8 ms^{-2}) [4]
Ans: 121.6 m from ground, 4 sec

23. **2074 Set B Q.No. 13b** A stone is dropped from the top of a tower 200m high and at the same time another is projected vertically upwards from the ground with a velocity of 50ms^{-1}. Find where and when the two will meet? (g = 9.8 ms^{-2})[4]
Ans: 121.6 m from ground, 4 sec

24. **2073 Supp Q.No. 13b OR** A stone is dropped form the top of a tower 200 m high and at the same time another is projected vertically upwards form the ground with a velocity of 50ms^{-1}. Find where and when the two will meet? (g = 9.8 ms^{-2}) [4]
Ans: 121.6 m from ground, 4 sec

25. **2073 Set C Q.No. 13b** A body falls from rest from the top of a tower and during the last second it falls $\frac{16}{25}$ th of the whole height. Find the height of the tower. (g = 10ms^{-2}) [4]
Ans: 31.25 m

26. **2071 Old Q.No. 14 a** A stone is dropped into a well and the sound of its striking the water is heard in $4\frac{2}{9}$ seconds. If the velocity of the sound is 352.8 ms^{-1}. Find the depth of the well. ($g = 9.8\ ms^{-2}$) [4]
Ans: 78.4 m

27. **2067 Q.No. 13b** A stone is dropped from the top of a tower 200 m high and at the same time another is projected vertically upwards from the ground with a velocity of 50ms^{-1}. Find where and when the two will meet ($g = 9.8\ ms^{-2}$). [4]
Ans: 121.6 m from ground, 4 sec

28. **2063 Q.No. 13 b** A stone is dropped from the top of a tower 200 m high and at the same time another is projected vertically upwards from the ground with a velocity of 50 m/s. Find where and when the two will meet? ($g = 9.8\ m/s^2$). [4]
Ans: Two stones meet at a height of 121.6 m from the ground after 4 sec.

29. **2061 Q.No. 13 b** A body falls from rest from the top of a tower and during the last second it falls $\frac{16}{25}$ th of the whole height. Find the height of the tower. ($g = 10 m/sec^2$) [4]
Ans: 31.25 m

30. **2058 Q.No. 13 b** A body falls from rest from the top of a tower and during the last second it falls $\frac{16^{th}}{25}$ of the whole height. Find the height of the tower ($g = 10ms^{-2}$). [4]
Ans: 31.25 m

6 Marks Questions

31. **2072 Set E Q.No. 14** A body is projected vertically upward with velocity u and t seconds afterwards another body is projected similarly with the same velocity. Show that they meet a height $\frac{4u^2 - g^2t^2}{8g}$ from the point of projection after $\left(\frac{u}{g} - \frac{t}{2}\right)$ secs from the instant of projection of the second body. [6]

C. MOTION DOWN AN INCLINED PLANE

FORMULAE

1. Projected downward
$v^2 = u^2 + 2g \sin\alpha \cdot l$
$v = u + g \sin\alpha \cdot t$
$l = ut + \frac{1}{2} g \sin\alpha \cdot t^2$
2. Projected upward
$v^2 = u^2 - 2g \sin\alpha \cdot l$
$v = u - g \sin\alpha \cdot t$
$l = ut - \frac{1}{2} g \sin\alpha\, t^2$

2 Marks Questions

1. **2075 Set A Q.No. 12c** A body is projected up an inclined plane with a velocity of 25 m/s. If the inclination of the plane to the horizon be 30°, what length of the plane will it cover after 4 sec? ($g = 10\ m/s^2$) [2]
Ans: 60 m

2. **2073 Set C Q.No. 12b** A particle slides down a smooth inclined plane 10 m long and acquires a velocity of $10\sqrt{2}$ ms^{-1}. Find the inclination of the plane. ($g = 10\ ms^{-2}$) [2]
Ans: 90°

3. **2072 Set D Q.No. 12c** A particle slides down a smooth inclined plane 10 m long and acquires a velocity $10\sqrt{2}$ ms^{-1}. Find the inclination of the plane. ($g = 10\ ms^{-2}$) [2]
Ans: 90°

4. **2072 Set E Q.No. 12b** A ball is projected up a smooth plane with velocity 25m/s. If the inclination of the plane to the horizon be 30°, find the velocity of the ball when it travels a distance of 22.5 m. ($g = 10\ m/s^2$) [2]
Ans: 20 m/sec

5. **2071 Supp. Q.No. 12b** A particle slides from the rest $39.2\sqrt{3}$ m in 4 seconds down a smooth inclined plane. Calculate the angle of inclination of the plane.[$g = 9.8\ m/s^2$][2]
Ans: 60°

6. **2071 Set C Q.No. 12 c** A ball is thrown up an inclined plane with a velocity of 14.7 m/s. Where will the velocity of the ball be 4.9 m/s? Assume that the inclination of the plane to the horizon is 30°. ($g = 9.8\ m/s^2$) [2]
Ans: 19.6 m

7. **2070 Supp. Q.No. 12 b** A particle, projected from the bottom of a smooth inclined plane with a velocity of 19.6 m/s, is just carried to the top in 4 sec; find the inclination of the plane to the horizon and also the length of the plane. [$g = 9.8 m/s^2$]. [2]
Ans: 30°, 39.2 m

8. **2070 Set C Q.No. 12 c** A ball is projected up a smooth inclined plane with velocity 25 m/s. If the inclination of the plane to the horizon be 30°, find the velocity of the ball when it travels a distance of 22.5 m. [$g=10\ m/s^2$]. [2]
Ans: 20 m/s

9. **2066 C Q.No. 5 a** A body slides down an inclined plane 39.24 m long and acquires a velocity of 19.6 m/sec. Find the inclination of the plane. (take $g = 10\ m/sec^2$) [2]
Ans: 29.3°

10. **2065 Q.No 5 a** A particle slides down an inclined plane 20 m long and acquires a velocity of $10\sqrt{2}$ m/sec. Find the inclination of the plane ($g = 10 m/sec^2$). [2]
Ans: 30°

11. **2059 Q.No. 5 b** A particle slides down an inclined plane 30 m. long and acquires a velocity of $\sqrt{300\sqrt{3}}$ ms^{-1}. Find the inclination of the plane. ($g = 10\ ms^{-2}$). [2]
Ans: 60°

4 Marks Questions

12. **2076 Set B Q.No. 13b** A body slides down from rest from the top of a smooth plane of height 44.1 m and inclination 30° with the horizon. Divide the plane into three parts so that the body at the top of the plane may describe each part in equal interval of time. ($g = 9.8\ ms^{-2}$) [4]
Ans: 9.8 m, 29.4 m, 49 m

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2075 GIE Q.No. 13b A body is projected up an inclined plane with a velocity of 25 ms^{-1}. If the inclination of the plane to the horizon be 30°, what length of the plane will it cover after 4 seconds? [4]

Ans: 20 ms^{-1}

2066 Q.No. 13 b A particle slides down from rest from the top of a smooth plane of height 1962 cms and inclination 30° with the horizon. Divide the plane into three parts so that a particle at the top of the plane may describe each part in equal times. ($g = 981\ cm/sec^2$) [4]

Ans: 436 cm, 1308 cm, 2180 cm

4 Marks Questions

2074 Set A Q.No. 15 OR A body slides down a smooth plane whose length is 100 m and height 20 m. Find (i) the velocity of the body when it reaches the bottom of the plane, (ii) time taken by it to reach the bottom of the plane (iii) velocity of the body after 4 seconds. [$g = 10\ m/s^2$] [6]

Ans: (i) 20 m/s (ii) 10 sec (iii) 8 m/s

15. DYNAMICS (CONTINUED)

A. NEWTON'S LAW OF MOTION, IMPULSE

FORMULAE

1. Momentum = mv
   Change in momentum = mv − mu
   Average rate of change of momentum = $\frac{m(v-u)}{t}$
2. Upward force: R = m(a + g)
   Downward force: R = m(g − a)
3. Impulsive force: $F = \frac{d(mv)}{dt}$, as m is constant
4. Principle of conservation of linear momentum
   mv − MV = 0
   $m_1 v_1 + m_2 v_2 = (m_1 + m_2) v$

2 Marks Questions

1. **2076 GIE Set B Q.No. 12b** A body of mass 0.5kg and initially at rest, is subjected to a force of 2N for 1 second. Find the velocity acquired during the second. [2]

   Ans: 4 ms^{-1}

2. **2076 Set B Q.No. 12c** Find the mass of an object which on earth weighs 98 N. ($g = 9.8\ ms^{-2}$) [2]

   Ans: 10 kg

3. **2076 Set C Q.No. 12c** A body of mass 0.5 kg and initially at rest is subject to a force of 2 N for 1 sec. Find the velocity acquired during the second. [2]

   Ans: 4 ms^{-1}

4. **2075 Set A Q.No. 12b** A cart is pushed on a frictionless smooth plane with an average force of 20 N for 5 seconds. If the cart with mass 50 kg is at rest in the beginning, find the velocity acquired by the cart. [2]

   Ans: 2 m/sec

5. **2074 Set A Q.No. 12c** A uniform force of 150 N change the velocity of a body moving in a straight line from 300 to 350 meters per second in 2 minutes. Find the mass of the body. [2]

6. **2073 Supp Q.No. 12c** Find the mass of an object which on earth weights 98N. ($g = 9.8\ ms^{-2}$) [2]

   Ans: 10 kg

7. **2071 Supp. Q.No. 12c** A bullet of mass 25 gm moving 250 m/s penetrating into a tree trunk and is then brought to rest in 0.02 seconds. Find impulse of the force on the bullet. [2]

   Ans: 6.25 kg m/s

8. **2071 Set C Q.No. 12 b** A body of mass 50 kg is falling from a certain height is brought to rest after striking the ground with a speed of 5 m/s. If the resistance force of the ground is 500 N, find the duration of contact. [2]

   Ans: 0.5 sec

9. **2070 Supp. Q.No. 12 c** A bullet of mass 25 gm moving 250 m/s penetrates into a tree trunk and is then brought to rest in 0.02 seconds. Find the distance of penetration of the tree-trunk. [2]

   Ans: 2.5 m

10. **2070 Set C Q.No. 12 b** A cart is pushed on a frictionless smooth plane with an average force of 20 N for 5 seconds. If the cart with mass 50 kg is at rest in the beginning, find the velocity acquired by the cart. [2]

    Ans: 2 m s^{-1}

11. **2070 (Old) Q.No. 6 b** A car of mass 1000 kg is brought to rest by applying a breaking force of 2500 N. Find the average retardation. [2]

    Ans: 2.5 m/s^2

12. **2069 (Set A) Old Q.No. 5b** A bullet of mass 2 kg is fired from a gun of mass 100 kg with a velocity 250 m/sec, find the recoil velocity of the gun. [2]

    Ans: 5 m/sec

13. **2069 Old (Set B) Q.No. 6c** A car of mass 1000 kg is brought to rest by applying a braking forces of 2500 N. Find the average retardation. [2]

    Ans: 2.5 m/sec^2

14. **2068 Q.No. 5b** A constant force of 10N acting on an object reduces its velocity from 15 m/s to 5 m/s in 2 seconds. Find the mass of the object. [2]

    Ans: 2 kg

15. **2067 Q.No. 5b** A bullet fired into a target loses half its velocity after penetrating 6 cm. How much further will it penetrate? [2]

    Ans: 2 cm

16. **2067 Q.No. 6b** State Newton's second law of motion hence define a force. [2]

17. **2066 C Q.No. 6 a** Find the velocity of a 4 kg shot that will just penetrate through a wall 16 cm thick, the resistance being 4 metric tonnes weight. [2]

    Ans: 56 m/sec

18. **2066 Q.No. 6 a** A body of mass 1 kg is falling under gravity at the rate of 28 ms^{-1}. What uniform force will stop it in 0.1 second? ($g = 9.8\ ms^{-2}$) [2]

    Ans: 29 kg wt

19. **2065 Q.No 6 a** The pull of the earth on a body is 49 N. If the acceleration due to gravity is $g = 9.8\ m/sec^2$. Find the mass of the body. [2]

    Ans: 5 kg

20. 2064 Q.No. 6 a Show that Newton's second law of motion gives the measurement of a force. [2]

21. 2062 Q.No. 6 a A constant force of 10 N acting on an object reduces its velocity from 15 ms^{-1} to 5 ms^{-1} in 2 seconds. Find the mass of the object. [2]

Ans: 2 kg

4 Marks Questions

22. 2074 Supp Q.No. 13b A shot of 2 kg is discharged by a gun of mass 400 kg with a velocity of 800 m/s. Find the constant force which would be required to stop the recoil of the gun in $1\frac{1}{4}$ sec. [4]

Ans: 1280 N

23. 2073 Set D Q.No. 13b A mass of 5 kg falls 3 m from rest and is then brought to rest by penetrating 30 cm into some sand. Find the average thrust of the sand on it. [4]

Ans: 55 kg wt

24. 2072 Supp. Q.No. 13b A balloon is rising with a acceleration f. Prove that the fraction of the weight of the balloon which must be emptied out of the balloon in order to double the acceleration is $\frac{f}{g+2f}$. [4]

25. 2072 Set C Q.No. 13b State laws of motion. A body of mass 50 kg falling from a certain height is brought to rest after striking the ground with a speed of 5 ms^{-1}. If the resistance force of ground is 500 N, find the duration of the contact. [4]

Ans: 0.5 sec

26. 2072 Set D Q.No. 13b State laws of motion. Use Newton's Law to define an absolute unit of force. [4]

27. 2072 Set E Q.No. 13b State Newton's laws of motion. Prove that Newton's second law provides the measurement of the force. [4]

28. 2071 Set D Q.No. 13 b A gun of mass 400 kg fires a shot of mass 3 kg, with a velocity of 200 m/s, find the constant force which acting on the gun would stop it after a recoil of 2.5 meters. [4]

Ans: 180 N

29. 2069 (Set A) Q.No. 13b A mass of 5 kg falls 300 cm from rest and is then brought to rest by penetrating 30 cm into some sand, find the average thrust of the sand. [4]

Ans: 55 kg wt.

30. 2069 (Set B) Q.No. 13b State Newton's laws of motion. Show that Newton's second law gives the measurement of a force. [4]

31. 2069 Old (Set B) Q.No. 14a A balloon is raising with an acceleration f. Prove that the fraction of the weight of the balloon which be emptied out of the balloon in order to double the acceleration is $\frac{f}{g+2f}$. [4]

32. 2063 Q.No. 14 b OR State Newton's laws of motion. Show that Newton's second law of motion gives the measurement of a force. [4]

33. 2060 Q.No. 14 b OR A shot whose mass is 40 kg is discharged from a 700 kg gun with a velocity of 140 ms^{-1}. Find the constant force which acts on the gun would stop it after a recoil of 6.4 m. [4]

Ans: 3500 N

34. 2069 Q.No. 14 b A body of mass 1 kg is falling under gravity at the rate of 28 ms^{-1}. What is the uniform force that will stop it in (i) 0.1 sec (ii) 20 cm ($g = 10\ ms^{-2}$). Instead of falling under gravity if the body is moving at the rate of 28 ms^{-1} along a horizontal line, what will be the force required in above two cases? [4]

Ans: (i) 290 N (ii) 80 N and (i) 280 N (ii) 70 N

6 Marks Questions

35. 2077 Set H Q.No. 9 Define laws of motion. A gun of mass 1 metric tonne force a shot of mass 14 kg and recoils up smooth inclined plane, rising to a height of 1.6 m, find the initial velocity of the projectile. [6]

Ans: 400 m /sec

36. 2075 GIE Q.No. 15 State Newton's laws of motion. A force equal to a weight of 1 kg acts on a body continuously for 10 seconds and causes it to distance 10 m in that time, find the mass of the body. [6]

Ans: 49 kg

37. 2073 Set C Q.No. 14 State Newton's Laws of Motion. A bullet of mass 10 g is fired from a gun of mass 3 kg with a velocity 300 kmh^{-1}. Find the velocity of recoil of the gun. [6]

Ans: 1 Kmh^{-1}

B. PROJECTILES

FORMULAE

1. Equations of Motion of a Projectile
   For the vertical motion,
   $v \sin\theta = u \sin\alpha - gt$
   and for the horizontal motion,
   $v \cos\theta = u \cos\alpha$
2. Time to reach the greatest height
   $t = \frac{u \sin\alpha}{g}$
3. Time of Flight and Range
   $T = \frac{2u \sin\alpha}{g}$
   $R = \frac{u^2 \sin 2\alpha}{g}$
4. Maximum horizontal range $= \frac{u^2}{g}$
5. Greatest height: $H = \frac{u^2 \sin^2\alpha}{2g}$

2 Marks Questions

1. 2071 Old Q.No. 6 c A particle is projected at an angle 75° to the horizon with a velocity of 2943 cm/sec. Find the range on a horizontal plane. [2]

Ans: 4330.62 m

2. 2059 Q.No. 6 a If u and α be the velocity and angle of projection of a projectile, then find the time of flight. [2]

Ans: $\frac{2u \sin\alpha}{g}$

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Marks Questions

1. **2076 GIE Set B Q.No. 13b** A projectile thrown from a point in a horizontal plane comes back to the plane in 4 seconds at a distance of 60m in front of the point of projection. Find the velocity of projection. ($g = 10m/s^2$) [4]
   Ans: $u = 25\ ms^{-1}$

2. **2075 Set A Q.No. 13b** If R be the horizontal range and T, the time of flight of a projectile, show that $\tan\alpha = \frac{gT^2}{2R}$ where α is the angle of projection. [4]

3. **2074 Set A Q.No. 13b OR** Find the velocity and the direction of the projection of a shot which passes in a horizontal direction just over the top of a wall which is 250 m off and 125 m high. ($g = 9.8\ m/s^2$) [4]
   Ans: 70 m/s, 45°

4. **2073 Supp Q.No. 13b** Find the velocity and the direction of the projection of a shot which passes in a horizontal direction just over the top of a wall which is 250 m off and 125 m high. ($g = 9.8\ ms^{-2}$) [4]
   Ans: 70 m/s, 45°

7. **2072 Set E Q.No. 13b OR** With what velocity must a body be projected at an angle of 45° from the top of a tower 65 m high, if it is to reach a point on the ground 180 m from the base of the tower. [4]
   Ans: 36 m/sec

8. **2071 Supp. Q.No. 13b** A body thrown from a point in a horizontal plane comes back to the plane in 4 sec at a distance of 58.8 m from the point of projection. Find the velocity of the projection. [$g = 9.8\ m/s^2$] [4]
   Ans: 24.5 m/sec

9. **2071 Set C Q.No. 13 b** A stone is thrown horizontally with velocity $\sqrt{2gh}$ from the top of a tower of height h. Find where it will strike the level ground through the foot of the tower. What will be its striking velocity? [4]
   Ans: 2h, $2\sqrt{gh}$

10. **2071 Old Q.No. 14 b** A ball is thrown by a player from a height of 2 meters, at an angle of 30° with the horizon with a velocity of $18ms^{-1}$, is caught by another player at the height of 0.4 meter from the ground. How far apart were the two players? ($g = 9.8\ ms^{-2}$) [4]
    Ans: $18\sqrt{3}$ m

11. **2070 Supp. Q.No. 13 b** A ball is projected at an angle of 30° to the horizon and land on the surface of height 10 m which is $20\sqrt{3}$ m away from the point of projection. Find the velocity of projection and its striking velocity on the surface. ($g = 10\ m/s^2$) [4]
    Ans: $20\sqrt{2}$ m/s, $10\sqrt{6}$ m/s

12. **2070 Set C Q.No. 13 b** Find the velocity and the direction of projection of a shot which passes in a horizontal direction just over the top of wall which is 250 m off and 125 m high. ($g = 9.8\ m/s^2$) [4]
    Ans: 70 m/s, 45°

13. **2070 (Old) Q.No. 14 b** Find the velocity and direction of projection of a shot which passes in a horizontal direction just over the top of a wall which is 50 meter off and 25 meter high ($g = 9.8\ ms^{-2}$). [4]
    Ans: $14\sqrt{5}$ m/sec, 45°

14. **2069 (Set A) Old Q.No. 14b** A projectile thrown from a point in a horizontal plane comes back to the plane in 4 secs at a distance of 60m infrot of the point of projection, find the velocity of projection. ($g = 10\ ms^{-2}$) [4]
    Ans: $u = 25\ ms^{-1}$

15. **2069 Old (Set B) Q.No. 14b** A ball is thrown from the top of a building towards a tall building $50\sqrt{3}$ m away. The initial velocity of the ball is $20\ ms^{-1}$ at 30° above the horizontal. How far above or below its original level will the ball strike the opposite wall? [4]
    Ans: The ball strikes the opposite wall 75 m below the original level.

16. **2068 Q.No. 14b** The horizontal and vertical components of the initial velocity of a projectile are U and V respectively. If R be the range and the H the greatest height attained, prove that: $\frac{4H}{R} = \frac{V}{U}$ [4]

17. **2067 Q.No. 14b** Find the velocity and direction of projection of a shot which passes in a horizontal direction just over the top of a wall which is 250 m off and 125 m high. ($g=9.8ms^{-2}$)[4]
    Ans: 70 m/sec, 45°

18. **2066 C Q.No. 14 b** A particle is projected with a velocity u. If the greatest height attained by the particle be H, prove that the range of R on the horizontal plane through the point of projection is: $R = 4\sqrt{H\left(\frac{u^2}{2g} - H\right)}$ [4]

19. **2066 Q.No.14 b** Find the velocity and direction of projection of a shot which passes in a horizontal direction just over the top of a wall 250 m off and 125 m high. ($g = 9.8ms^{-2}$) [4]
    Ans: $70\ ms^{-1}$, 45°

20. **2065 Q.No 14 b** If R be the horizontal range and T the time of flight of a projectile, show that $\tan\alpha = \frac{gT^2}{2R}$, where α is the angle of projection. [4]

21. **2064 Q.No. 14 b** A stone is thrown horizontally with velocity $\sqrt{2gh}$ from the top of a tower of height h. Find where it will strike the level ground through the foot of the tower. What will be its striking velocity? [4]
    Ans: 2h, $2\sqrt{gh}$

22. **2063 Q.No. 14 b** A projectile thrown from a point in a horizontal plane comes back to the plane in 4 sec. at a distance of 60m in front of the point of projection. Find the velocity of projection. ($g = 10\ m/s^2$). [4]
    Ans: 25 m/sec.

23. **2062 Q.No. 14 b OR** If R be the horizontal range and T be the time of flight of a projectile, show that $\tan\alpha = \frac{gT^2}{2R}$ where α is the angle of projection [4]

24. 2061 Q.No. 14 b If R be the horizontal range of a projectile and h its greatest height.
Prove that its initial velocity is $\sqrt{2g\left(h+\frac{R^2}{16h}\right)}$. [4]

25. 2060 Q.No. 14 b From a point on the ground at a distance 'x' from the foot of a vertical wall, a ball is thrown at an angle of 45° which just clears the top of the wall and afterwards strikes the ground at a distance 'y' on the other side. Prove that the height of the wall is $\frac{xy}{x+y}$. [4]

26. 2059 Q.No. 14 b OR A particle is projected with a velocity u. If the greatest height attained by the particle be H, prove that the range R on the horizontal plane through the point of projection is $R = 4\sqrt{H\left(\frac{u^2}{2g}-H\right)}$. [4]

27. 2058 Q.No. 14 b If R be the horizontal range and T, the time of flight of a projectile, show that $\tan\alpha = \frac{gT^2}{2R}$, where α is the angle of projection. [4]

28. 2057 Q.No. 14 b If R be the horizontal range of a projectile and h is greatest height, prove that its initial velocity is $\sqrt{2g\left(h+\frac{R^2}{16h}\right)}$. [4]

6 Marks Questions

29. 2077 Set H Q.No. 9 OR A cannon ball has the same range R on a horizontal plane for two different angles of projection. If H and H¹ are the greatest heights and t_1 and t_2 are the time of flight in two paths for which this is possible, prove that: [6]
a. $R^2 = 16HH^1$
b. $R = \frac{1}{2}gt_1t_2$

30. 2077 Set I Q.No. 9 A stone is thrown horizontally with velocity $\sqrt{2gh}$ from the top of a tower of height 'h'. Find where it will strike the level ground through the foot of the tower. What will be its striking velocity? [6]
Ans: 2h, $2\sqrt{gh}$ at 45° to the horizon

31. 2076 Set B Q.No. 14 Find the velocity and direction of projection of a shot which passes in a horizontal direction just over the top of a wall which is 250 m off and 125 m high. ($g = 9.8\ ms^{-2}$) [6]
Ans: u = 70 m/s, α = 45°

32. 2076 Set C Q.No. 15 If R be the horizontal range of a projectile and h its greatest height, prove that its initial velocity is $\sqrt{2g\left(h+\frac{R^2}{16h}\right)}$. [6]

33. 2075 GIE Q.No. 15 OR A ball is thrown upwards at an angle of 30° to the horizon and lands on the top edge of a building that is $10\sqrt{3}$ m away. The top edge is 5 m above the throwing point. How fast was the ball thrown? [6]
Ans: 19.8 m/sec.

34. 2075 Set C Q.No. 14 OR A particle is projected with a velocity u. If the greatest height attained by the particle be H, prove that the range R on the horizontal plane through the point of projection is $R = 4\sqrt{H\left(\frac{u^2}{2g}-H\right)}$. A body is projected with a velocity of 9.8 m/sec and rises upto the height 2.45 m. Find the horizontal range. [6]
Ans: 9.8 m

35. 2074 Supp Q.No. 14 With what velocity must a body be projected at an angle of 45° from the top of a tower 65 m high, if it is to reach a point on the ground 180 m from the base of the tower. Ans: 36 m/sec [6]

36. 2074 Set B Q.No. 15 From a point on the ground at a distance x from the foot of a vertical wall a ball is thrown at an angle of 45° which just clears the top of the wall and afterwards strikes the ground at a distance y on the other side. Prove that the height of the wall is $\frac{xy}{x+y}$. [6]

37. 2073 Set C Q.No. 14OR If R be the horizontal range of a projectile and h is greatest height, prove that its velocity is $\sqrt{2g\left(h+\frac{R^2}{16h}\right)}$. [6]

38. 2073 Set D Q.No. 14 A projectile thrown from a point in horizontal plane comes back to the plane in 4 secs at a distance of 60 m from the point of projection. Find the velocity of the projection. ($g = 10m/s^2$) [6]
Ans: 25 m/sec

39. 2072 Supp. Q.No. 14 From a point on the ground at a distance x from the foot of a vertical wall, a ball is thrown at an angle of 45° which just clears the top of the wall and afterwards strikes the ground at a distance y on the other side. Prove that the height of the wall is $\frac{xy}{x+y}$. [6]

40. 2072 Set C Q.No. 15 If R be the horizontal range of a projectile and h its greatest height, prove that its initial velocity is $\sqrt{2g\left(h+\frac{R^2}{16h}\right)}$. [6]

41. 2072 Set D Q.No. 15 OR Describe motion of a projectile. A stone is thrown horizontally with velocity $\sqrt{2gh}$ from the top of a tower of height h. Find where it will strike the level ground through the foot of the tower and also find the striking velocity. Ans: 2h, $2\sqrt{gh}$ [6]

42. 2071 Set D Q.No. 14 OR A cannon ball has the same range R on a horizontal plane for two different angles of projection. If H and H¹ are the greatest heights in two paths for which this is possible, prove that: $R^2 = 16HH^1$. [6]

43. 2070 Set D Q.No. 14 A projectile thrown form a point in a horizontal plane comes back to the plane in 4 sec. at a distance of 60 m in front of the point of projection. Find the velocity of projection. ($g = 10m/s^2$) Ans: 25 m/sec [6]

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2069 (Set A) Q.No. 14 The horizontal and the vertical components of the initial velocity of a projectile are U and V. If R be the range and H, the greatest height attained, prove that [6]

(a) $\frac{4H}{R} = \frac{V}{U}$ (b) $\left(\frac{R}{U}\right)^2 = \frac{8H}{g}$

2069 (Set B) Q.No. 14a If R be the horizontal range of a projectile and h is greatest height, prove that its initial velocity is $\sqrt{2g\left(h + \frac{R^2}{16h}\right)}$. [6]

C. WORK, ENERGY AND POWER

FORMULAE

1. Work: $W = F \times s$
2. Power: $P = \frac{W}{t} = \frac{F \times s}{t}$
3. Energy
   - i. Kinetic Energy: $KE = \frac{1}{2} mv^2$
   - ii. Potential Energy: $PE = mgh$

2 Marks Questions

1. **2077 Set H Q.No. 7** A car covers a distance of 50 m in 5 sec. against a frictional force. If the power of the engine is 400 w, find the frictional force. [2]
   Ans: F = 400 N
2. **2077 Set I Q.No. 7** A motor boat of 5 HP working at full speed moves at the rate of 36 kmh^{-1}. What is the resistance of water to its motion? [2]
   Ans: 500 N
3. **2076 GIE Set A Q.No. 12c** Just before striking the ground, a mass of 2kg has a kinetic energy of 400 Joule. What is the velocity of the mass of that time? [2]
   Ans: 20ms^{-1}
4. **2073 Set C Q.No. 12c** How large a force is required to cover a distance of 80m if the total work done is 800J? [2]
   Ans: 10 N
5. **2072 Set E Q.No. 12c** Calculate the power of a pump which can lift 300 kg of water through a vertical height of 4m in 10 secs. ($g = 10\ m/s^2$) [2]
   Ans: 1200 w
6. **2071 Old Q.No. 6 b** A car is moving at 36km/h. What velocity will double its kinetic energy? [2]
   Ans: $10\sqrt{2}$ m/s
7. **2063 Q.No. 6a** A pump having a power of 294 w pumps water at the rate of 90 liters per minute. Find the height to which the water is raised. ($g = 9.8\ m/s^2$, 1 litre of water = 1 kg) [2]
   Ans: 20 m
8. **2061 Q.No. 5 b** A car of mass 1000 kg. moves up an incline of 30° at a constant speed of 20 m/sec. If the frictional force is 2000N, calculate the power developed by the engine. ($g = 10\ m/sec^2$). [2]
   Ans: 140 kw
9. **2060 Q.No. 5 b** A car covers a distance of 50m in 5 secs against a frictional force. If the power of the engine is 4000 watts, find the frictional force. [2]
   Ans: 400 N
10. **2059 Q.No. 6 c** A car is moving at 36 kmh^{-1}. What velocity will double its kinetic energy? [2]
    Ans: $10\sqrt{2}$ ms^{-1}
11. **2057 Q.No. 5 b** Calculate the power of a pump which can lift 300 kgs of waters through a vertical height of 4m in 10 secs. [$g = 10m\ s^{-2}$] [2]
    Ans: 1200 watt

4 Marks Questions

12. **2076 GIE Set B Q.No. 13OR** 800 kg of air, moving at 20m/s imping on the vanes of a windmill every second. At what rate in kilowatt is the energy arriving at the wind mill? What is the maximum mass of water that could be pumped each second through a vertical height of 2.5m? ($g = 10m/s^2$)
    Ans: 160 kw, 6400 kgs^{-1}
13. **2075 Set A Q.No. 13b OR** Define K.E. and P.E. of a body. Prove that the change in the K.E. of a body is equal to the work done by the force. [4]
14. **2075 Set C Q.No. 13b** A bullet of mass 100 g is fired into a target with a velocity of 500 ms^{-1}. The mass of the target is 4.9 kg and is free to move; find the loss of kinetic energy by the impact. [4]
15. **2074 Supp Q.No. 14 OR** A bullet passes through two planks in succession. Its initial velocity is 1200 m/s and it loses a velocity of 200 m/s in penetrating through each plank. Find the ratio of the thickness of the planks, assuming that they offer the same average resistance. [4]
    Ans: 11:9
16. **2074 Set A Q.No. 13b** A particle is allowed to slide down a smooth inclined plane. Show that the sum of its kinetic and potential energies is always constant throughtout its motion.[4]
17. **2072 Set C Q.No. 13b OR** State the principle of conservation of energy. Also prove that the sum of the kinetic and potential energies of a moving body remains constant throughout the motion. [4]
18. **2071 Supp. Q.No. 13b OR** A particle is allowed to slide down a smooth inclined plane. Show that the sum of its kinetic and potential energies is always constant throughout its motion.[4]
19. **2071 Set C Q.No. 13 b OR** Find the H.P. of an engine which can travel at the rate of 144 km/hr up an incline of 1 in 200, the mass of the engine and load being 15 metric tons and the resistance due to friction etc. being 15 kg weight per metric ton. ($g = 10\ m/sec^2$). **Ans: 160.83** [4]
20. **2071 Old Q.No. 14 b OR** Define work, power and energy. Prove that the sum of the kinetic and potential energy of a freely falling body remains constant throughout the motion. [4]
21. **2070 Supp. Q.No. 13 b OR** A particle is slide down a smooth inclined plane. Show that the sum of its kinetic and potential energies always constant throughout its motion. [4]
22. **2070 Set C Q.No. 13 a or** A bullet passes through two planks in succession whose initial velocity is 1200 m/s and loses a velocity of 200 m/s in penetrating each plank. Find the ratio of the thickness of the planks assuming that they offer the same average resistance. **Ans: 11:9** [4]

23. **2070 (Old) Q.No. 14 b Or** A shot of mass m is projected from a gun of mass M by an explosion which generates a kinetic energy E. Show that the gun recoils with a velocity $\sqrt{\frac{2mE}{M(M+m)}}$. [4]

24. **2069 (Set A) Q.No. 13b or** Define work done by a force. Prove that the change in kinetic energy of a body is equal to the work done by the force. [4]

25. **2069 (Set A) Old Q.No. 14b or** Define work and energy. Prove that the sum of the kinetic and potential energies of a freely falling body at any instant is constant. [4]

26. **2069 Old (Set B) Q.No. 14b Or** What do you mean by the principle of conservation of energy? Verify its validity for a body falling under gravity. [4]

27. **2068 Q.No. 14 b Or** If a force be applied on the body, prove that the change in kinetic energy of a body is equal to the work done by the force. [4]

28. **2067 Q.No. 14b OR** A bullet of mass 200 gm is fired into a target with a velocity of 500 ms^{-1}. If the man of the target is 4.8 kg and in free to move, find the loss of kinetic energy by the impact. [4]
Ans: 24,000 Joules

29. **2066 Q.No.14 b OR** A bullet loses $1/20^{th}$ of its velocity in passing through a plank. Find how many such uniform planks it would pass through before coming to rest assuming the retardation to be uniform. [4]
Ans: $10\frac{10}{39}$

30. **2066 C Q.No. 14 b OR** An engine pumps 746 litres of water per minute from a well through an average height of 60 m. Find the horse power of the engine if 50% of the power is wasted. (1 litre of water = 1 kg, g = 10 m /sec^2) [4]
Ans: 20 HP

31. **2065 Q.No 14 b OR** State and prove the Principle of Conservation of Energy. [4]

32. **2064 Q.No. 14 b OR** If a force acts on a body, prove that the change in kinetic energy of a body is equal to the work done by the force. [4]

33. **2062 Q.No. 14 b** An engine pumps 746 liters of water per minute from a well through an average height of 60m. Find the horse power of the engine if 50% of the power is wasted. (1 liter of water = 1 kg., g = 10 m/s^2) [4]
Ans: 20 HP

34. **2061 Q.No. 14 b OR** State the principle of conservation of energy. Illustrate it with the consideration of a body sliding down a smooth inclined plane. [4]

35. **2058 Q.No. 14 b OR** "The change in kinetic energy of a body is equal to the work done by the acting force". Prove this statement. [4]

36. **2057 Q.No. 14 b OR** Define work, power and energy. Prove that the sum of the kinetic and potential energies of a freely falling body remains constant throughout the motion. [4]

6 Marks Questions

37. **2077 Set I Q.No. 9 OR** Define energy. State principle of conservation of energy. Also prove that the sum of the Kinetic and Potential energies of a falling body remains constant throughout the motion. [6]

38. **2076 GIE Set A Q.No. 15 OR** A bullet of mass 'm' moving with velocity 'u' strikes a block of mass 'm' which is free to move in the direction of the bullet and is embedded in it. Show that the loss of Kinetic Energy is $\frac{1}{2}\frac{Mm}{M+m}u^2$. [6]

39. **2076 Set C Q.No. 15 OR** A bullet passes through two planks in succession. Its initial velocity is 1200 m/s and it loses a velocity of 200 m/s in penetrating through each plank. Find the ratio of the thickness of the planks, assuming that they offer the same average resistance. [6]
Ans: 11 : 9

40. **2075 Set B Q.No. 15**
a. A rocket expels gas at the rate of 0.4 kg/s. If the velocity of the gas is 400 m/s, what is the force produced by the rocket?
b. A particle is projected with a velocity of 49 m/s, at an angle of 30° to the horizon, find the time of flight and the range.
c. A pump having a power of 392 W pumps water at the rate of 100 litres per minute. Find the height to which water is raised. ($g = 9.8\ m/s^2$, 1 litre = 1kg) [6]
Ans: (a) 160 N (b) 5 sec, 212.18 m (c) 24 m

41. **2075 Set C Q.No. 15** Define kinetic energy and potential energy with examples. A shot of mass 'm' is projected from a gun of mass 'M' by an explosion, which generates a kinetic energy E. Find i) the initial velocity of the shot ii) the velocity of the gun. [6]
Ans: (i) $\sqrt{\frac{2ME}{m(m+M)}}$ (ii) $\sqrt{\frac{2ME}{M(m+M)}}$

42. **2074 Set B Q.No. 15 OR** Define energy. State principle of conservation of energy. Also prove that the sum of the kinetic and potential energies of a moving body remains constant throughout the vertical motion. [6]

43. **2073 Supp Q.No. 15** State the principle of conservation of energy. Also prove that the sum of the Kinetic and Potential energies of a moving body remains constant throughout the motion. [6]

44. **2073 Set D Q.No. 14 OR** 800 kg of air, moving at 20 m/s, imping on the vanes of a windmill every second. At what rate in kilowatt is the energy arriving at the windmill? What is the maximum mass of water that could be pumped each second through a vertical height of 2.5 m? ($g = 10\ m/s^2$) [6]
Ans: 160 kw, 6400 kgs^{-1}

45. **2072 Supp. Q.No. 14 OR** Define kinetic and potential energies of a body. Prove that the sum of the kinetic and the potential energies of a freely falling body remains constant throughout the motion. [6]

46. **2072 Set D Q.No. 15** Define energy. State principle of conservation of energy. Also prove that the sum of the kinetic and potential energy of a moving body remains constant throughout the motion. [6]

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7. **2071 Set D Q.No. 14** Define potential energy and kinetic energy of a body. Prove that the sum of the K.E. and P.E. of a freely falling body at any instant is constant. [6]

8. **2070 Set D Q.No. 14 Or** A bullet of mass 20 g is fired horizontally into a suspended stationary wooden block of mass 380 g with a velocity of 200 m/s. What is the common velocity of the bullet and the block if the bullet is embedded into the block? Find the loss of K.E. by the impact. ($g = 10\ m/s^2$) [6]

Ans: 10 m/sec, 380 J

9. **2069 (Set B) Q.No. 14a Or** A car of mass 2000 kg moves up an inclined plane at an angle 30° to the horizon at a constant speed of 20 m/s. If the frictional force is 2000 N, calculate the power developed by the engine ($g = 10\ m/s^2$). [6]

Ans: 240 kw

16. LINEAR PROGRAMMING

A. GRAPHICAL METHOD

1. If the inequality contains < or > sign, dotted line is used to represent the boundary line as it is not included in the solution set.
2. If the inequality contains ≤ or ≥ sign, dark (bold) line is used to represent the boundary line as it is included in the solution set.
3. Mathematical Model of Linear Programming Problem
   The linear programming problem can be written as
   Optimize $(z) = ax_1 + bx_2 + c$ (objective function)
   subject to the set of constraints
   $a_{11}x_1 + a_{12}x_2$ (< or ≤ or > or ≥) b_1
   $a_{21}x_1 + a_{22}x_2$ (< or ≤ or > or ≥) b_2
   The non-negative constraints
   $x_1 \geq 0, x_2 \geq 0$

2 Marks Questions

1. **2077 Set I Q.No. 10** Find the vertices of the feasible region determined by the constraints $3x + 2y \leq 24$, $x + y \leq 20$, $x \geq 0, y \geq 0$. [2]
2. **2076 GIE Set A Q.No. 16a** Shade the feasible reason under the constraints $x + y \leq 6$, $x \leq 4$, $y \leq 4$, $x, y \geq 0$ [2]
3. **2076 GIE Set B Q.No. 16a** Find the feasible region determined by the following inequalities: $x + y \leq 6$, $2x + y \geq 8$, $y \geq 0$ [2]
4. **2076 Set B Q.No. 16a** In graph shade the feasible region under the constraints $2x + y \leq 40$, $x + 2y \leq 50$, $x \geq 0, y \geq 0$. [2]
5. **2076 Set C Q.No. 16a** Graphically shade the feasible region for the constraints $x + 2y \leq 7$, $x - y \leq 4$, $x, y \geq 0$. [2]
6. **2075 GIE Q.No. 16a** Find the feasible region graphically determined by the constraints y, $x \geq 0$, $y - x \leq 4$, $1 \leq x \leq 6$. [2]
7. **2075 Set A Q.No. 16a** Find the feasible region determined by the inequalities $x + y \leq 6$, $x - y \geq -2$, $x \geq 0$, $y \geq 0$. [2]
8. **2075 Set B Q.No. 16a** Determine graphically the solution set of $2x + y \geq 2$, $x \geq 0$, $y \geq 0$. [2]
9. **2075 Set C Q.No. 16a** Shade the feasible region bounded by $x + y \leq 6$, $x, y \geq 0$. [2]
10. **2074 Supp Q.No. 16a** Find the feasible region determined by the inequalities $3x + 4y \leq 24$, $0 \leq y \leq 4$, $0 \leq x \leq 7$. [2]
11. **2074 Set A Q.No. 16a** Determine graphically the solution set of the inequality $x - 3y \leq 3$. [2]
12. **2074 Set B Q.No. 16a** Shade the feasible region under the constraints: $2x + y \leq 40$, $x + 2y \leq 50$, $x, y \geq 0$ [2]
13. **2073 Supp Q.No. 16a** Write the procedure of solving a linear programming problem by the graphical method. [2]
14. **2073 Set C Q.No. 16a** Find the vertices of the feasible region under the constraints: $3x+2y \leq 48$, $x+y \leq 20$; $x, y \geq 0$. [2]

Ans: (0, 0), (16, 0), (8, 12) and (0, 20)

15. **2073 Set D Q.No. 16a** Find the feasible region determined by the inequalities: $2x + y \leq 8$, $x + 2y \leq 10$, $x, y \geq 0$. [2]
16. **2072 Supp. Q.No. 16a** Find the vertices of the feasible region determined by the following inequalities:
    $2x + y \leq 8$, $x + 2y \leq 10$ and $x, y \geq 0$. [2]

Ans: (0, 0), (4, 0), (2, 4) and (0, 5)

17. **2072 Set C Q.No. 16a** Shade the feasible region for the constraints $x + 2y \leq 7$, $x, y \geq 0$ [2]
18. **2072 Set D Q.No. 16a** Draw the graph of the inequality: $3x - 3 \leq 5x - y$. [2]
19. **2072 Set E Q.No. 16a** Determine the feasible region bounded by the following system of inequalities:
    $x + y \leq 6$, $2x + y \geq 8$, $y \geq 0$. [2]
20. **2071 Supp. Q.No. 16a** Determine graphically the solution set of the inequality $x - 5y \leq 5$. [2]
21. **2071 Set C Q.No. 16 a** Determine the feasible region of the following system of inequalities:
    $2x + y \leq 8$, $x + 2y \leq 10$, $x, y \geq 0$ [2]
22. **2071 Set D Q.No. 16 a** Determine graphically the feasible region determined by the following inequalities:
    $3x + 4y \leq 24$, $x \geq 2$, $y \geq 1$ [2]
23. **2070 Supp. Q.No. 16 a** Determine graphically the solution set of the inequality: $2x - 3y \leq 6$. [2]
24. **2070 Set C Q.No. 16 a** Draw the graph of the following inequalities: $3x + 4y \leq 24$, $0 \leq y \leq 4$, $0 \leq x \leq 7$. [2]
25. **2070 Set D Q.No. 16 a** Draw the graph of the following inequalities: $x + y \leq 6$, $2x + y \geq 8$, $y \geq 0$. [2]
26. **2069 (Set A) Q.No. 16a** Shade the feasible region determined by the following inequalities: $3x + 2y \leq 12$, $x + y \leq 5$, $x, y \geq 0$ [2]
27. **2069 (Set B) Q.No. 16a** Shade the feasible region determined by the inequalities: $x+2y \leq 10$, $x + y \leq 6$, $x, y \geq 0$. [2]
28. **2068 Q.No. 3c** Determine the half plane represented b y the inequality $y - x \geq 1$ [2]
29. **2067 Q.No. 3 c** Solve graphically: $x - y \leq 0$ and $x \geq 0$ [2]
30. **2066 Q.No. 3c** Determine the half plane given by the inequality $y \geq -x$. [2]
31. **2065 Q. No. 3 c** Solve graphically: $y \geq 2x - 1$ [2]

32. 2062 Q.No. 3c Determine the half plane given by the inequality. $2x - y < 2$, graphically. [2]

33. 2061 Q.No. 3c Solve graphically: $x \geq y$ and $x \geq -y$ [2]

34. 2060 Q.No. 3c Graphically show the solution of $x-y-3>0$. [2]

35. 2059 Q.No. 3c Determine the solution set of $2x-1>4x+3$ [2]
Ans: $x < -2$

36. 2058 Q.No. 3c Determine the half plane given by the inequality $2x - y < 2$. [2]

37. 2057 Q.No. 3c Find the solution set of $4x + 3 \geq 2x - 1$. [2]
Ans: $\{x : x \geq -2, x \in R\}$

38. 2056 Q.No. 3c Graph the half plane given by: $y - x \geq 1$ [2]

4 Marks Questions

39. 2068 Q.No. 14 b Find the maximum and the minimum values of the objective function $F = 16x - 2y + 40$ subjected to $3x + 4y \leq 24$, $0 \leq y \leq 4$, $0 \leq x \leq 7$. [4]
Ans: Max: 152 at (7,0); Min: 32 at (0,4)

40. 2067 Q.No. 14 b Find the extreme values of the objective function $10x + 15y$ subject to constraints:
$x + 2y \leq 25$, $2x + y \leq 20$, $x \geq 3$, $y \geq 4$ [4]
Ans: Max.: 200 at (5, 10); Min: 0 at (0, 0)

41. 2066 Q.No. 14 b How does a linear inequality differ from the linear equation? Determine the maximum and minimum value of the function $\Phi(x, y) = 16x - 2y + 40$ subject to $3x + 4y \leq 24$, $0 \leq x \leq 7$, $0 \leq y \leq 4$. [4]
Ans: Max: 152 at (7,0); Min: 32 at (0,4)

42. 2065 Q. No. 14 b Determine the extreme value of the functions $F(x, y) = x + y + 100$ subject to the constraints: $y - x \geq 1$; $y - x \leq 4$ and $1 \leq x \leq 6$ [4]
Ans: Max. 116

43. 2064 Q.No. 14 b Graph the following systems of inequalities and find the vertices where they exist:
$x + 2y \leq 20$, $x + y \leq 16$, $x \geq 0$ [4]
Ans: [(16, 0) (12, 4), (0, 10); region is unbounded]

44. 2063 Q.No. 14b Graph the following system of inequalities to find maximum and minimum of the objective function
$F = 16x - 2y + 40$; $3x + 4y \leq 24$, $0 \leq y \leq 4$, $0 \leq x \leq 7$ [4]
Ans: maximum value of F = 152 at (7, 0) and minimum value of F = 32 at (0, 4)

45. 2062 Q.No. 14b Maximize: $F = 50x + 15y$, subject to $x + y \leq 60$, $5x + y \leq 100$, $x \geq 0$, $y > 0$ [4]
Ans: Max. value of F = 1250 at (10, 50) and Min. value of F = 0 at (0, 0)

46. 2061 Q.No. 14b Maximize and minimize the function $F = 34x + 6y$ subject to the constraints $x + y \geq 1$, $x + y \leq 6$ and $1 \leq x \leq 3$ [4]
Ans: Max. value of F = 120 at (3, 3); Min. value of F = 34 at (1, 0)

47. 2060 Q.No. 14b Maximize and minimize $F = 10x + 15y$ subject to $x + 2y \leq 20$, $x + y \leq 16$, $x \geq 0$, $y \geq 0$ [4]
Ans: Max. value = 180 at (12, 4); Min. value = 0 at (0, 0)

48. 2059 Q.No. 14b Maximize and minimize the function $F(x, y) = 9x + 7y$
Subject to constraints $x + 2y \leq 7$, $x - y \leq 4$; $x \geq 0$; $y \geq 0$ [4]
Ans: Max. value = 52 at (5, 1) Min. value = 0 at (0, 0)

49. 2058 Q.No. 14b Maximize and minimize the function $F = 9x + 40y$ subject to constraints $y - x \geq 1$, $x + y \leq 3$, $2 \leq x \leq 5$. [4]
Ans: Max. value = 366 at (5, 8) Min. value = 138 at (2, 3)

50. 2057 Q.No. 14b Find the extreme values of the function $G(x, y)$ defined by $G(x, y) = 10x + 15y$ over the convex polygon given by the inequalities. $x + 2y \leq 20$; $x + y \leq 16$; $x \geq 0$; $y \geq 0$ [4]
Ans: Max. value = 180 at (12, 4) Min. value = 0 at (0, 0)

51. 2056 Q.No. 14b Maximize and minimize the function $F(x, y) = 9x + 7y$.
Subject to constraints $x + 2y \leq 7$; $x - y \leq 4$; $x \geq 0$; $y \geq 0$. [4]

6 Marks Questions

52. 2074 Set A Q.No. 10 A small industry manufactures necklaces and bracelets. The combined number of necklace and bracelets that it can handle per day is not more than 24. Each bracelet takes 1 hour of labour to make and each necklace takes a half hour. The total number of hours of labour available does not exceed 16. If the profit on the necklace is Rs. 80 and the profit on the bracelet is Rs. 50. How many of each product should be produced daily to maximize profit? [6]
Ans: 8 and 16

B. SIMPLEX METHOD

FORMULAE

Summary of the Simplex Method (Maximization)

1. Convert the constraints to equations by adding slack variables.
2. Create the initial simplex tableau.
3. Locate the most negative entry in the last row. The column for this entry is called the **entering column**. If ties occur, we can use any one column for pivot column.
4. The **departing row** corresponds to the smallest non-negative ratio $\frac{b_i}{a_{ij}}$. If all entries in the entering column are 0 or negative, then there is no maximum value.
   For ties, choose either entry. The element in the entering column and departing row is pivot.
5. Use elementary row operations to make pivot 1 and all other entries in the entering column 0.
6. If all the entries in the last row are non-negative then the optimal solution is obtained. If not, repeat step 3 to 5 until the entries in the last row are all non-negative.

The Simplex Method (Minimization)

A LPP of minimizing the objective function must have the constraints in the form of $\geq$. We solve minimization problem by converting it into maximization problem and use the method stated above.

A minimization problem in standard form is

$Z = c_1x_1 + c_2x_2 + \ldots + c_nx_n$ (objective function)

subject to the constraints

$a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n \geq b_1$

$a_{21}x_1 + a_{22}x_2 + \ldots + a_{2n}x_n \geq b_2$

$\vdots \quad \vdots \quad \vdots \quad \vdots$

$a_{m1}x_1 + a_{m2}x_2 + \ldots + a_{mn}x_n \geq b_m$

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where $x_i \geq 0$, i = 1, 2 ... n
$b_i \geq 0$, i = 1, 2 ... m

Step I: Write the augmented matrix

$$A = \left[\begin{array}{cccc|c} a_{11} & a_{12} & \dots & a_{1n} & b_1 \\ a_{21} & a_{22} & \dots & a_{2n} & b_2 \\ \vdots & \vdots & & \vdots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} & b_m \\ \hline c_1 & c_2 & \dots & c_n & 0 \end{array}\right]$$

Step II: Find the transpose of the matrix A.

$$A^T = \left[\begin{array}{cccc|c} a_{11} & a_{12} & \dots & a_{m1} & c_1 \\ a_{12} & a_{22} & \dots & a_{m2} & c_2 \\ \vdots & \vdots & & \vdots & \vdots \\ a_{1n} & a_2 & \dots & a_{mn} & c_n \\ \hline b_1 & b_2 & \dots & b_m & 0 \end{array}\right]$$

Step III: Form the dual maximization problem as follows

Maximize: $w = b_1y_1 + b_2y_2 + \dots + b_ny_n$

subject to

$a_{11}y_1 + a_{21}y_2 + \dots + am_1y_m \leq c_1$

$a_{12}y_1 + a_{22}y_2 + \dots + am_2y_m \leq c_2$

$a_{1n}y_1 + a_{2n}y_2 + \dots + a_{mn}y_m \leq c_n$

where $y_i \geq 0$, i = 1, 2 ... m

Step IV: Apply the simplex method to the dual maximization problem. The maximum value of w will be the minimum value z. The values $x_1, x_2 \dots x_n$ will occur in last row of the final simplex tableau.

4 Marks Questions

1. **2075 Set B Q.No. 17a** Using the simplex method, maximize $p = x + 3y$ subject to constraints $x + y \leq 4, x - y \leq 1, x \geq 0, y \geq 0$. [4]
Ans: Max. p = 12 at x = 0, y = 4

6 Marks Questions

2. **2077 Set G Q.No. 12** Using Simplex method, maximize $Z = 3x + 5y$ subject to constraints $3x + 2y \leq 18, x \leq 4, y \leq 6$ and $x, y \geq 0$. [6]
Ans: Max. Z = 36 at x = 2 and y = 6

3. **2077 Set I Q.No. 12** Using Simplex method, maximize $Z = 50x_1 + 80x_2$ subject to constraints $x_1 + 2x_2 \leq 32, 3x_1 + 4x_2 \leq 84, x_1 \geq 0, x_2 \geq 0$. [6]
Ans: Max. Z = 1480 at x = 0, y = 6

4. **2076 GIE Set A Q.No. 18** Using Simplex method, maximize: $z = 14x + 4y$ subject to $2x + y \leq 3, x - y \leq 1, x \geq 0, y \geq 0$ [6]
Ans: Max. z = 20 at $x = \frac{4}{3}$ and $y = \frac{1}{3}$

5. **2076 GIE Set B Q.No. 18** Using Simplex method, maximize $U = 25x + 45y$ subject to $x + 3y \leq 21, 2x + 3y \leq 24, x, y \geq 0$ [6]
Ans: Max U = 345 at x = 3, y = 6

6. **2076 Set B Q.No. 18** By Simplex method maximize $F = 15x_1 + 10x_2$ subject to $2x_1 + x_2 \leq 10, x_1 + 3x_2 \leq 10; x_1, x_2 \geq 0$. [6]
Ans: Max. F = 80 at $x_1 = 4, x_2 = 2$

7. **2076 Set C Q.No. 18** Solve by Simplex method: Maximize $z = 7x_1 + 5x_2$ subject to $x_1 + 2x_2 \leq 6, 4x_1 + 3x_2 \leq 12, x_1, x_2 \geq 0$.[6]
Ans: Max. z = 21 at $x_1 = 3, x_2 = 0$

8. **2075 GIE Q.No. 18** Using Simplex method, maximize $Z = 9x_1 + x_2$ subject to $2x_1 + x_2 \leq 8, 4x_1 + 3x_2 \leq 18; x_1, x_2 \geq 0$.[6]
Ans: Max. Z = 36 at $x_1 = 4$ and $x_2 = 0$

9. **2075 Set A Q.No. 18** Using simplex method, maximize $U = 25x + 45y$ subject to $x + 3y \leq 21, 2x + 3y \leq 24, x, y \geq 0$. [6]
Ans: Max U = 345 at x = 3, y = 6

10. **2075 Set C Q.No. 18** Using the Simplex method, minimize $W = 3x + 2y$ subject to $2x + y \geq 4, x + 2y \geq 4, x, y \geq 0$. [6]
Ans: Min. $W = \frac{20}{3}$ at $\left(\frac{4}{3}, \frac{4}{3}\right)$

11. **2074 Supp Q.No. 18** Using Simplex method, maximize $P = 50x_1 + 80x_2$ subject to $x_1 + 2x_2 \leq 32, 3x_1 + 4x_2 \leq 84, x_1, x_2 \geq 0$. [6]
Ans: Max. P = 1480 at $x_1 = 20, x_2 = 6$

12. **2074 Set A Q.No. 18 OR** Use the simplex method to maximize $P = x + y$ subject to constraints $x + 2y \leq 6, 3x + 2y \leq 12, x \geq 0, y \geq 0$. [6]
Ans: Max. P = $\frac{9}{2}$ at $x = 3, y = \frac{3}{2}$

13. **2074 Set B Q.No. 18** Apply simplex method to maximize $z = 5x + 3y$ subject to $2x + y \leq 40, x + 2y \leq 50; x, y \geq 0$. [6]
Ans: Max. z = 110 at x = 10 and y = 20

14. **2073 Supp Q.No. 18** Apply Simplex method to maximize $z = 15x_1 + 10x_2$ subject to $2x_1 + x_2 \leq 10, x_1 + 3x_2 \leq 10, x_1, x_2 \geq 0$. [6]
Ans: Max. z = 80 at (4, 2)

15. **2073 Set C Q.No. 18** Maximize $z = 5x_1 + 7x_2$ subject to $2x_1 + 3x_2 \leq 13, 3x_1 + 2x_2 \leq 12; x_1, x_2 \geq 0$ by simplex method. [6]
Ans: Max. z = 31 at $x_1 = 2, x_2 = 3$

16. **2073 Set D Q.No. 18** Using the simplex method, maximum $z = 15x_1 + 10x_2$ subject to $2x_1 + x_2 \leq 10; x_1 + 3x_2 \leq 10; x_1, x_2 \geq 0$. [6]
Ans: Max. z = 80 at $x_1 = 4, x_2 = 2$

17. **2072 Supp. Q.No. 18** Using simplex method, maximize $z = 5x + 3y$ subject to $2x + y \leq 40; x + 2y \leq 50; x, y \geq 0$ [6]
Ans: Max. z = 110 at x = 10, y = 10

18. **2072 Set C Q.No. 18** Solve by Simplex method, the LP problem to maximize $z = 7x + 5y$ subject to $x + 2y \leq 6, 4x + 3y \leq 12, x, y \geq 0$. [6]
Ans: Max z = 21 at (3, 0)

19. **2072 Set D Q.No. 18** Using Simplex method, find the optimal solution of $z = 7x_1 + 5x_2$ subject to $x_1 + 2x_2 \leq 6, 4x_1 + 3x_2 \leq 12, x_1, x_2 \geq 0$. [6]
Ans: 21 at (3, 0)

20. **2072 Set E Q.No. 18** Using Simplex method, Maximize $F = 5x - 3y$ subject to $3x + 2y \leq 6, -x + 3y \geq -4, x, y \geq 0$ [6]
Ans: 10 at (2, 0)

21. **2071 Supp. Q.No. 18** Using the simplex method, maximize $p = 4x + 5y$ subject to $2x + 5y \leq 25, 6x + 5y \leq 45, x \geq 0, y \geq 0$. [6]
Ans: 35 at (5, 3)

22. **2071 Set C Q.No. 18** Using simplex method, Maximize $f = 15x_1 + 10x_2$, subject to $2x_1 + x_2 \leq 10; x_1 + 3x_2 \leq 10; x_1, x_2 \geq 0$ [6]

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Ans: Max. f = 80 when $x_1 = 4$, $x_2 = 2$

23. 2071 Set D Q.No. 18 Using simplex method, maximize $U = 25x + 45y$
subject to $x + 3y \leq 21$; $2x + 3y \leq 24$; $x, y \geq 0$ [6]
Ans: Max. U = 345 where x = 3, y = 6

24. 2070 Supp. Q.No. 18 Using the simplex method, maximize $P = 20x + 30y$
subject to constraints $2x + 5y \leq 20$, $2x+y \leq 12$, $x \geq 0$, $y \geq 0$ [6]
Ans: Max P = 160 when x = 5, y = 2

25. 2070 Set C Q.No. 18 Using Simplex method, Max. $z = 5x_1 + 7x_2$
subject to $2x_1 + 3x_2 \leq 13$; $3x_1 + 2x_2 \leq 12$; $x_1, x_2 \geq 0$. [6]
Ans: Max. z = 31 at $x_1 = 2$, $x_2 = 3$

26. 2070 Set D Q.No. 18 Using Simplex method, Max. $P = 50x_1 + 80x_2$
subject to $x_1 + 2x_2 \leq 32$; $3x_1 + 4x_2 \leq 84$; $x_1, x_2 \geq 0$. [6]
Ans: Max. P = 1480 at $x_1 = 20$, $x_2 = 6$

27. 2069 (Set A) Q.No. 18 Using simplex method, Maximize $Z = 7x_1 + 5x_2$
subject to $x_1 + 2x_2 \leq 6$; $4x_1 + 3x_2 \leq 12$; $x_1, x_2 \geq 0$ [6]
Ans: Max. Z = 21 when $x_1 = 3$, $x_2 = 0$

28. 2069 (Set B) Q.No. 18 Using simplex method, maximize $Z = 7x_1 + 5x_2$ [6]
subject to: $x_1 + 2x_2 \leq 6$, $4x_1 + 3x_2 \leq 6$, $x_1, x_2 \geq 0$
Ans: Max. Z = 10.5 at (1.5, 0)

17. COMPUTATIONAL METHOD

A. NUMBER SYSTEM

FORMULAE

Number System in Different Form

Decimal	Binary	Octal	Hexadecimal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

2 Marks Questions

1. 2077 Set G Q.No. 10 Convert the hexadecimal number 27A to binary number. [2]
Ans: 1001111010_2

2. 2077 Set H Q.No. 10 Convert the binary number 10110010 to hexadecimal number. [2]
Ans: $B2_{16}$

3. 2076 GIE Set A Q.No. 16b Convert the hexadecimal number $34E_{16}$ into binary form. [2]
Ans: 1101001110_2

4. 2076 GIE Set B Q.No. 16b Convert hexadecimal number $12DB_{16}$ to decimal form. [2]
Ans: 1001011011011_2

5. 2076 Set B Q.No. 16b Convert the decimal number 31923 into hexadecimal number. [2]
Ans: $7CB3_{16}$

6. 2076 Set C Q.No. 16b Convert hexadecimal number 81 A into Octal number. [2]
Ans: 4032_8

7. 2075 GIE Q.No. 16b Convert the Octal number 2064 into binary form. [2]
Ans: 10000110100_2

8. 2075 Set A Q.No. 16b Convert the hexadecimal numeral $AB5_{16}$ to decimal form. [2]
Ans: 2741

9. 2075 Set C Q.No. 16b Convert the decimal number 4526_{10} to hexadecimal form. [2]
Ans: $11AE_{16}$

10. 2074 Supp Q.No. 16b Convert the decimal number 3058_{10} to hexadecimal form. [2]
Ans: $BF2_{16}$

11. 2074 Set A Q.No. 16b Convert $2B1_{16}$ into the binary number. [2]
Ans: 1010110001_2

12. 2074 Set B Q.No. 16b Convert the hexadecimal number $22F_{16}$ in to binary form. [2]
Ans: 1000101111_2

13. 2073 Supp Q.No. 16b Convert the decimal number 7593 into hexadecimal form. [2]
Ans: $1DA9_{16}$

14. 2073 Set C Q.No. 16b Convert the octal number 143_8 into hexadecimal form. [2]
Ans: 63_{16}

15. 2073 Set D Q.No. 16b Convert the decimal numeral 3058 to hexadecimal form. [2]
Ans: $BF2_{16}$

16. 2072 Supp. Q.No. 16b Convert the decimal number 1503 into hexadecimal form. [2]
Ans: $5DF_{16}$

17. 2072 Set C Q.No. 16b Convert the decimal number 3159 into hexadecimal form. [2]
Ans: $C57_{16}$

18. 2072 Set D Q.No. 16b Convert hexadecimal number $70A_{16}$ into binary form. [2]
Ans: 11101010_2

19. 2072 Set E Q.No. 16b Convert the decimal numeral 1503 into hexadecimal form. [2]
Ans: $5DF_{16}$

20. 2071 Supp. Q.No. 16b Convert the binary number 10100011000_2 into the octal number. [2]
Ans: 2430_8

21. 2071 Set C Q.No. 16 b Convert the decimal number 2567_{10} to octal form. [2]
Ans: 5007_8

22. 2071 Set D Q.No. 16 b Convert the hexdecimal number $AB5_{16}$ to the decimal number. [2]
Ans: 2741

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26. **2070 Supp. Q.No. 16 b** Convert 110011_2 to the decimal number [2]
Ans: 51

27. **2070 Set C Q.No. 16 b** Convert the decimal numeral 1503 to hexadecimal form. [2]
Ans: $5DF_{16}$

28. **2070 Set D Q.No. 16 b** Convert the decimal number 3058 to hexadecimal form. [2]
Ans: $BF2_{16}$

29. **2069 (Set A) Q.No. 16b** Convert the octal numeral 3733_8 into decimal form. [2]
Ans: $(2011)_{10}$

30. **2069 (Set B) Q.No. 16b** Convert the hexadecimal numeral 2E4B into decimal form. [2]
Ans: $(11851)_{10}$

B. BISECTION METHOD

FORMULAE

1. True error = ± (True value – Approximate value)
2. Absolute error: $E_A = |X - X_1|$
3. Relative error: $E_R = \frac{E_A}{X} = \frac{|X - X_1|}{|X|}$, $X \neq 0$
4. Percentage error: $E_P = 100\ E_R = \frac{100\ |X - X_1|}{|X|}$, $X \neq 0$
5. We stop the process of bisecting the interval $[a_k, b_k]$ in one of the following three cases.
   i. Maximum number of iterations allowed.
   ii. When $f(x_k) = 0$.
   iii. When $\frac{|b_k - a_k|}{2} < \varepsilon$, where $\varepsilon > 0$ is the pre-assigned error tolerance.

2 Marks Questions

1. **2075 Set B Q.No. 16b** If f(0) = –1 and f(8) = 1, how many steps of the bisection method will be required to find an approximation to the root of f(x) accurate to 0.25? [2]
Ans: 5 or more

4 Marks Questions

2. **2077 Set I Q.No. 11** Applying the method of successive bisection find the square root of 3 within two places of decimal in (1, 2). [4]
Ans: 1.73

3. **2076 Set B Q.No. 17b** Use the Bisection method to find solutions accurate to within 10^{-2} for $x^3 - 7x^2 + 14x - 6 = 0$ in (0, 1). [4]
Ans: 0.5859

4. **2075 GIE Q.No. 17a** Apply the method of successive bisection to find the root of the equation $x^3 - 2x - 5 = 0$ lying between 2 and 3 correct to three places of decimal. [4]
Ans: 2.094

5. **2074 Set A Q.No. 17a** Use the bisection method to find the solution of $x^3 - x - 1 = 0$ in the interval (1, 2) correct to three places of decimals. [4]
Ans: 1.324

6. **2074 Set B Q.No. 17a** Show that the equation $x^3 - x - 4 = 0$ has two negative roots and one positive root and find the positive root correct to 3 places of decimal by successive bisection method. [4]
Ans: 1.797

7. **2073 Set C Q.No. 17a** Apply successive bisection method to find the root of the equation $x^3 - 4x - 1 = 0$ lying between 1 and 2 correct to two places of decimal. [4]
Ans: No root lies between 1 and 2

8. **2072 Set D Q.No. 17b** Using the bisection method find the root of the equation $x^2 + x - 4 = 0$ in (1, 2) correct to two places of decimals. [4]
Ans: 1.56

9. **2071 Supp. Q.No. 17a** Find the solution of $x^2 - 10 = 0$ using the bisection method with a = 3, b = 4 and $\varepsilon = 0.01$. [4]
Ans: 3.16212

10. **2070 Supp. Q.No. 17 a** Use the Bisection method to find the solution of the equation $x - 2^{-x} = 0$ in the interval [0, 1], accurate to within 10^{-3}. [4]
Ans: 0.640625

6 Marks Questions

11. **2077 Set H Q.No. 12** Determine the number of positive roots and apply the method of successive bisection to find the roots of the equation $x^3 - 2x - 5 = 0$ in (2, 3) correct to three places of decimals. [6]
Ans: 2.094

12. **2076 GIE Set A Q.No. 19 OR** Find a root of an equation $x^3 + x - 4 = 0$ in the interval [1, 4] within an accuracy of 10^{-1} by bisection method. [6]
Ans: 1.375

13. **2076 GIE Set B Q.No. 19** Using method of Successive bisections, find a root of the equation $2x^3 - 5x + 2 = 0$ lying in between 1 and 2 correct to 4 places of decimals with error less than 0.05 [6]
Ans: 1.3125

14. **2075 Set A Q.No. 19** Find the positive root of the equation $x^3 - x - 4 = 0$ correct to 3 places of decimal with error less than 0.005. [6]
Ans: 1.796

15. **2075 Set C Q.No. 19 OR** Find the roots of the equation $f(x) = x^3 - 4x - 9$ correct to three decimal places by using bisection method. [6]
Ans: 2.706

16. **2074 Supp Q.No. 19** Applying the method of successive bisection, find the root of the equation $x^3 - 4x + 1 = 0$ lying between 1 and 2 correct to two place of decimals. [6]
Ans: 1.86

17. **2073 Supp Q.No. 19** Show that the equation $f(x) = x^3 - 18$ has only one positive root. Using bisection method, find the positive root correct to 3 places of decimals in the interval (2, 3). [6]
Ans: 2.621

18. **2073 Set D Q.No. 19** Show that the equation $f(x) = x^3 - 3x - 8 = 0$ has only one positive root. Using bisection method, find a root in (2, 3) correct to 3 places of decimals. [6]
Ans: 2.492

19. 2072 Supp. Q.No. 19 Using the method of bisection, find the root of the equation $x^3 - 2x - 5 = 0$ lying between 2 and 3 correct to 3 places of decimals. [6]
Ans: 2.094

20. 2072 Set C Q.No. 19 Apply the method of bisection to find the root of the equation $x^3 - 2x - 5 = 0$ in (2, 3) correct to three places of decimal. [6]
Ans: 2.094

21. 2072 Set E Q.No. 19 Using bisection method, find the root of the equation: $2x^3 - 5x + 2 = 0$, $x \in (1, 2)$ with error less than 10^{-2}. [6]
Ans: 1.32032

22. 2071 Set D Q.No. 19 Using the bisection method, find a root of the equation: $f(x) = 2x^3 - 5x + 2 = 0$, between 1 and 2 with error less than 10^{-2}. [6]
Ans: 1. 32032

23. 2070 Set C Q.No. 19 Find the root of the equation $x^3 - 2x - 5 = 0$ lying between 2 and 3 correct to three places of decimals by successive bisection method. [6]
Ans: 2.094

24. 2070 Set D Q.No. 19 Applying the method of successive bisection, find the root of the equation $x^3 - 4x + 1 = 0$ lying between 1 and 2 correct to 2 places of decimals. [6]
Ans: 1.86

25. 2069 (Set A) Q.No. 19 Using method of bisection, find the root of the equation $x^3 - x - 4 = 0$ lying between 1 and 2 correct to 3 places of decimals. [6]
Ans: 1.796

26. 2069 (Set B) Q.No. 19 Show that the equation $f(x) = x^3 - x - 4$ has one positive root and using the method of bisection, find the positive root correct to 3 places of decimals. [6]
Ans: 1.796

C. NEWTON RAPHSON'S METHOD

FORMULAE

1. $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$
2. Finding square roots by Newton–Raphson method
$f(x) = x^2 - a$
$x_{n+1} = \frac{1}{2}\left(x_n + \frac{a}{x_n}\right)$.

4 Marks Questions

1. 2077 Set I Q.No. 11 OR Find a root of the equation $x^3 - x - 4 = 0$ in (1, 2) to three places of decimal by Newton Raphson method. [4]
Ans: 1.796

2. 2076 Set C Q.No. 17a Using method of successive bisection method Or Newton Raphson's method, find the root of the equation $x^2 + x - 4 = 0$ in (1, 2) correct to three places of decimals. [4]
Ans: 1.561

3. 2074 Set A Q.No. 17a OR Use Newton–Raphson's method to approximate $\sqrt[3]{2}$ with an error less than 0.00001. [4]
Ans: 1.259921

4. 2074 Set B Q.No. 17a OR Using Newton-Raphson's method, find the positive root of $x^3 - 2x - 5 = 0$ lying between 2 and 3 correct to three places of decimal. [4]
Ans: 2.094

5. 2073 Set C Q.No. 17a OR Find a root of the equation $x^3 - x - 4 = 0$ between 1 and 2 to three places of decimal by Newton Raphson's method. [4]
Ans: 1.796

6. 2071 Supp. Q.No. 17a OR Let $f(x) = -x^3 - \cos x$ and $x_0 = -1$. Use Newton-Raphson's method to find x_2. Could $x_0 = 0$ be used? [4]
Ans: 0.8657, No

7. 2070 Supp. Q.No. 17 a OR Use Newton – Raphson method to find the solution of the equation $x^3 + x - 1 = 0$ in the interval [0, 1], accurate to within 10^{-4}. [4]
Ans: 0.68234

6 Marks Questions

8. 2077 Set H Q.No. 12 OR Using Newton Raphson method find a positive root of $x^3 + 3x - 5 = 0$ in (1, 2) correct to three places of decimals. [6]
Ans: 1.154

9. 2076 GIE Set A Q.No. 19 Using Newton-Raphson method, find a positive root of $x^3 + 3x - 5 = 0$ lying between 1 and 2 correct to 3 places of decimals. [6]
Ans: 1.154

10. 2076 GIE Set B Q.No. 19 OR Using Newton Raphson's method, find a root of the equation $x^3 + 3x - 5 = 0$ lying between 1 and 2 correct to 3 places of decimals.
Ans: 1.154

11. 2075 Set A Q.No. 19 OR Using Newton-Raphson method, find a root of the equation $x^3 + 3x - 5 = 0$ between 1 and 2 to three places of decimals. [6]
Ans: 1.154

12. 2075 Set B Q.No. 18 For $f(x) = x^3 - 4$, perform 3 iterations of Newton-Raphson's method with starting point $x_0 = 2$. Find the errors and percentage errors of x_0, x_1, x_2 and x_3. [6]
Ans: $x_0 = 2$
$x_1 = 1.66667$, $E_1 = 0.1999$, 19.99%;
$x_2 = 1.59111$, $E_2 = 0.0475$, 4.75%
$x_3 = 1.58741$, $E_3 = 0.0023$, 0.23%

13. 2075 Set C Q.No. 19 Use Newton-Raphson method (formula) to find the solutions of $f(x) = 1 - 12x + x^3$ correct upto four decimal places. [6]
Ans: 3.4216

14. 2074 Supp Q.No. 19 OR Using Newton-Raphson method, find a root of the equation $x^3 - 2x - 5 = 0$ lying between 2 and 3 correct to 3 places of decimals. [6]
Ans: 2.094

15. 2073 Supp Q.No. 19 OR Use Newton Raphson's Method to find a positive root of $\cos x = x^3$. [6]
Ans: 0.99997

16. 2073 Set D Q.No. 19 OR Using Newton -Raphson method, find a root of the equation $f(x) = x^3 - x - 4 = 0$ in (1, 2) correct to 3 places of decimals. [6]
Ans: 1.796

17. 2072 Supp. Q.No. 19 OR Using Newton Raphson's method, find the root of the equation $f(x) = x^3 - x - 4 = 0$ in (1, 2) correct to 3 places of decimals. [6]
Ans: 1.796

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2072 Set E Q.No. 19 OR Find a root of the equation $2x^2 - 3x - 1 = 0$, $x \in (1, 2)$ using Newton Raphson method with error less than 10^{-4}. [6]
Ans: 1.7808

2071 Set C Q.No. 19 Find a root of an equation $x^3+x-4=0$ in the interval [1, 4] within an accuracy of 10^{-1} [6]
Ans: 1.375

2071 Set C Q.No. 19 OR Find a root of the equation $x^3 - x - 4 = 0$ between 1 and 2 to three places of decimal by Newton-Raphson method. [6]
Ans: 1.796

21. **2071 Set D Q.No. 19 OR** Derive the formula for Newton-Raphson method. Using Newton Raphson method, find a positive root of $x^3 + 3x - 5 = 0$ lying between 1 and 2 correct to three places of decimals. [6]
Ans: 1.154

22. **2070 Set C Q.No. 19 or** Solve $2x^2 - 3x - 1 = 0$ using Newton-Raphson method taking $x_0 = 1$ with error less than 10^{-4}. [6]
Ans: 1.7808

23. **2070 Set D Q.No. 19 Or** Using Newton-Raphson method, find the positive root of $x^3 - 18 = 0$ in (2, 3). [6]
Ans: 2.62

24. **2069 (Set A) Q.No. 19 or** Using Newton-Raphson's method, find the square root of 153 correct to 3 places of decimals. [6]
Ans: 12.369

25. **2069 (Set B) Q.No. 19 Or** Using Newton Raphson's method find the positive root of the equation $f(x) = x^3 - 2x - 5 = 0$ lying between 2 and 3 correct to 3 places of decimals. [6]
Ans: 2.094

18. COMPUTATIONAL METHOD (CONTINUED)

A. GAUSS ELIMINATION METHOD

FORMULAE

1. A system of linear equation is said to be **consistent** if it has either one solution or infinitely many solutions and system is said to **inconsistent** if it has no solution.

2 Marks Questions

1. **2076 Set C Q.No. 16c** Using Gauss-elimination method, solve the equations [2]
$x + 2y = 5, 5x - 3y = -1.$
Ans: x = 1, y = 2

2. **2071 Supp. Q.No. 16c** By Gauss elimination method, solve $2x + 3y = 4$, $3x + 2y = -4$. [2]
Ans: x = –4, y = 4

3. **2070 Supp. Q.No. 16 c** Test the consistency of the following system by the Gauss elimination method:
$x - y - 2z = -1, 2x + y + z = 2, 3x + 2y + 9z = 4.$ [2]
Ans: Consistent

4 Marks Questions

4. **2076 QE Set B Q.No. 17a** Solve the following equations using Gauss – elimination method $x + 3y - 2z = 0, 2x - 3y + z = 1, 4x - 3y + z = 3$ [4]
Ans: x = 1, y = 1, z = 2

5. **2075 QE Q.No. 17b** Solve by Gauss elimination method:
$x_1 + x_2 + x_3 = -3, 3x_1 + x_2 - 2x_3 = -2, 2x_1 + 4x_2 + 7x_3 = 7.$ [4]

6. **2075 Set A Q.No. 17a** Solve the following system of equations by Gauss-elimination method. [4]
$x + 3y - z = -2, 3x + 2y - z = 3, -6x - 4y - 2z = 18.$
Ans: x = 1, y = –3, z = –6

7. **2074 Supp Q.No. 17a** Using Gauss-elimination method, solve the following system of equation: [4]
$x + 3y - 2z = 5, 3x + 5y + 6z = 7, 2x + 4y + 3z = 8.$
Ans: x = –15, y = 8, z = 2

8. **2074 Set A Q.No. 17b** Solve the following system of equations by Gauss elimination method,
$2x + 3y + 4z = 20, 3x + 4y + 5z = 26, 3x + 5y + 6z = 31.$ [4]
Ans: x = 1, y = 2, z = 3

9. **2074 Set B Q.No. 17b** Solve by Gauss elimination method:
$x + 3y - 2z = 5, 3x + 5y + 6z = 7, 2x + 4y + 3z = 8.$ [4]
Ans: x = –15, y = 8, z = 2

10. **2073 Set C Q.No. 17b** Solve by Gauss elimination method.
$3x_1 + x_2 + x_3 = 5, x_1 - 4x_2 + x_3 = -2, x_1 + x_2 - 3x_3 = -1.$ [4]
Ans: $x_1 = 1, x_2 = 1, x_3 = 1$

11. **2073 Set D Q.No. 17a** Using Gauss-elimination method, solve the following system of equations:
$2x - 3y + 3z = 27, 4x + y - 2z = 0, -6x - 4y + 2z = 0.$ [4]
Ans: x = 3, y = –2, z = 5

12. **2072 Supp. Q.No. 17a** Solve the following system of equations using Gauss elimination method: [4]
$x + 3y - 2z = 5; 3x + 5y + 6z = 7; 2x + 4y + 3z = 8.$
Ans: x = –15, y = 8, z = 2

13. **2072 Set C Q.No. 17a OR** Solve by Gauss elimination method:
$x + 3y - 2z = 5, 3x + 5y + 6z = 7, 2x + 4y + 3z = 8.$ [4]
Ans: x = –15, y = 8, z = 2

14. **2072 Set D Q.No. 17a OR** Use Gauss elimination method to solve: [4]
$4x - y + z = 8, 2x + 5y + 2z = 3, x + 2y + 4z = 11.$
Ans: x = 1, y = –1, z = 3

15. **2072 Set E Q.No. 17a** Using Gauss-elimination method, Solve the following system of equations.
$2x_2 + 3x_3 = 7, 3x_1 - 2x_2 + 2x_3 = 1, 2x_1 + 3x_2 - 3x_3 = 5.$ [4]
Ans: $x_1 = 1, x_2 = 2, x_3 = 1$

16. **2071 Set C Q.No. 17a** Using Gauss-elimination method, solve the following system of equation.
$x + 3y - z = -2, 3x + 2y - z = 3, -6x - 4y - 2z = 18$ [4]
Ans: x = 1, y = –3, z = –6

17. **2071 Set D Q.No. 17a** Using Gauss-elimination method, solve the following system of equation: $x - 2y + 3z = 2$, $2x - 3y + z = 1, 3x - y + 2z = 9.$ [4]
Ans: x = 3, y = 2, z = 1

18. **2070 Set C Q.No. 17a** Solve, using Gauss elimination method, the following equations. [4]
$x + 3y - 2z = 5$, $3x + 5y + 6z = 7$, $2x + 4y + 3z = 8$.
Ans: x = –15, y = 8, = 2

19. **2070 Set D Q.No. 17a** Solve the following system of equation by Gaussian elimination method. [4]
$x + 3y - 2z = 5$, $3x + 5y + 6z = 7$, $2x + 4y + 3z = 8$.
Ans: x –15, y = 8, z = 2

20. **2069 (Set A) Q.No. 17a** Using Gauss elimination method, solve the following system of equations: [4]
$x - 2y + 3z = 2$, $2x - 3y + z = 1$, $3x - y + 2z = 9$
Ans: x = 3, y = 2, z = 1

21. **2069 (Set B) Q.No. 17a** Using Gauss elimination method, solve the following system of equations:
$x_1 - 2x_2 + 3x_3 = 10$, $2x_1 + 3x_2 - 2x_3 = 1$, and
$-x_1 - 2x_2 + 4x_3 = 13$. [4]
Ans: $x_1 = 1$. $x_2 = 3$, $x_3 = 5$

6 Marks Questions

22. **2075 Set B Q.No. 19** What are two steps of Gauss elimination method? Find the approximate solution of the following system of equations by Gauss elimination method:
$3x - y + z = -2$, $x + 5y + 2z = 6$, $2x + 3y + z = 0$. [6]
Ans: x = –2, y = 0, z = 4

B. GAUSS-SEIDEL METHOD

FORMULAE

1. Diagonally Dominant
A system
$a_{11}x_1 + a_{12}x_2 + a_{13}x_3 = b_1$
$a_{21}x_1 + a_{22}x_2 + a_{23}x_3 = b_2$
$a_{31}x_1 + a_{32}x_2 + a_{33}x_3 = b_3$ is diagonally dominant if
$|a_{11}| > |a_{12}| + |a_{13}|$
$|a_{22}| > |a_{21}| + |a_{23}|$
$|a_{33}| > |a_{31}| + |a_{32}|$.

2 Marks Questions

1. **2076 Set B Q.No. 16c** Examine whether the system of equations $3x + 12y - z = 28$, $x + 4y + 7z = 2$ and $10x + 4y - 2z = 20$ is diagonally dominant. [2]
Ans: Not diagonally dominant

2. **2075 GIE Q.No. 16c** Examine whether the system of equations $2y + 3z = 7$, $3x - 2y + 2z = 1$ and $2x + 3y - 3z = 5$ is diagonally dominant or not. [2]
Ans: Not diagonally dominant

3. **2075 Set A Q.No. 16c** Are the followings system of equation diagonally dominant? [2]
$12x_1 + 3x_2 - 5x_3 = 1$, $x_1 + 5x_2 + 3x_3 = 28$, $3x_1 + 7x_2 + 13x_3 = 1$.
Ans: Diagonally Dominant

4. **2074 Set A Q.No. 16c** Is the system $\begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 7 \end{bmatrix}$ well-conditioned? Justify your answer. [2]
Ans: Yes

5. **2074 Set B Q.No. 16c** Examine whether the system of equations $x + 3y - 2z = 0$, $2x - 3y + z = 1$ and $4x - 3y + z = 3$ is diagonally dominant or not. [2]
Ans: No

6. **2073 Supp Q.No. 16c** Interpret geometrically that a system of equations in two variables is ill-conditioned. [2]

7. **2073 Set C Q.No. 16c** Define well-conditioned and ill-conditioned of a system of equation. [2]

8. **2072 Supp. Q.No. 16c** Examine whether the following equations are diagonally dominant: [2]
$8x_1 - 2x_2 + 3x_3 = -1$; $-3x_1 + 9x_2 - x_3 = 2$; $2x_1 - x_2 - 7x_3 = 3$
Ans: Diagonally dominant

9. **2072 Set C Q.No. 16c** Write the conditions for the system of equations $a_{11}x + a_{12}y = b_1$, $a_{21}x + a_{22}y = b_2$, to be ill conditioned. [2]

10. **2072 Set D Q.No. 16c** Test whether the system of equations $12x + 3y - 5z = 1$, $x + 5y + 3z = 28$ and $3x + 7y + 13z = 1$ is diagonally consistent? [2]
Ans: Diagonally dominant

11. **2069 (Set A) Q.No. 16c** Examine whether the following system of equations are ill conditioned.
$2x_1 + x_2 = 25$; $2.001x_1 + x_2 = 25.01$ [2]

4 Marks Questions

12. **2076 Set B Q.No. 17a** Solve by Gauss elimination or Gauss Seidel method: [4]
$2x + 2y + z = 6$, $x - y + z = 0$ and $4x + 2y + 3z = 4$.
Ans: x = 9, y = –1, z = –10

13. **2076 Set C Q.No. 17b** Use Gauss-Seidel method to solve. [4]
$3x + 4y + 8z = 7$, $x + 20y + z = -18$ and $25x + y - 5z = 19$.
Ans: x = 1, y = – 1, z = 1

14. **2075 GIE Q.No. 17b OR** Solve by Gauss Seidel method in second iteration: [4]
$3x_1 + x_2 + 2x_3 = -1$, $2x_1 + 3x_2 + x_3 = 5$, $x_1 + 2x_2 - x_3 = 8$.
Ans: $x_1 = 2.074$; $x_2 = 1.802$; $x_3 = -2.322$

15. **2073 Set D Q.No. 17a OR** Using Gauss-Seidel method, solve the following system of equations: [4]
$4x_1 + x_2 + x_3 = 7$, $2x_1 - 5x_2 + 2x_3 = 1$, $x_1 - x_2 + 3x_3 = 6$.
Ans: $x_1 = 1$, $x_2 = 1$, $x_3 = 2$

16. **2072 Supp. Q.No. 17a OR** Solve the following equation using Gauss-Seidel method: $3x_1 + x_2 = 5$; $x_1 - 3x_2 = 5$. [4]
Ans: $x_1 = 2$, $x_2 = -1$

17. **2072 Set C Q.No. 17a** Using Gauss Seidel method, solve the equations $3x + 2y = -9$, $2x - 3y = -6$. [4]
Ans: x = –3, y =0

18. **2072 Set D Q.No. 17a** Using Gauss Seidel method, solve:
$3x + 4y + 8z = 7$, $x + 20y + z = -18$, $25x + y - 5z = 19$. [4]
Ans: x = 1, y = –1, z = 1

19. **2070 Set C Q.No. 17 a or** Solve the following equation using Gauss Seidel method $3x_1 + x_2 = 5$; $x_1 + 2x_2 = 5$. [4]
Ans: $x_1 = 1$, $x_2 = 2$

20. **2070 Set D Q.No. 17 a Or** Solve the following system of equations by Gauss Seidel method
$3x + y - z = 2$, $2x - 5y + z = 20$, $x - 3y - 8z = 3$. [4]
Ans: x = 2, y – 3, z = 1

21. **2069 (Set A) Q.No. 17a or** Solve the following equations using Guess-Seidel method:
$2x_1 - x_2 = 8$; $3x_1 + 7x_2 = -5$. [4]
Ans: $x_1 = 3$, $x_2 = -2$

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2069 (Set B) Q.No. 17a Or Solve the following equations using Guess-Seidel method: $3x_1 + x_2 = 6$, $x_1 - 3x_2 = 5$. [4]
Ans: $x_1 = 2$, $x_2 = -1$

4 Marks Questions

2071 Supp. Q.No. 19 Use the Gauss-Siedel method to solve the systems $4x-y+z=8$, $2x+5y+2z=3$, $x+2y+4z=11$. [6]
Ans: x = 1, y = –1, z = 3

2071 Supp. Q.No. 19 OR Given the system
$0.835x + 0.667y = 0.168$, $0.333x + 0.266y = 0.067$
Determine whether the system is ill conditioned by changing the coefficient 0.667 to 0.666. [6]
Ans: Ill-conditioned

2070 Supp. Q.No. 19 Given the system
$3x - 6y + 2z = 23$, $-4x + y - z = -8$, $x - 3y + 7z = 17$
Make it diagonally dominant and solve by Gauss-siedel method with error less than 0.005. [6]
Ans: 0.9998, – 3.0002, 0.9999; Exact solution 1, –3, 1

2070 Supp. Q.No. 19 OR Given the system
$3x + 1.52y = 1$, $2x + 1.02y = 1$
Determine whether the system is ill-conditioned by changing the coefficient 1.02 to 1.03. [6]
Ans: Ill – conditioned

C. MATRIX INVERSION METHOD

FORMULAE

1. Augment the coefficient matrix A with an identity matrix as
$$\begin{bmatrix} a_{11} & a_{12} & a_{13} & : & 1 & 0 & 0 \\ a_{21} & a_{22} & a_{23} & : & 0 & 1 & 0 \\ a_{31} & a_{32} & a_{33} & : & 0 & 0 & 1 \end{bmatrix}.$$
2. Apply the Gauss-Jordan method to the augmented matrix to reduce A to an identity matrix I as
$$\begin{bmatrix} 1 & 0 & 0 & : & a'_{11} & a'_{12} & a'_{13} \\ 0 & 1 & 0 & : & a'_{21} & a'_{22} & a'_{23} \\ 0 & 0 & 1 & : & a'_{31} & a'_{32} & a'_{33} \end{bmatrix}$$
where, $A^{-1} = \begin{bmatrix} a'_{11} & a'_{12} & a'_{13} \\ a'_{21} & a'_{22} & a'_{23} \\ a'_{31} & a'_{32} & a'_{33} \end{bmatrix}$.
3. $AX = B \Rightarrow X = A^{-1}B$

4 Marks Questions

1. **2077 Set G Q.No. 11** Solve the system of equations by Gauss elimination or Matrix inversion method: $2x - 3y + z = 1$, $x - 2y + 3z = 2$, $3x - y + 2z = 9$. [4]
Ans: x = 3, y = 2, z = 1
2. **2076 GIE Set A Q.No. 17a** Solve the following equations using Gauss Elimination method or Inverse Matrix method. [4]
$x + 3y - 2z = 5$, $3x + 5y + 6z = 7$, $2x + 4y + 3z = 8$
Ans: x = – 15, y = 8, z = 2
3. **2075 Set C Q.No. 17a** Solve the following system of equations using Gauss-elimination or inverse matrix method. [4]
$x + y + z = 6$, $3x - 4y = -5$, $4z - 3x + 2y = 13$
Ans: x = 1, y = 2, z = 3
4. **2074 Supp Q.No. 17a OR** Solve the following system of equations using inverse matrix method:
$3x + y + z = 15$, $x + y + z = 3$, $y - z = -1$. [4]
Ans: x = 6, y = –2, z = –1
5. **2073 Supp Q.No. 17a** Solve by Gauss elimination or matrix inversion method the system of equations:
$3x + 12y - z = 28$, $x + 4y + 7z = 2$, and $10x + 4y - 2z = 20$. [4]
Ans: $x = \frac{22}{25}$, $y = \frac{56}{25}$, $z = \frac{-26}{25}$
6. **2072 Set E Q.No. 17a OR** Solve the following equation using matrix inversion method:
$3x + y + z = 15$, $x + y + z = 3$, $y - z = -1$ [4]
Ans: x = 6, y = –2, z = –1
7. **2071 Set C Q.No. 17 a OR** Using inverse matrix method, solve the following system of equations:
$3x + y + z = 15$, $x + y + z = 3$, $y - z = -1$ [4]
Ans: x = 6, y = –2, z = –1
8. **2071 Set D Q.No. 17 a OR** Solve the following system of equations using inverse matrix method:
$x_1 - 2x_2 - x_3 = 1$, $x_1 - x_2 + 2x_3 = 9$, $2x_1 - 3x_2 - x_3 = 4$. [4]
Ans: $x_1 = 2$, $x_2 = -1$, $x_3 = 3$

6 Marks Questions

9. **2075 Set B Q.No. 19 OR** Solve the following system of equations by matrix inversion method:
$3x + 5z = 14$, $2x + y - 3z = 3$, $x + y + z = 4$. [6]
Ans: x = 3, y = 0, z = 1

19. NUMERICAL INTEGRATION

A. TRAPEZOIDAL RULES

FORMULAE

1. Mid Point Rule (Rectangle Rule): $A \approx (b-a)\, f\left(\frac{a+b}{2}\right)$
2. Trapezoidal Rule: Simple Form
$$\int_a^b f(x)\,dx \approx \frac{1}{2}(b-a)\,[f(a) + f(b)]$$
3. Trapezoidal Rule: General Form
$$\int_a^b f(x)dx \approx \frac{b-a}{2n}[f(x_0) + 2f(x_1) + 2f(x_2) + \ldots + 2f(x_{n-1}) + f(x_n)]_e$$
4. Error Analysis: $E_r \le \frac{M(b-a)^3}{12n^2}$

2 Marks Questions

1. **2076 GIE Set A Q.No. 16c** Using Composite Trapezoidal rule, compute $\int_0^2 (2x^2 - 1)\,dx$ with 4 intervals. [2]
Ans: 3.5
2. **2076 GIE Set B Q.No. 16c** Using composite Trapezoidal rule, evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\sin x}\,dx$, n = 2 [2]
Ans: 1.0531

3. **2075 Set C Q.No. 16c** Use the Trapezoidal Rule to approximate the integral $\int_1^2 \frac{1}{x} dx$. Find the error for the approximation. [2]

Ans: 0.693254, 0.000107

4. **2074 Supp Q.No. 16c** Using trapezoidal rule, evaluate $\int_0^1 \frac{dx}{1+x^2}$, n = 2. [2]

Ans: 0.775

5. **2071 Set C Q.No. 16 c** Using the trapezoidal rule evaluate; $\int_0^1 \frac{dx}{1+x^2}$, n = 2 [2]

Ans: 0.775

6. **2071 Set D Q.No. 16 c** Using the trapezoidal rule, evaluate: $\int_0^2 (2x^2 - 1)dx$, n = 4. [2]

Ans: 3.5

7. **2070 Set C Q.No. 16 c** Using trapezoidal rule, evaluate $\int_0^{\pi/2} \sqrt{\sin x}\, dx$, n = 2. [2]

Ans: 1.0531

8. **2070 Set D Q.No. 16 c** Using trapezoidal rule, evaluate $\int_0^3 (3x^2 - 4x)dx$, n = 3. **Ans: 10.5** [2]

9. **2069 (Set B) Q.No. 16c** Given $I = \int_0^4 x^3\, dx$, n = 4

Estimate the value of I using Trapezoidal rule. [2]

Ans: 68

4 Marks Questions

10. **2075 Set A Q.No. 17b OR** Evaluate, using composite trapezoidal rule the integral: $\int_0^1 \frac{dx}{1+x}$, n = 5. [4]

Ans: 0.69562

11. **2075 Set B Q.No. 17b** Compute an approximate value of $\int_0^1 (1 + x^2)^{-1} dx$ by using the composite trapezoid rule with three points. Then comparing with the actual value of the integral, find the error. **Ans: 0.775, Error = 0.01** [4]

12. **2073 Set D Q.No. 17b** Using the trapezoidal rule, compute $\int_0^2 (2x^2 - 1)\, dx$ with 4 intervals. Find the absolute error of approximation from its actual value. [4]

Ans: 3.333 and 0.1667

13. **2072 Set E Q.No. 17b** Evaluate using composite trapezoidal rule, the integral $\int_0^\pi \sin x\, dx$, n = 4. [4]

Ans: 1.896

14. **2071 Supp. Q.No. 17b** Compute an approximate value of $\int_0^1 (1+x^2)^{-1}\, dx$ by the composite trapezoid rule with three points. Then comparing it with the actual value of the integral find the error. [4]

Ans: 0.775, Error = 0.01

15. **2070 Supp. Q.No. 17 b** Compute two approximate values for $\int_1^2 x^{-2}\, dx$ using $h = \frac{1}{2}$ and $h = \frac{1}{4}$ by the composite trapezoid rule. [4]

Ans: 0.5347, 0.509

16. **2069 (Set A) Q.No. 17b** Estimate the following integral using Trapezoidal rule.

$\int_0^1 \frac{dx}{1+x}$, n = 4

Estimate the error with respect to the actual value. [4]

Ans: 0.67701 and 0.01614

6 Marks Questions

17. **2076 Set B Q.No. 19 OR** Approximate the value for $\int_{-1}^1 e^x\, dx$ using Trapezoidal rule with n = 2. **Ans: 2.5431**

18. **2076 Set C Q.No. 19 OR** Evaluate: $\int_0^1 \frac{dx}{1+x}$, using Trapezoidal rule for n = 4. [6]

Ans: 0.67701

19. **2075 GIE Q.No. 19** Evaluate using Trapezoidal rule $\int_1^2 \frac{dx}{1+x}$, n = 4. Also estimate error. [6]

Ans: 0.4055; – 0.4068

20. **2074 Set A Q.No. 19** Using trapezoidal rule, evaluate $\int_0^1 \frac{dx}{1+x}$, n = 4. Estimate the error of approximation from its actual value. [6]

Ans: 0.67701 and 0.01614

21. **2074 Set B Q.No. 19** State Trapezoidal rule, hence evaluate $\int_0^2 \frac{dx}{1+x^4}$ for n = 4 correct to 3 places of decimal. [6]

Ans: 1.068

22. **2073 Set C Q.No. 19** Define Trapezoidal rule. Evaluate using Trapezoidal rule $\int_0^1 \frac{dx}{1+x}$ for n = 4. [6]

Ans: 0.67701

23. **2072 Set C Q.No. 19 OR** State and prove Trapezoidal rule of numerical approximation. [6]

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2072 Set D Q.No. 19 Approximate the value using trapezoidal rule for $\int_{-1}^{1} e^x dx$ n = 2. [6]

Ans: 2.5431

8. SIMPSON'S RULE

FORMULAE

1. Simpson's $\frac{1}{3}$ Rule

$$\int_a^b y\,dx \approx \frac{h}{3}(y_0 + 4y_1 + 2y_2 + 4y_3 + 2y_4 + \ldots + 4y_{n-1} + y_n)$$

2. Simpson's $\frac{3}{8}$ Rule

$$\int_a^b y\,dx \approx \frac{3h}{8}(y_0 + 3y_1 + 3y_2 + 2y_3 + 3y_4 + 3y_5 + 2y_6 + \ldots + 2y_{n-3} + 3y_{n-2} + 3y_{n-1} + y_n)$$

3. Error Analysis

$$E_S \leq \frac{M(b-a)^5}{180\,n^4}$$

2 Marks Questions

1. **2075 Set B Q.No. 16c** Apply Simpson's rule to approximate the value of $\int_1^4 e^x \ln x\,dx$ with n = 3. [2]

Ans: 58.969815

2. **2073 Set D Q.No. 16c** Using Simpson's $\frac{1}{3}$ rule, evaluate $\int_0^{0.2} \sqrt[3]{1-2x^2}\,dx$, n = 2. [2]

Ans: 0.1982

3. **2072 Set E Q.No. 16c** Find the approximate value of $\int_0^{0.2} \sqrt{1-2x^2}\,dx$, n = 2, using Simpson's $\frac{1}{3}$ rule. [2]

Ans: 0.1973

4 Marks Questions

4. **2077 Set H Q.No. 11** Evaluate, using Simpson's rule: $\int_0^1 \frac{dx}{1+x^2}$, n = 4 [4]

Ans: 0.7854

5. **2076 GIE Set A Q.No. 17b** Using Simpson's rule, compute $\int_0^1 \frac{dx}{1+x}$ for n = 4 correct to 4 places of decimals. [4]

Ans: 0.69562

6. **2076 GIE Set B Q.No. 17b** Using Simpson's $\frac{1}{3}$ rule, evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\cos x}\,dx$, n = 4 [4]

Ans: 1.0819

7. **2075 Set A Q.No. 17b** Using Simpson's rule, evaluate: $\int_0^1 \frac{dx}{1+x}$, n = 4. [4]

Ans: 0.6933

8. **2075 Set B Q.No. 17b OR** Approximate $\int_0^2 2^x\,dx$ using Simpson's $\frac{1}{3}$ rule with $h = \frac{1}{2}$. [4]

Ans: 4.3283

9. **2075 Set C Q.No. 17b** Using Simpson's $\frac{1}{3}$ rule, evaluate $\int_0^2 (4x^2-4x+1)dx$, n=4. [4]

Ans: 3.3333

10. **2074 Supp Q.No. 17b** Using Simpson's $\frac{1}{3}$ rule, evaluate $\int_0^2 (2x-1)^2\,dx$, n = 4. [4]

Ans: 0.785

11. **2073 Supp Q.No. 17b** Evaluate the following using Simpson's rule: $\int_0^1 \frac{dx}{1+x^2}$, n = 4 [4]

Ans: 0.785

12. **2072 Supp. Q.No. 17b** Evaluate the following integral using Simpson's rule: $\int_0^1 \frac{dx}{1+x^2}$, n = 4. [4]

Ans: 0.785

13. **2072 Set C Q.No. 17b** Using Simpson's $\frac{1}{3}$ rule, calculate $\int_1^5 x^4\,dx$ with n = 4. [4]

Ans: 625.33

14. **2071 Set C Q.No. 17 b** Using Simpson's 1/3 rule, evaluate: $\int_0^1 \sqrt{1+2x^2}\,dx$, h = 0.25 [4]

Ans: 1.2712

15. **2071 Set D Q.No. 17 b** Estimate the following integral using Simpson's 1/3 rule, $\int_0^{\pi} \sin x\,dx$, n = 6 [4]

Ans: 2.0008

16. **2070 Set C Q.No. 17 b** Using Simpson's $\frac{1}{3}$ rule evaluate $\int_0^1 \frac{dx}{1+x^2}$, n = 4. [4]

Ans: 0.785

17. **2070 Set D Q.No. 17 b** Using the Simpson's $\frac{1}{3}$ rule, evaluate $\int_0^1 \frac{dx}{1+x}$, n = 4. [4]

Ans: 0.69325

18. **2069 (Set B) Q.No. 17b** Evaluate the following integral using Simpson's rule: $\int_0^{\pi} \sin x\, dx$, n = 6. [4]

Ans: 2.0008

6 Marks Questions

19. **2076 Set B Q.No. 19** Compute $\int_0^1 (1 + x^2)^{-1}\, dx$, by Simpson's $\frac{1}{3}$ rule. Also compare it with true solution. [6]

Ans: Approximate value = 0.775, True value = 0.7854; Error = 0.0104

20. **2076 Set C Q.No. 19** Evaluate: $\int_0^1 \sqrt{1+x^3}\, dx$, using Simpson's $\frac{1}{3}$ rule with n = 4. [6]

Ans: 1.1114

21. **2075 GIE Q.No. 19 OR** Evaluate using Simpson's rule $\int_1^3 \frac{dx}{x^2}$, n = 4. Also estimate error.

Ans: 0.66667; – 0.00476

22. **2074 Set B Q.No. 19 OR** Define Simpson's rule, hence evaluate $\int_0^1 \frac{dx}{1+x}$ for n = 4 correct to 4 places of decimal. [6]

Ans: 0.6933

23. **2073 Set C Q.No. 19 OR** Using Simpson's rule, evaluate $\int_0^2 \frac{dx}{1+x^4}$ for n = 4, correct to 3 places of decimal. [6]

Ans: 1.081

24. **2072 Set D Q.No. 19 OR** Evaluate $\int_0^1 \sqrt{1+x^3}\, dx$ using Simpson's $\frac{1}{3}$ rule with n = 4. [6]

Ans: 1.111

YEARWISE QUESTIONS

2077 (Set G)

Group 'A'

Attempt all the questions.

1. a. Find the term independent of x in the binomial expansion of $\left(2x + \frac{1}{2x}\right)^{10}$. [2]

   b. Determine the equation of the hyperbola with vertex (8, 0) and passing through $(8\sqrt{2}, 4)$. [2]

   c. If $3\hat{i} + \hat{j} - \hat{k}$ and $x\hat{i} - 4\hat{j} + 4\hat{k}$ are collinear vectors, find x. [2]

2. a. Evaluate: $\int \frac{dx}{x + \sqrt{x^2 - 1}}$ [2]

   b. Solve: $\sqrt{1-x^2}\, dy + \sqrt{1-y^2}\, dx = 0$ [2]

3. In how many ways a committee of three person can be formed out of 3 men and 4 women so as to include atleast one woman. [4]

4. Find the equation of the plane through the point (2, 2, 1) and (9, 3, 6) and normal to the plane 2x + 6y + 6z = 9. [4]

5. Calculate Karl Pearson's coefficient of correlation from the following data. [4]

X	12	9	8	10	13	7
Y	14	8	6	9	12	3

6. Find from definition, the derivative of sin (logx). [6]

   OR

   State Rolle's theorem, interpret it geometrically. Verify Rolle's theorem for f(x) = (x + 1) (x – 2) in [–1, 2].

Group 'B'

7. Find the resultant and the angle subtended by it with P when the forces P and Q act at right angle. [2]

8. Two forces of magnitude 3P, 2P respectively have a resultant R. If the first force be doubled, the magnitude of the resultant is doubled, find the angle between the forces. [4]

   OR

   Two forces P and Q acting parallel to the length and base of an inclined plane respectively, would each of them singly support a weight w on the plane, prove that: $\frac{1}{P^2} - \frac{1}{Q^2} = \frac{1}{w^2}$.

9. Define moment of a force. Also interpret it geometrically. State and prove Varignon's theorem for intersecting forces. [6]

Group 'C'

10. Convert the hexadecimal number 27A to binary number. [2]

11. Solve the system of equations by Gauss elimination or Matrix inversion method: 2x – 3y + z = 1, x – 2y + 3z = 2, 3x – y + 2z = 9. [4]

12. Using Simplex method, maximize Z = 3x + 5y subject to constraints 3x + 2y ≤ 18, x ≤ 4, y ≤ 6 and x, y ≥ 0. [6]

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2077 (Set H)

Group 'A'

Attempt all the questions.

1. a. Find the middle term in the expansion of $(3x + x^3)^{10}$. [2]
   b. Find the vertices and eccentricity of the hyperbola $\frac{(x+2)^2}{16} - \frac{(y-1)^2}{9} = 1$ [2]
   c. Find the angle between the lines whose direction cosines are proportional to 1, 2, 2 and 2, 3, 6. [2]
2. a. Find the equation of normal to the curve $y = 2x^3 - 5x^2 + 8$ at (2, 4). [2]
   b. Calculate the semi-inter Quartile Range of 2, 5, 9, 10, 10, 9, 4. [2]
3. Prove that $\left\{\frac{n}{5}, n \in Z\right\}$ is a group with respect to addition. [4]

   OR

   Define group. Let (G, *)be a group, prove that:
   $(a * b)^{-1} = b^{-1} * a^{-1} \forall a, b \in G$. [4]
4. Evaluate: $\int \frac{dx}{4 + 3\cos hx}$ [4]

   OR

   Evaluate: $\int \frac{5}{(x+5)(2x^2+5)} dx$ [4]
5. A certain manufacturing plant produces electric fuses of which 20% are defective. Find the probability that in a sample of 8 fuses selected at random there will be atleast one defective and not more that one defective. [4]
6. Define cross product of two vectors and give its geometrical interpretation. Prove by vector method:
   $\cos(A - B) = \cos A \cos B + \sin A \sin B$. [6]

Group 'B'

7. A car covers a distance of 50 m in 5 sec. against a frictional force. If the power of the engine is 400 w, find the frictional force. [2]
8. Three forces P, Q, R acting at O along OA, OB, OC; where O is the incenter of ΔABC, are in equilibrium. Show that: [4]
   $$\frac{P}{\cos\frac{A}{2}} = \frac{Q}{\cos\frac{B}{2}} = \frac{R}{\cos\frac{C}{2}}$$

   OR

   State and prove converse of the triangle of forces. [4]
9. Define laws of motion. A gun of mass 1 metric tonne force a shot of mass 14 kg and recoils up smooth inclined plane, rising to a height of 1.6 m, find the initial velocity of the projectile. [6]

   OR

   A cannon ball has the same range R on a horizontal plane for two different angles of projection. If H and H^1 are the greatest heights and t_1 and t_2 are the time of flight in two paths for which this is possible, prove that:
   a. $R^2 = 16HH^1$ [6]
   b. $R = \frac{1}{2} gt_1t_2$

Group 'C'

10. Convert the binary number 10110010 to hexadecimal number. [2]
11. Evaluate, using Simpson's rule: $\int_0^1 \frac{dx}{1+x^2}$, $n = 4$ [4]
12. Determine the number of positive roots and apply the method of successive bisection to find the roots of the equation $x^3 - 2x - 5 = 0$ in (2, 3) correct to three places of decimals. [6]

    OR

    Using Newton Raphson method find a positive root of $x^3 + 3x - 5 = 0$ in (1, 2) correct to three places of decimals. [6]

2077 (Set I)

Group 'A'

Attempt all the questions

1. a. Find the number of ways in which 5 courses out of 8 can be selected when 3 courses are compulsory. [2]
   b. Prepare a Caley's table for $G = \{1, \omega, \omega^2\}$ where ω is the cube root of unity under multiplication. [2]
   c. Find the derivative of $\sinh^{-1}(\cosh x)$. [2]
2. a. Evaluate: $\int \frac{dx}{\sqrt{2ax - x^2}}$ [2]
   b. Two dice are rolled simultaneously. Determine the probability of turning up the number whose sum is less than six. [2]
3. Find equation and the point of contact of tangent to the parabola $y^2 = 12x$ which makes an angle 45° with the straight line $x - 2y + 3 = 0$. [4]

   OR

   Find the eccentricity and coordinates of foci of: $\frac{x^2}{8} + \frac{(y-2)^2}{12} = 1$ [4]
4. Prove that the line $lx + my + n = 0$ will be normal to the parabola $y^2 = 4ax$ if $al(2m^2 + l^2) + m^2n = 0$. [4]

   OR

   Find the vertices and foci of the ellipse
   $16x^2 + 25y^2 + 64x + 50y - 311 = 0$ [4]
5. Solve: $\cos^2 x \frac{dy}{dx} + y = 1$ [4]

   OR

   Solve: $\frac{dy}{dx} + \frac{y}{x} = \frac{y^2}{x^2}$ [4]

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6. Define exponential and logarithm series. Also sum to infinity the series.

$1^2 + \frac{2^2}{2!} + \frac{3^2}{3!} + \ldots\ldots$ [6]

Group 'B'

7. A motor boat of 5 HP working at full speed moves at the rate of 36 kmh^{-1}. What is the resistance of water to its motion? [2]
8. A particle is projected up from the bottom of an inclined plane with a velocity of 25m/s, while another is dropped from the highest point to slide down the plane as the same moment. If the length of the plane be 200 m and the angle of inclination of the plane with the horizon is 30°, find when and where the two particles will meet. ($g = 10m/s^2$) [4]
9. A stone is thrown horizontally with velocity $\sqrt{2gh}$ from the top of a tower of height 'h'. Find where it will strike the level ground through the foot of the tower. What will be its striking velocity? [6]

OR

Define energy. State principle of conservation of energy. Also prove that the sum of the Kinetic and Potential energies of a falling body remains constant throughout the motion. [6]

Group 'C'

10. Find the vertices of the feasible region determined by the constraints

$3x + 2y \leq 24, x + y \leq 20, x \geq 0, y \geq 0.$ [2]

11. Applying the method of successive bisection find the square root of 3 within two places of decimal in (1, 2). [4]

OR

Find a root of the equation $x^3 - x - 4 = 0$ in (1, 2) to three places of decimal by Newton Raphson method. [4]

12. Using Simplex method, maximize $Z = 50x_1 + 80x_2$ subject to constraints

$x_1 + 2x_2 \leq 32, 3x_1 + 4x_2 \leq 84, x_1 \geq 0, x_2 \geq 0.$ [6]

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