RK MODERN SCHOOL, NOIDA

CLASS-XII

ASSIGNMENT

UNIT-1(PLANNING IN SPORTS)

1.Write any three objective of planning.

2.What is the task of the decoration and ceremony committees?

3.Give two reasons why tournaments are important.

4.What are the three types of tournaments?

5.What is the difference between round robin and knockout?

6.Draw a knockout fixture of 24 teams.

7.write briefly about the objectives of intramurals.

8.write three differences between intramurals and extramurals .

9.Draw a league fixture of 16 teams.

10.Describe five specific programmes in details.

11.what do you understand by planning.

12. Write down the role of the various committees post tournament.

13. The other name of League Tournament is—

(a) Round robin Tournament

(b) Knock out Tournament

(c) Combination Tournament

(d) Challenge Tournament

14. To avoid compete in initial round which of the following

is correct.

(a) Bye (b) Seeding

(c) fixture (d) Special seeding

15. Describe the mertis & Demerits of league Tournamant.

16. Describe the merits & demerits of knock out Tournaments.

17. How many bye will be given for 21 teams on the knock

out basis.

(a) 15 (b) 16

(c) 14 (d) 17

18. In the placement of Byes, IV Bye is given to whom.

(a) Ist Team of lower half

(b) Ist team of upper half

(c) Last team of lower half

(d) Last team of upper half

19. Explain the meaning of specific sport programs? Explain any four.

20. Write a short note on sports day.

UNIT-2(SPORTS AND NUTRITION)

1. Mention the types of carbohydrate?

2. List down simple types of carbohydrates?

3. Stae complex carbohydrates types?

4.How many amino acids are found in proteins?

5.State two Non-Nutritive components of Diet?

6.Which types of vitamin B are found in diet?

7. Explain Balanced diet and it function in our body?

8. Mention micronutrients which are important for body?

9. Write importance of protein for our body?

10. Write difference between types of carbohydrate simple and complex carbohydrate?

11. How water is useful for us? Explain Briefly?

12. How food intolerance is treated? What are systems Explain in brief?

13. Is fat useful or not useful for us and for body, explain?

14. What is Balanced Diet? How it is important for individual

Body?

15. What factors can be considered for making balanced diet?

16. Why macronutrients should be essential part of our diet?

17. Mention the types and effects of micro nutrients on our body?

18. What is the effect of Diet on performance of sports persons?

19.Maximum Carbohydrates are obtained from

(a) Whole grain food (b) Fish

(c) Plant oil (d) Nuts

20.Sources of Proteins includes

(a) Fish (b) Spinach

(c) Potato (d) Cucumber

UNIT-3(YOGA AND LIFESTYLE)

1.Choose the odd one Asana helps to improve:

(a) Blood circulation (b) Depth of respiration

(c) Speed (d) Digestive system

2.According to Yog sutra, Asana means—

(a) Shira Sukham Asana (b) Asana Sukh Shira

(c) Sukhan asana Shira (d) Sitting pose

3.The word 'YOG' is derived from Sanskrit word

(a) Yug (b) Yuda

(c) Yuj (d) Yum

4.According to Asthana Yog" Asana lies in what place—

(a) Second (b) Third

(c) First (d) Fifth

5. Elaborate the role of Yoga in preventing life style disease?

6. Enlist the lifestyle related diseases. How can they be prevented with the help of asana /Yoga?

7.What is the excess percentage of the normal weight is called obese: _____

(a) 15% (b) 20%

(c) 25% (d) 30%

8. Define obesity.

9.Write any two asanas for obesity and briefly explain the procedure and benefits of any one of them.

10.Define obesity. Explain the procedure of any two asana which helps us reduce obesity.

11. Define diabetes. Briefly explain any two asana which helps to control diabetes.

12.Explain the procedure and benefits of pavanmuktasan in detail.

13.What are the benefits and contraindications of Paschimottanasana and Bhujang asana.

14.Describe the procedure, Benefits & contraindications of Ardhmatseyndrasan.

15.Coughing, heavy berating, chest tightness are the symptoms of:

(a) Asthma (b) Diabetes

(c) Obesity (d) Back pain

16. A disease associated with respiratory tracts is known as

(a) Diabetes (b) Obesity

(c) Asthma (d) Back pain

17. Enlist the asanas which are used to control Asthma.

Explain any two asanas in detail.

18. Elaborate the importance of Paschimotanasan and

matsyasana to cure Asthma.

19. Elaborate the role of Ardhchakrasana and Shavasana in

preventive the hypertension.

20. Briefly explain the three asanas for “hypertension”.

UNIT-4(Physical Education and Sports for

CWSN (Children with Special Needs–Divyang))

1. Which is not a disability:

(a) Hearing (b) Speech

(c) Vision (d) ADHD

2.Most suitable word used for disable person:

(a) Handicapped (b) Retarded

(c) Divyang (d) Blind

3. Olympics for physical handicapped categories

(a) Winter Olympics (b) Paralympics

(c) Summer Olympics (d) Deaflympics

4. Which is a disorder:

(a) Disrupts a person’s performance

(b) It is a mental illness

(c) Lethal Gradually

(d) It is a physical inability

5. Briefly discuss the concept of disability?

6. Explain the concept of disorder?

7. Discuss the type of disability?

8. Elaborate the causes of disability?

9. SPD's expended form is

a. Special police department

b. Special processing Disorder

c. Sensory processing Disorder

d. Sensory processing department

10. Repeated Action are called

a. ADHD c. ODD

b. OCD d. ASD

11. Child is not able to adjust within society is suffering from

a. ADHD c. ASD

b. ODD d. OCD

12. Expended from of ADHD

a. Automatic deficit hyper disorder

b. Attention defect hyper activity disorder

c. Attention disorder of hypoactive defect

d. Automatic disability high defect

13. ASD is --------

a. autism spectrum disorder

b. Autism special disability

c. Automatic special disorder

d. Autism sensory disorder

14. What is the nature of Autism Spectrum Disorder (ASD)?

15. What is the nature of Oppositional Defiant Disorder (ODD)?

16. Explain the disability etiquettes in details?

17. Explain the advantages of physical activities for children with special needs.

18. Explain the strategies to make physical activities accessible for children with special needs?

19. What is the nature of Obsessive-compulsive disorder (OCD)?

20. Mention the symptoms and causes of ODD.

UNIT-5(Children and Women in Sports)

1. Elucidate the meaning of motor development.

2. Mention types of motor development in child new.

3. Explain any five factors affective motor Development in

Children.

4.What are Exercise Guidelines at Different Stages of Growth and

Development?

5.What are the Benefits of Physical Exercises on children?

6. Select the correct development during infancy state.

a. Moral values

b. Various senses

c. fine motor skill

d. Writing skills

7. Pre-school children learn things by

a. Imagination

b. Practice

c. Lecture

d. Repetition

8. In the childhood, children's behavior is mostly influenced

by

a. Friends

b. School

c. Peer group

d. family

9. In adolescence exercises help to

a. Strengthens of cardio-vascular system

b. Increases age toward old

c. Move away from society

d. Remove various senses

10. Explain briefly about the motor development in middle childhood?

11. Write the benefits of exercises during old age?

12. Describe the exercise for Adolescence.

13. Explain the symptoms & corrective measures of kyphosis?

14. Mention the symptoms causes & corrective measures of knock

Knee.

15. Discuss the symptoms, causes & corrective Measures of flat

Feet?

16. Describe the symptoms, causes & corrective measuring of scoliosis?

17. Discuss the symptoms, causes & corrective measure of bow legs?

18. Select the correct reason for less participation of female in

sports.

(a) Low physical fitness

(b) Lack of education

(c) Good Legal system

(d) (a) & (b) both

19. Select the correct reason to improve participation of female

in sports

(a) Good legal system

(b) Female role model

(c) Both (a) & (b)

(d) Improper motivation

20. Express the reasons for women to have less participation in

Sports?

UNIT-6(Test & Measurement in Sprots)

1. Briefly describe the process and scoring of the 50 m standing

start and 600 m walk/Run.

2. Standing broad Jump tests the strength of which part of the

body. Explain the procedure of the test.

3. Briefly describe the process and scoring of the 4 × 10 m

shuttle Run?

4. Enlist of motor fitness test and explain the process of any Two

Test.

5. Measurement of the field for 2ig - 2ag

(a) 16 × 18 m (b) 16 × 10 m

(c) 15 × 10 m (d) 16 × 12

6. Weight of the medicine ball for Boys

(a) 1Kg (b) 2Kg

(c) 3Kg (d) 4Kg

7. Explain General Motor Fitness Test.

8. Explain the Rock port one mile test's Administration.

9. What do you understand by cardiovascular fitness? To calculate the fitness index of an individual.

10. Explain Harvard Step Test in details.

11. Rikli and Jones senior citizen test was developed in

(a) 1990 (b) 2000

(c) 2001 (d) 2002

12. Which of the following is assessed by eight foot up and go test.

(a) Physiology fitness

(b) Walking speed, Coordination and agility

(c) Lower body flexibility

(d) Upper body strength

13. Discuss the Back Scratch test for upper body flexibility.

14. Explain the chair stand test for lower body strength.

15. Write the test to measure the aerobic fitness of senior citizen.

16. Discuss the test item of Rikli & Jonne's to measure the upper

body strength.

17. Discuss chair sit and reach test in briefly.

18. Which test is used to measure the co-ordination and agility of

senior citizen? Write in detail.

19. Partial curl up test for

(a). To measure the explosive power of legs

(b). To measure agility and speed.

(c). To measure abdominal strength

(d). To measure acceleration speed

20. Athlete speed (Acceleration) is measured

(a). Modified push ups (Girls)

(b). 4 × 10 m shuttle Run

(c). 50 m standing start

(d). Sit and Reach

UNIT-7(Physiology and Injuries in Sports)

1. Discuss the physiological factors, determine the strength as

a component of physical fitness?

2. Discuss the physiological factors, determine the endurance

as a component of physical fitness: (Any three)

3. Discuss how physiological factors determine flexibility?

4. Describe the physiological factor determine the speed?

5. Explain the five effects of exercise on the cardiorespiratory

System.

6. What are the Effects of exercise on muscular system?

7. Differentiate between slow twist fiber and fast twist fiber.

8. List the effects of exercise on muscular system and explain

four in detail?

9. Elucidate Physiological change due to Ageing?

10.List some Prevention from Sports Injuries.

11. Not a Causes of sports injuries

(a) Inadequate warming up

(b) Lack of sports Facilities

(c) Practice During Fatigue

(d) Proper knowledge of spots skills.

12. You should use Ice on a soft tissue injury after.

(a) 5 minutes (b) 10 minutes

(c) 20 minutes (d) 15 minutes

13. An ankle sprain is an example of which type of injury.

(a) Skin (b) Hard tissue

(c) Soft tissue (d) Bone

14. Which of the following is not a type of fracture.

(a) Stress fracture (b) Oblique

(c) Contusion (d) Comminated

15. Define soft tissue injuries in the sports? Write its preventive

Measures?

16. What do you mean by dislocation in joints? Explain any two

dislocation in the body.

17. Write the signs & symptoms and treatment of dislocation.

18. Enumerate the types of fractures? Write briefly about any

three types of fracture?

19. Discuss the causes of fracture?

20. How you will prevent injuries in sports?

UNIT-8(Biomechanics and Sports)

1. What is Biomechanics? How it helps in the field of sports &

Games.

2. Discuss the Abduction, Adduction, flexion & extension with

suitable examples in detail? Name the Movements which

occurs in leg press exercise?

3. What are the newton's law of motion? Explain the Application

of 2nd law of Motion (any two applications).

4. The force which oppose the relative motion between the

surfaces of two object are known as

(a) Frictional force (b) Gravitational force

(c) Applied force (d) Tension force

5. The force produced when the surfaces of two objects comes

to contract of each other & tends to move but there is no

relative motion between them is known as

(a) Static friction (b) Sliding friction

(c) Rolling friction (d) Fluid friction

6. What is Friction? Discuss various types of Friction.

7. Differentiate between advantage & disadvantage of friction

in the field of sports.

8. Differentiate between flexion & Extension with examples.

9. Explain newton's 3rd law with two suitable examples from the

field of sports.

10. Differentiate between Abduction & Addaction with suitable

Examples.

11. Bending of Elbow when our hand is going toward our chest is

(a) Flexion (b) Extension

(c) Abduction (d) Adduction

12. Opening of hand sidewise when our hand is moving away

from body is example of

(a) Abduction (c) Adduction

(c) Flexion (d) Extension

13. What is Biomechanics how it helps to promote sports &

Games.

14. Which is not the Importance of Biomechanics

(a) Improvement of Technique

(b) To understand the structure of Movement & effect of

forces on the Movement

(c) To understand Physiology of human body

(d) Improvement of sports Equipements

15. Biomechanics Deals units.

(a) Muscles involved in Movement

(b) Effect of force on Different Movements done by human body

(c) To understand the physiology of the body

(d) To understand Time & Distance concept of Various

Movements

16. Biomechanics helps to improve technique skill & equipment

of sports? Explain with suitable examples.

17. What is the Abduction? Give Two suitable examples.

18. Differentiate between Abduction and Adduction.

19. Newton's 2nd law is also known as

(a) Law of Action Reaction

(b) Law of Inertia

(c) Law of Acceleration

(d) Law of velocity

20. In the long jump take off which law works

(a) 1st law of newton

(b) 2nd law of newton

(c) 3rd law of newton

(d) Low of conservation of mass.

UNIT-9(Psychology and Sports)

1. Elaborate the classification of personality given by Herbert Sheldon.

2. Explain the Jungs classification of human personality.

3. Define personality, write any four traits of Big-5 theory of personality in detail.

4. Elaborate the Big-5 theory of personality.

5. Differentiate between Endomorph and mesomorph.

6. Explain the types of motivation?

7. Enlist the different motivational techniques used in sports and explain any four techniques in detail.

8. Define motivation. Identify and Reward is a type of motivation which forces an athlete to excel in sports, Discuss.

9. Different motivational techniques works differently for every athlete. Enumerate three motivation techniques used in sports.

10. Define Intrinsic Extrinsic motivation. Elaborate any three motivational techniques used in sports.

11. Stick to the fitness program is known as

(a) Fitness (b) Exercise adherence

(c) Performance (d) Training

12. Participation in regular Exercise program is known as

(a) Exercise adherence (b) Wellness

(c) Fitness (d) Performance.

13. Elucidate the term “Exercise Adherence. Write any two

Reason to do exercise.

14. Write any six benefits of exercise. or enumerate any six

Reason to exercise.

15. Participation in exercise program for a long time helps to

developed physiologically, psychologically and sociologically individual in the society. Justify.

16. Elucidate any three Reasons to Exercise.

17. Elucidate exercise adherence. Write any four health related

benefit of exercise.

18. Write any three psychological and physiological benefits of

Exercise.

19. Methods which are used to enhance the participation of

people in exercise program are known as.

(a) Strategies (b) techniques

(c) training (d) Skill

20. Explain any five strategies which are used to enhance

adherence to exercise.

UNIT-10(Training in Sports)

1. What is strength? explain its types?

2. What are the methods for developing strength?

3. What do you understand by explosive strength and maximum

strength.

4. What is strength? Name the training method to improve the

strength & explain any one of them.

5. Explain the Advance training method to develop strength.

6. Explain Isometric, isotonic and Isokinetic method to develop

Strength.

7. Describe fartlek Training Method.

8. Briefly explain the types of endurance.

or

"Endurance is one of the most important factors for high

performance in games and sports" Explain.

9. Differentiate between the continuous method and interval

method. Describe its advantages.

10. What is Endurance? Explain its types?

11. Enlist the methods to Develop endurance and explain any one of them in detail.

12. Explain any two methods to develop the ability helps an

individual to continue it activity under the condition of fatigue.

13. Which is not the type of speed ability

(a) Reaction speed (b) Movement speed

(c) Speed Endurance (d) Speed Play

14. The ability which is helpful to Maintain max speed for long

time.

(a) Reaction speed (b) Locomotor speed

(c) Speed Endurance (d) Movement speed

15. Explain the types of speed Ability?

16. Differentiate between pace run and acceleration run.

17. Explain pace run method?

18. Explain Acceleration rum method?

19. What do you mean by flexibility? Explain types of flexibility.

20. Discuss Reaction Ability?

R. K. MODERN SCHOOL NOIDA

ENGLISH ASSIGNMENT

Class 12

FLAMINGO

The Last Lesson

General instructions:

- Answer question no. 1-5 in about 20-30 words each.
- Answer question no.6-18 in 40-60 words each.
- Answer question no. 19 and 20 in 100 to 120 words each.

Ques.1.What was the mood in the classroom when M. Hamel gave his last French lesson?

Ques.2.What had the narrator counted on to enter the school, unnoticed?

Ques.3 What was Franz expected to be prepared with for the school that day?

. Ques.4.What announcement did M. Hamel make? What was the impact of this on Franz?

Ques. 5.What changes did the order from Berlin cause in the school?

Q.6.What was the mood in the classroom when M. Hamel gave the last French lesson?

Q7."He had the courage to hear every lesson to the very last." What led Franz to make this remark?

Q.8 What made M. Hamel cry towards the end of his last lesson?

Q9. What shows M. Hamel's love for the French language?

Q10. Justify the title 'The Last Lesson'.

Q.11'Bah! I have plenty of time. I'll learn it tomorrow.' Franz was shocked when he heard that it was the last lesson in French and he hardly knew his mother tongue. Many of us find ourselves
in similar situations and regret when all is over. What should we do so that
we are able to achieve our goals?

Q.12..Give one reason why Franz was reluctant to go to school?

Q.13.Why did Franz not join the crowd in the town Hall?

Q.14.. Why had the bulletin-board become a centre of attention during the last two years?

Q.15. What was unusual about M. Hamel's dress and behaviour on the day of his last French lesson?

Q.16..According to M. Hamel who should be blamed for the neglect of
learning on the part of boys like Franz?

Q.17..What changes came over little Franz after he heard M.Hamel's announcement?

18. Why did M. Hamel write 'Vive La France' on the blackboard?

Long Answer Type Questions

Q19. The people in this story suddenly realise how precious their language is to them. What shows you this? Why does this happen?

Q.20 Is it possible to carry pride in one's language too far? Do you know what "linguistic chauvinism"means?

ENGLISH ASSIGNMENT

Lost Spring

General instructions:

- Answer question no. 1-5 in about 20-30 words each.
- Answer question no.6-18 in 40-60 words each.
- Answer question no. 19 and 20 in 100 to 120 words each.

  Q 1. What is Saheb looking for in the garbage dumps? Where is he and where has he come from?

Q.2. What explanations does the author offer for the children not wearing footwear?
Q 3.Is Saheb happy working at the tea-stall? Explain.
Q.4.What makes the city of Firozabad famous?
Q 5.Mention the hazards of working in the glass bangles industry.
Q.6.How is Mukesh's attitude to his situation different from that of his family?
Q.7 What could be some of the reasons for the migration of people from villages to cities?
Q.8.What forces conspire to keep the workers in the bangle industry of Firozabad in poverty?
Q.9. Why should child labour be eliminated and how?
Q.10 Why does the author say that the bangle-makers are caught in a vicious web?
Q.11.. Why don't the bangle makers of Firozabad organize themselves?
Q.12. What makes the authoress embarrassed at having made a promise that was not meant?
Q.13. What is Saheb looking for in the garbage dumps? Where is he and where has he come from?
Q.14.What does Anees Jung want to reveal in her story 'Lost Spring'?
Q.15.. Describe the irony in Saheb's name.
Q.16. Mention the hazards of working in the glass bangles industry. / Describe the difficulties the bangle
makers of Firozabad have to face in their lives.
Q 17. 'Lost Spring' explains the grinding poverty and traditions that condemn thousands of people to a lift of abject poverty. Do you agree? Why/Why not?
Q.18."None of them knows that it is illegal for children like him to work in the glass furnaces with high temperatures". What can be done to improve a lot of poor children in India?
Q.19.Justify the title of the story 'Lost Spring'.
Q20. Most of us do not raise our voice against injustice in our society. Anees Jung in her story, 'Lost Spring' vividly highlights the miserable life of street children and bangle makers of Firozabad. What values do we need to inculcate among the people to bring back the spring in the lives of these children.

The Deep Water

General instructions:

- Answer question no. 1-5 in about 20-30 words each.
- Answer question no.6-18 in 40-60 words each.
- Answer question no. 19 and 20 in 100 to 120 words each.

1. Name the book from which the excerpt 'Deep Water' is taken.
2. Who warned him about the dangers lurking in the river Yakima?
3. What unpleasant memory Douglas had about the beach in California?
4. Though the instructor thought that his job at the swimming pool was over, Douglas considered his practice unfinished. What else did he do at the swimming pool after the
departure of the instructor?
5. After the completion of practice and training in a swimming pool, he was not satisfied.
Where did he practice next?

Q.6.. What made the Y.M.C.A. pool safe for learner?
Q.7.. What did William Douglas mother warn him about and why?
Q.8 How did Douglas develop an aversion to water?
Q.9. How did Douglas try to feel at ease in the Y.M.C.A. pool?
Q.10. What did Douglas plan while he was drowning?
Q.11. Who had thrown Douglas into the pool and why?
Q.12.. What was the immediate effect on Douglas of the drowing incident?
Q.13. Mention any two long term consequences of the drowning experience?
Q.14. How did this incident (Douglas drowning) deprive him of the pleasures of water sports?
Q.15. What did the author do to overcome the fear of water? Did he succeed? Give reasons for your belief?
Q.16. Who helped him overcome his fear of water? How did he do so?
*Q.17. Why did the experience of Conquering his fear of water have a deeper meaning for Douglas?
Q.18. Which two incidents made Douglas fear water?
Q.19. What caused in Douglas a fear of water? How did he overcome it?
Q.20. 'If we surrender to our fears they overpower us, if we face them they fade away. Do
you agree? Why, Why not? Discuss with reference to the lesson.

The Rattrap

General instructions:

- Answer question no. 1-5 in about 20-30 words each.
- Answer question no.6-18 in 40-60 words each.
- Answer question no. 19 and 20 in 100 to 120 words each.

1. What amusing idea about the world struck the peddler?
2. How did the peddler feel after cheating the Crofter?
3. What did the peddler do to earn a living?
4. How did the old crofter welcome the peddler?
5. How did the peddler redeem himself in the end?
6. Why did the peddler accept EdlaWillmansson's invitation of bringing him to her home?
7. What did the peddler sell and how did he make the things?
8. Why did the peddler have to resort to both begging and petty thievery?
9. What kind of life did the peddler lead and why?
10. When did an idea suddenly strike to the peddler and what was it?
11. How does the author employ the metaphor of 'rattrap' effectively in the story? Explain by giving
examples from the text.
12. What did the peddler think of the world and its people?
13. Why was the old crofter so friendly and relaxed with the peddler?
14. How was he welcomed by the old crofter? Did he expect such a hospitality?
15. What did the old crofter do with the pouch and why?
16. How did the peddler prove false to his host, the old crofter? Did he let himself voluntarily be swept
away by the bait?
17. Why did the peddler decide to take his way through the forest?

18. Why did the peddler recall his thoughts about the world and the rattrap when he was lost in the big
and confusing forest?
19 The metaphor of the ‘rattrap” runs through the whole story. How does the author employ it?
20. Describe the story “The Rattrap” shows that basic human goodness can be brought out by understanding and love.

INDIGO

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-18 in 40-60 words each.
Answer question no. 19 and 20 in 100 to 120 words each.

Q1. Why did Gandhiji feel that taking the Champaran case
to court was useless?
Q.2. How did the Champaran peasants react when they
heard that a Mahatma had come to help them?
Q3.What made the Lieutenant Governor drop the case against Gandhiji?
Q4. Why did Gandhiji oppose when his friend Andrews
offered to stay in Champaran and help the peasants?
Q5. Why do you think Gandhi considered the Champaran
episode to be a turning point
in his life?
Q6. What did the peasants pay to the British landlords as
rent?
Q7.Why do you think the servants thought Gandhi to be another peasant?
Q8.”The battle of Champaran is won!” What led Gandhiji to
make this remark?
Q9.Why did Gandhi agree to the planters’ offer of a 25%
refund to the farmers?
Q10.How was Gandhi able to influence the lawyers? Give
instances.
Q 11How did Gandhi bring solution not only to the political issues but also to
the social and cultural problems?
Q.12Why do you say that even ordinary citizens too had
a great role to play in the independence movement.
Q.13. Freedom from fear is more important than legal
justice forthe poor. Comment
Q14 Why is the Champaran episode considered to be the
beginning of the Indian struggle for independence?
Q15Gandhiji’s loyalty was not a loyalty to abstractions; it
was a loyalty to living human beings. Why did Gandhiji continue his
stay in Champaran even after indigo sharecropping disappeared?
Q16.Describe how, according to Louis Fischer, Gandhiji
succeeded in his Champaran campaign.
Q.17.Why did Gandhiji agree to a settlement of 25% refund to the farmers? How did

influence the peasant-landlord relationship in Champaran?
Q18. Give an account of Gandhiji's efforts to secure justice for the poor indigo sharecroppers of Champaran.
Q.19Why did Gandhiji decide to go to Muzaffarpur before going to Champaran?

Poetry Section
My Mother At Sixty six

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-25 in 40-60 words each.

Q.1. What was the childhood fear that now troubled the poet?
Q.2 What was the speaker's familiar ache?
Q3. What do the poet's parting words suggest?
Q.4. Why did the poet smile and smile?
Q.5 Explain "pale as a late winter's moon".
Q.6. How does the poet describe her mother?
Q.7. What is the kind of pain and ache that the poet feels?
Q.8.. What were Kamala Das' fears as a child? Why do they surface when she is going to the airport?
Q.9. What were the poet's feelings as she drove to Cochin airport?
Q.10. What do you understand by the phrase, "face ashen like that of a corpse"?
Q.11. Why are the young trees described as 'sprinting'?
Q.12. Why has the poet brought in the image of the merry children 'spilling out of their homes'?
Q.13.What makes you say that the joyful scene did not help her drive away painful thought?
Q14.. Why has the mother been compared to the 'late winter's moon'?
Q.15. What traits are associated with 'old age' and 'youth'?
Q.16. What do the parting words of the poet signify?
Q.17. Why does the poet use the word "smile" repeatedly in the poem?
Q.18. What does the poet's mother look like? What kind of images has the poet used to signify her ageing decay?
Q.19.. What does the poet realise with pain?
Q.20.. Why does the poet 'put that thought away' and look outside?
Q.21.. The poet's repeated smile seems out of place in away. In which way is that appropriate?
Q.22.. Why does the poet look outside? What does she see happening outside?

Q.23. How has the poet contrasted the scene inside the car with the activities going on outside?
Q.24.. What does the poet do after the security check-up? What does she notice?
Q 25.. Why does the poet smile and what does she say while

An Elementary School Class Room In A Slum

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-20 in 40-60 words each.
1. How does the poet describe class room walls ?
2. What are class room walls decorated with?
3. What do you mean by open handed map?
4. What do you understand about 'awarding the world its world?
5. Why did the poet compare the children to the rootless weeds?
6.Why was the boy described as unlucky heir?
7.. How does the poet explain the conditions of the children in the class room in slum?
8. How does the poet explain the condition of the class room?
9. Does the map have any relevance to these slum children? if not why?
10.Explain the expression' these windows, not this map, their world'.
11.What did you understand about the awarding the world its world?
12.Why is Shakespeare described wicked?
13.How did the map tempt them to steal?
14.Explain the pathetic living conditions of slum children depicted in the third stanza.
15 How is the fourth stanza different from the previous stanzas?
16.. What do you understand about the phrase "all of their time and space are foggy slum"?
17.What does the poet ask the Governor, inspector and visitor to do ?
18.What will happen if they do not take care of these slum children?
19. Explain this – "this map becomes their window and these windows that shut upon their lives like catacombs"
20. What do you understand about this expression? "History theirs whose language is the Sun"

KEEPING QUIET

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-20 in 40-60 words each.
1.What will counting up to twelve and keeping still help us to achieve ?
2.Do you think the Poet Neruda advocates total inactivity and death ? \
3.What is the "sadness" that the Poet Neruda is speaking about in the poem, "Keeping Quiet" ?
4.What symbol from Nature does Neruda invoke in the poem, "Keeping Quiet" to say that there can be life under apparent stillness ?
5."Life is what it is about" ……..How is keeping quiet related to life ?
6.Why does one feel "sudden strangeness" on counting to twelve and keeping quiet ?

7.How will “keeping quiet” protect our environment?
8.What does the poet Neruda mean by saying ,”victory with no survivors” ?
9.What is Neruda”s attitude towards “War” as a whole ?
10.How will you interpret ‘twelve” in the poem, “Keeping Quiet” ?
11.What will counting upto twelve and keeping still help us achieve?
12- Do you think the poet advocates total inactivity and death?
13.What is the ‘sadness’ that the poet refers to in the poem?
14- What symbol from Nature does the poet invoke to say that there can be life under apparent stillness?
15. What is the sadness that the poet refers to in the poem ‘Keeping Quiet’? (All india 2014)
16. Which images in the poem ‘Keeping Quiet’ show that the poet condemns violence?
17.. What symbol from nature does the poet use to prove that keeping quiet is not total inactivity?
18..What are the different kinds of wars mentioned in the poem? What is Neruda’s attitude towards these wars?
19. How can suspension of activities help?
20. According to the poet, what is it that human beings can learn from nature? (All india 2010)

LONG QUESTIONS :
1.Write the central idea of the poem, “Keeping Quiet” ?
2.”Though it was written in the last century, yet Neruda’s “Keeping Quiet” is highly relevant in 21st Century also” How ? Elucidate .

A Thing of Beauty

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-20 in 40-60 words each.
1. According to Keats , what makes man love life in spite of all its problems and miseries ?
2. What image does Keats use to describe the beautiful bounty of the earth ?
3. What makes human beings love life inspite of troubles and sufferings ?
4.Mention any two “things of beauty” that Keats has described in his poem . How do they make us joyful ?
5.Mention any two things which according to Keats , give us pain and suffering .
6.Why and how is grandeur associated with the mighty dead ?
7.What is the message of the poem , “A Thing of Beauty” ?
8.What does Keats consider “an endless fountain of immortal drink” and why does he call it “immortal” ?
9.In the hot season, how do man and beast get comfort ?
10.How do beautiful things influence our lives ?
11. What are the flowery bands that bind us to the earth?
1 2. According to Keats, what makes man love life in spite of all
its problems and miseries?

13. What image does Keats use to describe the beautiful bounty of the earth?
14. Mention any two ‘things of beauty’ that Keats has described in his poem. How do they make us joyful?
15. Mention any two things which, according to Keats, give us pain and suffering.
16. What does the phrase, ‘pass into nothingness’ mean?
17. What are the effects of beautiful things on man’s spirit?
18. Why and how is grandeur associated with the mighty dead?
19. What is the message of the poem, ‘A Thing of Beauty’?
20. How is a thing of beauty a joy forever?
21. According to Keats Which evil things do we possess and suffer from?

Aunt Jennifer' Tigers

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-20 in 40-60 words each.
1. Describe the tigers created by Aunt Jennifer.
2. Why did Aunt Jennifer choose to embroider tigers on the panel?
3. What will happen to Aunt Jennifer’s tigers when she is dead?
4. What kind of married life did Aunt Jennifer lead?
5.How does Aunt Jennifer express her bitter-ness and anger against male dominance?
6. Aunt Jennifer’s efforts to get rid of her fear proved to be futile. Comment.
7. Why do you think Aunt Jennifer’s hands are ‘fluttering through her wool’ in the second stanza? Why is she finding the needle so hard to pull?
8. What is suggested by the image ‘massive weight of uncle’s wedding band’?
9.Of what or whom is Aunt Jennifer terrified in the third stanza?
10. Why is it significant that the” poet uses the word ‘ringed”! What are the different meanings of ‘ringed’ in the poem?
11.Interpret the symbols found in this poem.

12.What is the attitude of the speaker towards Aunt Jennifer?
13.What does the title of the poem suggest to you? Are you reminded of other poems on tigers?
14.How do 'denizens' and 'chivalric' add to our understanding of the tiger's attitudes?
15.. Why do you think Aunt Jennifer's hands are 'fluttering through her wool' in the second stanza? Why is she finding the needle so hard to pull?
16.Do you sympathise with Aunt Jennifer? What is the attitude of the speaker towards Aunt Jennifer?
17. What are the traits of tigers that are a contrast to the aunt?
18.What do tigers symbolise?
19.. Who are the men mentioned in the first stanza?
20 What is the significance of the word “mastered”?

VISTAS

Chapter 1: The Third Level

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-20 in 40-60 words each. Question no.21-27 in 100-120 words each.

1.What does the third level refer to?
2.What was the hobby of Charley's grandfather?

3. What route did Charley take to go home from office?
4.What is the name of Charley's wife?
5.What did Charley compare Grand Central to?
6.What does the third level refer to? 7.What is the significance of the third level?
8. What convinced Charley that he had reached the third level at Grand Central Station and not the second level
9. How does Charley, the narrator describe the third level at Grand Central Station?
10. How did Charley make sure that he was not in the present time?
11. How did Charley often get lost on the Grand Central Station?
12.. Why did Charley suspect that Sam had gone to Galesburg?
13.How does Charley describe Galesburg as it used to be in 1894?
14 What did Charley learn about Sam from the stamp and coin store?
15.. How did Sam reach Galesburg? What did he advise Charley to do?
16. Why did the booking clerk refuse to accept the money?
17 Why did Charley rush back from the third level?
18 What, according to the psychiatrist, was Charley's problem?
19. What did the psychiatrist think about Charley's stamp collection ? Why did Charley not agree with him?
20. How does Charley describe himself?
21. What idea did Charley have about the tunnel and why didn't he tell the psychiatrist about it?
22. How did Charley make sure that he had actually travelled in the past?
23. Describe Galesburg, as it existed in the year 1894?
24. In which context did Charley say, "eggs were thirteen cents a dozen in 1894"?
25. What made Louisa, Charley's wife, believe that the third level was a reality?
26. What is a first day cover?
27. Who had sent the first day cover and what was written on it?

The Enemy

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-15in 40-60 words each. Question no.16-20in 100-120 words each.

1. Hana and Dr. Sadao found a wounded man at the sea shore . Which country did he belong to?
2. Sadao was sent to America to learn ……..
3. The incident of this lesson happened at the time of……

4. In those days of war, Japanese treated Americans as……
5. Who is the Japanese army general mentioned in this lesson?
6. What did Dr. Sadao and his wife do with the the man?
7. What did Sadao do to help Tom escape to freedom?
8. Why was Dr. Sadao not sent abroad along with the troops?
9. Where had Dr. Sadao first met his wife ? What had been his initial reaction?
10. How did Dr. Sadao ensure that soldier left his house but he himself remained safe and secure?
11. The theme of the racism is reflected in the story . Elucidate with example.
12. How did the writer indicate that Sadao' s father was a traditional and conventional man?
13. In what condition did Dr. Sadao find American soldier at the seashore ?
14. What role did the American professor played in bringing Hana and Sadao together ?
15. Why did Dr.Sadao take American soldier in and save him ?

16. There are moments in life when we have to make hard choices between our roles as private individuals and as citizens with a sense of national loyalty. Discuss with reference to the story you have just read.
17. While hatred against a member of the enemy race is justifiable, especially during wartime, what makes a human being rise above narrow prejudices?
18. Do you think the doctor's final solution to the problem was the best possible one in the circumstances?
19. Good human values are far above any other value system. How did Dr.Sadao succeed as a doctor as well as a patriot?
20. Dr.Sadao was a patriotic Japanese as well as a dedicated surgeon. How could he honour both the values?

OR

What impression do you form about Dr.Sadao as a man and as surgeon on your reading the chapter, ' The Enemy' ?

SHOULD WIZARD HIT MOMMY…..

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-15in 40-60 words each. Question no.18-21 in 100-120 words each.

Answer following in one sentence each. 1 mark

1. What was the custom or a necessary ritual for Jack?
2. Why was it necessary for Jack to tell stories in the evenings and on Saturday afternoons?
3. What type of stories did Jack usually tell his daughter?
4. Who is Jo?
5. What do the questions raised by Jo tell about her?
6. What is the role played by mother Skunk in the story?
7. Why did Roger Skunk go to see the old owl?
8. How did the wizard help Roger Skunk?
9. How did Roger Skunk's Mommy react when he went home smelling of roses?
10. How did the Skunk's mother get him his old smell back?

11. Who is Jo? How has she changed in the past two years? How did Jo behave in the 'reality phase'?
12. How does Jo want the story to end and why?
13. Why was Roger Skunk's mother angry? On whom did she pour her anger?
14 Why does Jack feel himself caught up in a middle position?
15. Give an instance from the story to prove that Jack is not inventive or creative ?
16. The word that means the same as 'a period when someone is actively involved in a work 'is……
17. The wizard asked for ……..pennies than Roger usually had.
18. Describe Jack's art of storytelling.
19. At the end of the story telling session, why does Jack consider himself 'caught in an ugly middle
position?' Discuss.
20. How did Jack end the story? How and why did Jo want father to change it?
21. The world view as perceived by the two individuals about the same situation may be different for two
people. Substantiate the statement with reference to the story 'Should Wizard Hit Mommy '.

ON THE FACE OF IT

General instructions:

Answer question no. 1-5 in about 20-30 words each.

Answer question no.6-15in 40-60 words each. Question no.15-21 in 100-120 words each.

Read the extract and answer the questions:

1. "That's a terrible thing. That's the ugliest thing I ever saw."
a. Who is the speaker?
b. What is called terrible?
c. What is the speaker's reaction when he looks in a mirror?
d. Who is being spoken to?
2. "Lord, boy, you've got two arms, two legs and eyes and ears, you've got a tongue and a brain"
a. Who speaks the above lines?
b. To whom is he speaking?
c. What is the problem with the listener?
d. Why does the speaker address the boy?
3. "Oh no, oh no. Because if I don't go back there, I'll never go anywhere in the world"
a. Who is being spoken to?
b. What does the listener not want?
c. Who is the speaker?
d. What change brought about in the speaker is reflected in these lines?
4. What did Lamb tell Derry about surviving in this world?
5. Why didn't Lamb like curtains?
6. What did Lamb tell Derry about hate?
7. How and why did Derry enter Lamb's garden?
8. Why does Lamb have a tin leg? What do children call him?
9. Which are the comments that embittered Derry?
10. Derry felt that Lamb was peculiar. Why?

11. Derry's mother warns him not to meet Lamb. Why?
12. Why doesn't Derry stay to help Lamb get crab-apples?
13. Derry returns back to Lamb. Why?
14. What is the bond that unites Lamb and Derry?
15. Lamb told Derry the story of a man who locked himself. Why did the man do so and what was the result?
.16. Describe Mr. Lamb's garden.
17. How did the meeting with Mr. Lamb become a turning point for Derry?
18. What draws Derry towards Mr. Lamb?
19. Will Derry get back to his old seclusion or will Mr. Lamb's brief association affect a change in
the kind of life he will lead in the future?
20. What is the difference between Derry and Mr. Lamb in attitude towards people?
21. The lesson is an apt depiction of loneliness and sense of alienation experienced by people on
account of disability. Explain.

EVANS TRIES AN O LEVEL

General instructions:
Answer question no. 1-5 in about 20-30 words each.
Answer question no.6-15in 40-60 words each. Question no.15-21 in 100-120 words each.

R. K. Modern School

Assignment : English

Writing Section

Notice Writing

A notice is written for news announcement or information about something that has happened or is likely to happen. It may be a formal announcement of public importance or an advance warning meant for compliance or providing information.

A notice can be about a meeting, an event, an excursion/a historical trip/a picnic, lost and found, change of name/address/uniform/timings/venue etc.

The marking scheme for notice in the Board Examination

Format: 01 mark

Expression: O1 mark

Content: 02 marks

Format of Notice

Name of the issuing authority

NOTICE

Date of issue of the notice

Title/Subject of the Event

BODY of the Notice

(Mention Date/time/duration/Place/Venue)

Authorized signatory

(Name, Designation and signature)

PRACTICE QUESTIONS

1. You are Krishanu , a student of Valley Point School. Your school is providing a ' Summer Camp' for the children of Euphoria Residential campus on musical instruments.

Draft a notice giving details of the camp. Use only 50 words.

2. As the Vidyalaya Captain of your school, write a notice in not more than 50 words asking the students of your school to donate old clothes, books and bags for the Flood Victims.

3. You are Raghav, the Head Boy of your school. Your school is planning to hold Fun filled workshops on candle making and clay modelling for all Class VIII students on Children's Day in the school. write a notice informing students about it. Include

Include necessary details and write the notice in not more than 50 words.

4. Your school is organising an Excursion trip to the nearby Sanctuary in the summer vacations for interested students of ClassesVIII andIX.As president of the Excursions Committee, write a notice in not more than 50 words informing students about the trip and inviting them to join.

5. Write a notice for the school notice board informing the students about the inspection Visit of the School Inspector in your school on 20.9.2017. Write the notice in not more than 50 words asking the students to maintain punctuality, cleanliness and discipline.

6. The school is about to organise a Cultural Evening in theSportsComplex. The Principal has asked you, as the school Prefect, to write a notice about this event, informing the students and teachers to participate in it. Write the notice in not more than 50 words including all the relevant details.

7. The Welfare Association of your colony is organising a Diwali get together in the locality. As the president of the association, draft a notice in not more than 50 words informing the residents about the same. Give other essential details
about the celebration

Advertisement

1. You are the manager, Excel Pharma Ltd. Draft an advertisement for your company for the post of Sales Executive (two) mentioning all details as per your requirements.
2. Vasant international school requires a receptionist. The administrative office drafts an advertisement for publication in the situation vacant columns of a newspaper. As the Administrative Officer(AO) of the school
draft a classified advertisement inviting application for walk in interview along with the testimonials.
3. You are A L Bhagat of C-108, Shakti Nagar, Delhi. You are Charted
Accountant and you are capable of handling accounts and managing
finances, having six years of experience. Draft an advertisement for The Times of India seeking a job (full time/part time).
4. You are Mohan. You intent to start Online hobby classes during lockdown period at your residence. Write an advertisement to be published in The Hindu. (50 words) (Hints; name of hobby classes, date, time, qualified faculty, mode of admission, contact no etc.)
5. You own an independent house in Hyderabad and want to sell it. Draft an advertisement for local daily by giving all necessary details.
6. Suppose you are Arnab , Director Study Plus, Australia. You wish to
purchase land for setting up a school in India. Write a suitable advertisement inviting offers from land owners. Give necessary details like plot size, area or location and offer of out sight purchase. Do include your address in India.
7. You plan to sell your two wheeler. Draft a suitable advertisement in not
more than 50 words under the classified columns of local daily, giving all necessary details.
8. You want to sell off some office furniture such as table with chair,
cupboards etc. as you are moving out of Bengaluru. Draft an advertisement

Letter Writing

LONG ANSWER QUESTIONS

1]you are Kareena. You wish to apply for the post of librarian in ABC school. Write a letter to the principal
applying for the job.
2]You are Ajju .You want information about French language courses at Alliance Franchaise, New Delhi.
Write a letter to the director enquiring about the same.
3]You are Roseena. You observe that the youth of today is more attracted towards the western culture. Write a
letter to the editor of a national daily expressing your views and concern about it.

Letter Writing Questions

4. You are Radha G, member of NGO AWAAZ. Write a letter to the editor of a nationaldaily for a public movement to clean the Yamuna river. (You must introduce yourself,
describe how the people are to be blamed for polluting the river and suggest the need forinstalling water treatment plant to clean the river).
5. Write a letter to M/s. Oxford Publishing House, London complaining that the books sent

by them were not those you had ordered for. Ask for replacement. You are Varun Joshi,Sector-20, Chandigarh.
6. You are Ram/Rajani, living at 1, Rana Pratap Marg, New Delhi. Read the advertisement given below and apply for the job that suits you giving your bio-data separately. Sun University requires Lecturers in English and Demonstrators in Physics, Chemistry and Botany for their new Campus at Panipat. Candidates with a minimum of 5 year experience alone can apply.Excellent command of English is a must. Excellent packageand compensation for experienced persons. Those interested may e-mail to sununiversityjobs@gmail.com or mail their response to: Box no 123, 'The Harbinger',New Delhi.
7. Bal Vidya Public School, Bhilai, urgently requires a post-graduate teacher to teach political science for which they have placed an advertisement in The Bhilai Express. You are Sanjay/Sanjana Sharma from 21, Vasant Marg, Bhilai. Draft a letter including a CV,applying for the advertised post.(120 – 150 words)
8. You are Sanjeet of 122, Arjun Nagar, New Delhi. A number of scooters and cars are parked in your locality without any order, causing blockage of the streets. Write a letter to the local Secretary of the Resident's Association complaining against this problem.
9. Write a letter to the in-charge of text-books section of NCERT, New Delhi complaining about the non-availability of text books even one month after beginning of new session. You are Rohit Rana reading in St. Xavier's school, Delhi.
10. Gandhinagar is a thickly populated locality inhabited mainly by the working class people. Unfortunately, there is no Amul milk booth in the locality. Write a letter in 100 - 120 words to the editor of a local daily drawing the attention of the authorities to the problem faced by the people, requesting them to open a milk booth. You are Sham / Shobha, 4, Gandhinagar, Mumbai.
11. You are Rajesh, a brilliant student who has completed his class XII from a small town in Manipur, where not many facilities are available. Your friend has shown you an advertisement about a coaching centre for IIT-JEE. Write a letter to the Director of Suria Coaching Centre asking for more details.

Formal / Informal letter

1.You are going on a picnic at the Suraj Kund, near Haryana-Delhi border with a group of your classmates. Send an informal invitation to your close friend Vipin to join you.
2.Send a formal invitation to Sh. K.B. Vaid, noted novelist and educationist, to speak on 'The importance of devotion, dedication and discipline' in Value Education Club of your school.
3.You are Vijay Ahuja, proprietor of KIDS PLANET, a showroom of children's goods. Draft a formal printed invitation to be sent to your patrons, friends and relatives. Give details such as date, time and venue.
4.On behalf of Mr and Mrs V.K. Mehra, draft a printed invitation card for the marriage of their daughter Prabha with Mayank (S/o Mr & Mrs L.K. Dhingra of Faridabad). Give other details such as date, time and venue. (Word limit = 50 words)
5.Your school, Modem School, Barakhamba Road, New Delhi is organising its Annual Sports Day. Draft an invitation to be sent to the parents.
6.Your school, St. Thomas Public School, Meerut, is organising an inter school one-act play competition. Draft an invitation to famous playwright Vijay Kumar to act as one of the judges.
7.You have received an invitation to attend the prize giving ceremony on the occasion of the Regional Social Sciences Exhibition. Write a letter to the Secretary of the 'The World View'

(the organiser of the exhibition) informing him about your inability to attend. Give three reasons.
8.You were invited by a friend of yours to spend some days at his farmhouse in Manali during the summer vacation. Respond to his invitation.
9.Write an informal reply to your pen-friend in the U.K assuring her of all help and guidance during her planned forthcoming visit to India.
10.You are Arun/Aruna. You have been invited to attend the wedding of your friend's sister during summer vacation. Respond to the invitation accepting the invitation.

QUESTIONS FOR PRACTICE
1.Regular practice of yoga can help in maintaining good health and even in the prevention Writing Skills 121 of so many ailments. Write a speech in 150-200 words to be delivered in the morning assembly on the usefulness of yoga. (Delhi 2012)
2.Mobile phone of today is no longer a mere means of communication. Music lovers are so glued to it that they don't pay attention even to the traffic while crossing the roads. This leads to accidents, sometimes even fatal ones. Write a speech in 150-200 words to be delivered in the morning assembly advising the students to be careful in the use of this otherwise very useful gadget. Imagine you are the Principal of your school. (Delhi 2015)
3.Today's children are not yet aware of many opportunities awaiting them after they complete their school education. As an academic counsellor give a talk to the students of St Antony's School on the need for career guidance and how knowledge of the available careers can benefit the youth. Write the speech in 150-200 words. (Comptt. Delhi 2014)
4.Write a speech in 150-200 words on the topic, 'Library plays an important role at school'. It is to be delivered in the morning assembly. You are Karuna/Karan, Head Girl/Head Boy. (Delhi 2016)
5.As Mukul / Mahima of Alps Public School, write a speech to be delivered in school assembly highlighting the importance of cleanliness suggesting that the state of cleanliness reflects the character of its citizens.(150-200 words)(CBSE Sample Question Paper 2018-19)
6.You are Ali/Alia, Head girl / Head boy of your school. You are deeply disturbed by the rising cases of aggressive behaviour of students in your school. You decide to speak during the morning assembly about it. Write a speech on 'Indiscipline in Schools'. (150 – 200 words) (CBSE ALL INDIA Board 2017-18) .
7.You are PGT English Ms. Geetha is a short story writer also. 'Sky is not Far' is a collection of her latest short stories. This book has won a national award. Write a speech in 150 – 200 words you will deliver in her honour in the morning assembly. (10) (CBSE DELHI - 2017)
8.You are Sampreet, an educationist. You have noticed that the youth of today are often unable to cope with stress and become frustrated and bitter. Write a speech in 125-150 words to be delivered at a college function on 'Youth, their problems and solutions'. (Delhi 2014)
9.Power shortage has become a norm even in the metropolitan cities.

One way to face this situation is by preventing the wastage of power. Write a speech in 150-200 words on the importance of power in our daily life and how to save power at school and at home. Imagine that you are the Principal of your school. (Delhi 2014)

10.Man, by destroying nature, is putting his own life at risk. Write a speech in 150-200 words on the ways in which man destroys nature and the need to create awareness of the benefits of protecting nature. (Comptt. Delhi 2016)

R.K. MODERN SCHOOL

CLASS XII BIOLOGY CH-2

ASSIGNMENT – SEXUAL REPRODUCTION IN FLOWERING PLANTS

Q1 What is an anatropous ovule?

Q2 What is shield -shaped single cotyledon of monocots called?

Q3 Name the kind of pollination in maize.

Q4 Name the type of flower which favours cross pollination.

Q5 What is the function of germ pore?

Q6 Name the landing plateform for Pollen-grain.

Q7 What is polyembryony?Give two examples.

Q8 Draw a diagram of a male gametophytr of angiosperm.

Q9 What is triple fusion?

Q10 Draw a diagram of L.S. of an anatropous ovule of an angiospermand label nucellus, Integument, Antipodal cells, secondary nucleus.

Q11 Draw a diagram of pollen grain with germ tube and two male gametes.

Q12 Explain the following giving reasons

a) Pollen grains are well preserved as fossils.
b) Pollen tablets are in use by people these days.

Q13What is apomixis and what is its importance?

Q14 With a neat diagram explain the 7- celled , 8 -nucleate nature of the female gametophyte?

Q151)Draw a labelled long-sectional view of albuminous seed.

2) How are seeds advantage to flowering plants?

Q16 Explain the role of tapetum in the formation of pollen grain wall.

Q17 What is filiform apparatus?

Q18 Why is apple called false fruit? Which part of the flower forms the fruit?

Q19 Make a list of any three outbreeding devices that flowering plants have developed and explain how they help to encourage cross- pollination.

Q20 Give an example of a plant which came into India as a contaminated and is a cause of pollen allergy?.

R.K.MODERN SCHOOL

CLASS XII BIOLOGY ASSIGNMENT

CH-3 HUMAN REPRODUCTION

Q1 How many chromosomes are present in a human male sperm?

Q2 What is acrosome?

Q3 Mention the location and the function of Leydig cells in humans.

Q4 Where does fertilisation normally take place ina human female?

Q5 Expand –

a) HCG
b) FSH

Q6 Name the three layer of uterine wall.

Q7 Name the organs which comprise the male reproductive system

Q8Draw a labelled sectional view of seminiferous tubule of a human male.

Q9 What is ovulation? What happens to the graffan follicle after ovulation?

Q10 Define spermiogenesis?

Q11 What is parturition? Which hormones are involved in induction of parturition?

Q12 Women experience two major events in their life time , one at menarch and the second at menopause. Mention the characteristics of both the events.

Q13 Draw a labelled diagram of a graffian follicle.

Q14 Name the functions of the following-

a) Corpus luteum
b) Endometrium
c) Acrosome
d) Sperm tail
e) Fimbriae

Q15 a) Draw a schematic diagram of a human sperm and label the cellular composed .Give the functions of any three parts.

c) Where are the sperm heads found embedded to survive after sper matogenesis?

Q16 Describe the stages of oogenesis in human female.

Q17 Why does meiosis and mitosis occur ingerm cells?

Q18 Where are fimbriae present in a human female reproductive system?give their function.

Q19 Spermatide possess haploid chromosomes number .Explain

Q20 What happened to the blastocyst immediately after implantation?

Q21 How is the milk production regulated by hormones in human female? Explain.

Q22 How many eggs do you think we're released by the ovary of a female dog which gave birth to. Six puppies.

Q23 Name the important mammary gland secretion that help in resistance of the new born baby.

Q24Explain the function of umbilical cord.

Q25 In our society the women are often blamed for giving birth to daughters . Can you explain why this is not correct.

d)

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CLASS XII CH 4 ASSISTANT

REPRODUCTIVE – HEALTH

Q1 Define population explosion.

Q2 Expand MMR, IMR

Q3 Name the causative agent of AIDS.

Q4 Mention early symptoms of STDs.

Q5 Comment on the RCH programme of the government to improve the reproductive health of the people.

Q6 Describe the chemical of birth control.

Q7 Mention any four characteristics that an ideal contraceptive should have

Q8 Describe the different methods of embryo transfer.

Q9 What do you mean by reprod uctive health?

Q10 Removal of gonads can not be considered as a contraceptive option. Why?

Q11 Name is an oral pill used as a contraceptive by human females.Exlain how does it prevents pregnancy.

Q12 Why is medical termination of pregnancy MTP carried out?

Q14 A woman's husband is infertile, So the lady has decided to have baby by taking sperms from sperm bank. Which technique will you suggest for pregnancy.

Q15 Why is tubectomy considered a contraceptive method?

Q16 How do surgical procedure prevents conceptions in humans? Mention the way it is achieved in human males?

Q17 Name the hormonal composition of the oral contraceptive used by human females.

Q18 What are the barrier methods of birth control?

Q19 Name two sexually transmitted diseases caused by bacteria.

Q20 What is sterlisation?

Q CLASS XII BIOLOGY

ASSIGNMENT CH----5

PRINCIPLES OF INHERITANCE AND VARIATIONS

Q1 What is heredity?

Q2 What are variations?

Q3 Who is the father of genetics?

Q4 How many kinds of phenotypes would expect in F2 generation in a monohybrid cross?

Q5 Mention the type of allele that express itself only in homzygous state in an organism.

Q6 Give an example of ahuman disorder that is caused due to a single mutation.

Q7 What are alleles?

Q8 Write the types of sex determination in a male and a female bird.

a) Female XX with Male XO
b) b) Female ZW with Male ZZ

Q9 Give an example of a human disorder that is caused due to a single gene mutation.

Q10 State the chromosomal defect in individual with Turner's syndrome.

Q11 During monohybrid cross involving a tall pea plant with a dwarf pea plant , the offspring populations were tall and dwarf in equal ratio.Work out a cross to show it is possible?

Q12 when a tall pea plant was selfef, it produced one fourth of its progeny as dwarf . Explain with the help of a cross?

Q13 Explain co-dominance with the help of one example.

Q14 Write the scientific name of fruit fly, why did Morgan prefer to work with fruit flies for his experlments ? State any three reasons.

Q15 A woman with blood group O married a man with AB group.Show the possible blood groups of the progeny. List the alleles involved in this inheritance.

Q16 àExplain sex determination in birds.

Q17 How does mutation occur?

Q18 List any four symptoms shown by Klinfelter's sundorme sufferer.Explainthe cause of this diseases.

Q19 state the law of independent assortment.

Q20 Write the symptoms of haemophilia and sickle-cell anaemia in in humans.

Q21 Why is thalassemia categorised as a Mendelian disorder?

Q22A homozygous tall pea plant with green seeds is crossed with a dwarf peaplant with yellow seeds—

1) What would be the phenotype and genotype of F1?
2) Work out the phenotypic ratio of F2ge station with the help of a punnet square.
3)

How is gene CLASS XII ASSIGNMENT

CH—6 MOLECULAR BASIS OF INHERITANCE

Q1 Name two types of nucleic acids.

Q2 How many base pairs would a DNA segment of length 1.36 nm have?

Q3 Why are proteins either. Positively or negatively charged?

Q4 In a double stranded DNA, which strand is transcribed and why?

Q5 Give an example of a codon a having dual function.

Q6 Mention the contribution of genetic maps in human genome project?

Q7 Why is lactose considered an inducer in lac operon?

Q8 Draw a labelled schematic diagram of a transcription unit.

Q9 Draw the structure of atRNA charged with methionine.

Q10 Write the full form of VNTR .

Q11 Draw a labelled diagram of a nucleosome.Where is it found in a cy?

Q12 Why did Hershey and chase use radioactive sulphur and radioactive phosphorus in their experiment,?

Q13 Describe the experiments that help to demonstrate the semi – conservative mode of DNS replication.

Q14 Describe the termination process of transcription In bacteria.

Q15 How are DNA fragments separated and isolated for DNA fingerprinting.?Explain

Q16 Write any six sailent features of the human genome asdrawn from the human genome project.

Q17 A criminal blew himself up in a local market when was chased by cops His face was beyond recognition. Suggest and describe a modern technique that can help establish his identity.

Q18 How did the chemical nature of the Transforming principle get established?

Q19 How is gene differ from prokaryotic gene in its expression?

Q20 What is the function of histones in DNA?

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CLASS--- XII BIOLOGY

CH----7 EVOLUTION

Q1 Name the scientist who disapproved spontaneous generation theory.

Q2 State the significance of the study of fossils in evolution.

Q3 what is convergent evolution?

Q4 What is divergent evolution?

Q5 Why are analogous structures a result of convergent evolution,?

Q6 What is 'fitness of an individual ' according to Darwin?

Q7 According to de Vries what is saltation?

Q8 What is founder effect?

Q9 Write the name of the following.

a) A 15 Mya primates that was ape-like.
b) A 2mya primates that livedin Rast Africang grass lands.

Q10 Digrammatically represent the experimental set up that proves oparian -Haldane hypothesis.

Q11Mention the contribution of S.L.Miller's experiment on origin of life.

Q12 Why are wings of butterfly and birds said to be analogous organs?Name the type of evolution of which the analogous organs are a result of.

Q13 In England , during the post-industrialised period , the count of melanic moths increased in urban areas but remained low in rural areas , Explain

Q14 How is Darwin's fin he's illustrate adaptive raditation?

Q15 Discovery of lobefins is considered very significant by evolutionary biologist. Explain

Q16 Give a digrammatic representation ofth the S.L.Miller.

Q17 Describe the three different ways by which Natural selection can affect the frequency of a heritable trait in a population.

Q18 Write the scientific importance of single nucleotide polymorphism identified in human genome.

Q19 List the various causes of variations int the progeny of the population.

Q20 Explain the three different ways in which natural selection can affect the frequency of a heritable trait in a population.

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CLASS XII BIOLOGY ASSINGEMENT

CH -8 HUMAN HEALTH AND DISEASES

Q1 Name the vector which is responsible for spreading dengue.

Q2 Name the disease which infects lungs.

Q3 Name two major groups of cells required in attaining specific immunity.

Q4 What happens in lymphoid organ with respect to immunity.

Q5 What causes swelling of the lower limbs in patients suffering from filariasis?

Q6 State the functions of mast cells in allergy responses?

Q7 What type of virus causes AIDS?Name it's genetic material.

Q8 What is biopsy?

Q9 When is a tumour referred to as malignant?

Q10 How does colostrum provide initial protection against diseases

to new born infanta?Give one reason.

Q11Name the category of the disease Rheumatoid arthritis.

Q12 Which organ can trap the microbes in the body fluid.

Q13 What is the source of cocaine?

Q14 What is a vaccine?

Q15 Name the plant source of ganja.

Q16 Which test is used for diagnosis of typhoid?

Q17 Write full form of ELISA.

Q18 Why do pollen grains of some flowers trigger 'Sneezing'

In some people?

Q19 Name the protozoan parasite that causes amoeboid dysentery inhumans.

Q20 What are allergens?

Q21 Why is an antibody molecule represented as H2and L2.

Q22 Draw the the diagram of replication of HIV.

Q23 Why is that once a person starts taking alcohol or drugs, it is difficult to get rid of this habit?

Q24 List the harmful effects caused by alcohol/drug abuse.

Q25 What harm do cancerous cells cause?

Q26 Draw a well labelled diagram of an antibody molecule.

Q27 Explain what is meant by metastasis.

Q28List the two types of immunity a human baby is born with. Explain

the differences between the two types.

Q29 What measures would you take to prevent water-borne disease?

Q30 Define the term health. Mention anytwo ways of maintaining it.

Q31 List the symptoms of Ascariasis. How does a healthy person acquire this infections.

Q32 Trace the liffe-cycle of malarial parasite in the human body when bitten by an infected female anopheles.

Q34 Define auto -immune disease. Give two examples.

Q35 Explain the different ways of diagnosing cancer.

Q36 Write the source and the effect on the humanbody of the following drugs__

a) Morphine
b) b) Cocaine
c) c) Marijuana

Q37 Name three species of fungi that cause ringworm. Mention the symptoms of this disease?

Q38. What is the mechanism by which the AIDS virus causes deficiency in the immune system of the infected person.

Q39 Namethe form of Plasmodium that gains entry into the humanbody . Explain the different stages of its life- cycle in the human body.

Q40 Why do some adolescents start taking drugs. How can the

Situation be avoided?

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CLASS XII BIO AASIGNMENT CH – 10 MICROBES IN HUMAN WELFARE.

Q1 Name the biological name of baker's yeast.

Q2Name the first organic acid produced by microbial fermentation.

Q 3 Who won the Nobel prize for the discovery of penicillin?

Q4 What is the medical use of cyclosporin A?

Q5 Mention the role of cyanobacteria as a biofertiliser.

Q6 Name two industrially important enzymes.

Q7 Name the two free- living nitrogen fixing bacteria.

Q8 What is BOD?What does it mean if a water sample has more BOD?

Q9 What are methanogens?

Q10 Name the bacterium responsible for the large holes seen in Swiss cheese.

Q11 Give an example of a rod -Shaped virus.

Q12 Name the source of statin and state it's action on the human body.

Q13 Why are some molecules called bioactive molecules? Give two examples of such molecules.

Q14 How was penicillin discovered?

Q15 What are properties of an antibiotic?

Q16 How do methanogens help in producing biogas?

Q17 What are the harmful effects of chemical pesticides?

Q18 What are mycorrhiza ? How does it act as a biofertiliser?

Q19 Why are the fruit juices bought from market clearer as compared to those made at home?

Q20 What is the key difference between primary and secondary sewage treatment?

Q21 Why is Rhizobium categorised as asymbiotic bacterium?

Q22 What causes doughing of wheat flour?

Q23 Explain the process of water treatment?

Q24 Why are biogas plants more suitable and advantageous?

Q25 Name some traditional Indian foods made of wheat, rice and Bengal gram which involve use of microbes.

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CLASS. -XII BIOLOGY ASSIGNMENT

CH—11 BIOTECHNOLOGY---PRINCIPLES AND PROCESSES

Q1 What is biotechnology?

Q2 Name threecritical research areas of biotechnology.

Q3 Define genetically modified organisms.

Q4What is Bt cotton?

Q5 Name two genetically modified hormones.

Q6 Write the two uses of PCR technique in diagnosis.

Q7 Name the first transgenic cow.

Q8 A boy has been diagnosed with ADA deficiency.suggest anyone possible treatment.

Q 9 What is biopiracy?

Q10 For which variety of Indian rice, patent. Was filed by a USA company.?

Q20 What is EcoRI?How doesEcoRI differ from an exonuclease?

Q12 Why aremolecular scissors so called? Write their use in biotechnology.

Q13 Explain palindromic nucleotide sequence with the help of a suitable example.

Q14 What are cloning sites in a cloning vector?

Q15 Why and how bacteria can be made competei.

Q16Draw the stirred tank bioreactor . Write thepurpose for which it is used?

Q17 Write the role of ori and restriction site in a cloning vector PBR322.

Q18 Draw a schematic representation of polymerase chain reaction.

Q19 With the help of diagrams show. The different steps in the formation of recombinant DNA by. Action of. Restriction endonuclease enzymes EcoRI

Q20 With the help of diagrammatic representation only, show the steps of recombinant DNA technology?

Q21 Which methodology is used while sequencing the total. DNA from a cell.Explain it.

Q

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CLASS – XII BIOLOGY

CHAPTER 12

BIOTECHNOLOGY AND ITS. APPLICATIONS

Q1How are two short polypeptide chains of insulin linked together?

Q2 Name a molecular diagnostics technique to detect the presence of a pathgen in the early stage of infection.

Q3 In insulin molecule , which bond joins chain A and chain B.

Q4 How is patent given?

Q5 List any four beneficial effects of GM plants.

Q6 What is gene therapy?

Q7 What is GEAC and what are its objectives?

Q8 Explain the different uses of biotechnology in medical field?

Q9 Digrammatically represent the experimental steps in cloning and expressing a human gene into bacterium like E. Coli?

Q10 State the role of DNA ligase in biotechnology.

Q11 How did Eli Lily synthesise the human insulin?

Q12 Differentiate between PCR and gene cloning.

Q13 What is recombinant DNA vaccine?

Q14 List the disadvantage of insulin obtained from the pancreas of slaughtered cow and pigs.

Q15 plasmid is a boon to biotechnology. Justify this statement quoting the production of human insulin as an example.

Q16 How is Rosie considered different from a a normal cow? Expand.

Q17 Name the gene responsible for making Bt

Cotton plants resistant to bollworm attack.

Q18 Which gene was introduced in the first transgenic cow?

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CLASS---- XII

CH—14 ECOSYSTEM

Q1 Name the basic requirement of any ecosystem to function and sustain properly.

Q2 What is net primary productivity?

Q3 Write the equation that help in deriving the net primary productivity of an ecosystem.

Q4 What is secondary productivity?

Q5 Why is a food. Web form in nature?

Q6 Why is the pyramid of biomass inverted in a pond system?

Q7 'Man can be a primary as well as a secondary consumer.Justify.

Q8 What is meant by humification?

Q9 How are productivity, gross productivity, netprodictivity and secondary productivity interrelated?

Q10 Justify the importance of decomposers in an ecosystem.

Q11 Primary productivity varies from ecosystem to ecosystem. Explain

Q12 construct a pyramid ofbiomass starting with phytoplankton.Label three trophic levels.is the pyramid upright or inverted?

Q13 Name the pioneer species on a bare rock. How do they help in establishing the next type of vegetation .

Q14 Where and how does the primary succession occur? Explain

Q15 What will happen to an ecosystem if----

a) All producers are removed.
b) All organisms of herbivore level are eliminated and
c) All top carnivores population is removed.

Q16 Distinguish between pioneer community and climax community.

Q17 What is meantby 10% law?

Q18 Explain the response of all communities to environment over time

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Ji CLASSXII ASSIGNMENT

CH-15 BIODIVERSITY AND CONSERVTION

Q1 Name the three important components of biodiversity.

Q2What is genetic diversity?

Q3 India has more than 50,000 strains of rice . Mention the level of biodiversity it represents.

Q4 Why is genetic variation important in the plant Rauwolfia vomitoria?

Q5 Western ghats have a greater amphibians diversity than the Eastern ghats.what do you infer from the above two statements.

Q6 What is Red Data book?

Q7 Name any two sanctuaries in India.

Q8 What are seed banks?

Q9 State the use of biodiversity in modern agriculture.

Q10 Why are certain regions on the Earth called hot-spots ?Name any two hot-spots in India.

Q11 Would the exinction of one insect pollinator affect the ecosystem?Explain.

Q12 Why are sacred groves highly protected?

Q13 State how does ex-situ conservation help in protecting biodiversity.

Q14 Co-extinction and introduction of alien species too responsible for the loss of biodiversity .Explainhow?

Q15a)Why should we conserve biodiversity?How can we do it

Q16 Explain rivet popper hypothesis.

Q17 Differentiate between in-situ and ex-situu approaches.

Q18 What is the association between the bumble bee and it's favourite orchid ophrys?How would extinction or change of one would affect the other?

QExplain , giving three reasons, why trophic show greatest levels of species diversity.

Q20Is it true there is more solar energy available in the tropics? Explain briefly.

- If $\vec{a}$ $\vec{b}$ and $\vec{c}$ forms a triangle, then area of the triangle

$$= \frac{1}{2}|\vec{a} \times \vec{b}| = \frac{1}{2}|\vec{b} \times \vec{c}| = \frac{1}{2}|\vec{c} \times \vec{a}|.$$

VERY SHORT ANSWER TYPE QUESTIONS (1 MARK)

1. What is the horizontal and vertical components of a vector $\vec{a}$ of magnitude 5 making an angle of 150° with the direction of *x*-axis.
2. What is $a \in R$ such that $|a\vec{x}| = 1$, where $x = \hat{i} - 2\hat{j} + 2\hat{k}$?
3. Write when $|\vec{x} + \vec{y}| = |\vec{x}| + |\vec{y}|$.
4. What is the area of a parallelogram whose sides are given by $2\hat{i} - \hat{j}$ and $\hat{i} + 5\hat{k}$?
5. What is the angle between $\vec{a}$ *and* $\vec{b}$, If $\vec{a} \cdot \vec{b} = 3$ and $|\vec{a} \times \vec{b}| = 3\sqrt{3}$.
6. Write a unit vector which makes an angle of $\frac{\pi}{4}$ with *x*-axis and $\frac{\pi}{3}$ with *z*-axis and an acute angle with *y*-axis.
7. If *A* is the point (4, 5) and vector $\overrightarrow{AB}$ has components 2 and 6 along *x*-axis and *y*-axis respectively then write point *B*.
8. What is the point of trisection of *PQ* nearer to *P* if position of *P* and *Q* are $3\hat{i} + 3\hat{j} - 4\hat{k}$ and $9\hat{i} + 8\hat{j} - 10\hat{k}$.
9. What is the vector in the direction of $2\hat{i} + 3\hat{j} + 2\sqrt{3}\hat{k}$, whose magnitude is 10 units?
10. What are the direction cosines of a vector equiangular with co-ordinate axes?
11. What is the angles which $3\hat{i} - 6\hat{j} + 2\hat{k}$ makes with *x*-axis?
12. Write a unit vector perpendicular to both the vectors $3\hat{i} - 2\hat{j} + \hat{k}$ and $-2\hat{i} + \hat{j} - 2\hat{k}$.
13. What is the projection of the vector $\hat{i} - \hat{j}$ on the vector $\hat{i} + \hat{j}$?
14. If $|\vec{a}| = 2$, $|\vec{b}| = 2\sqrt{3}$ and $\vec{a} \perp \vec{b}$, what is the value of $|\vec{a} + \vec{b}|$?
15. For what value of λ, $\vec{a} = \lambda\hat{i} + \hat{j} + 4\hat{k}$ is perpendicular to $\vec{b} = 2\hat{i} + 6\hat{j} + 3\hat{k}$?
16. What is $|\vec{a}|$, if $(\vec{a} + \vec{b}).(\vec{a} - \vec{b}) = 3$ and $2|\vec{b}| = |\vec{a}|$?
17. What is the angle between $\vec{a}$ and $\vec{b}$, if $|\vec{a} - \vec{b}| = |\vec{a} + \vec{b}|$?

18. In a parallelogram *ABCD,* $\overrightarrow{AB} = 2\hat{i} - \hat{j} + 4\hat{k}$ *and* $\overrightarrow{AC} = \hat{i} + \hat{j} + 4\hat{k}$. What is the length of side $\overrightarrow{BC}$?

19. What is the area of a parallelogram whose diagonals are given by vectors $2\hat{i} + \hat{j} - 2\hat{k}$ and $-\hat{i} + 2\hat{k}$?

20. Find $|\overrightarrow{x}|$ if for a unit vector $\hat{a}$, $(\overrightarrow{x} - \hat{a}).(\overrightarrow{x} + \hat{a}) = 12$.

21. If $\overrightarrow{a}$ and $\overrightarrow{b}$ are two unit vectors and $\overrightarrow{a} + \overrightarrow{b}$ is also a unit vector then what is the angle between $\overrightarrow{a}$ and $\overrightarrow{b}$?

22. If $\hat{i}, \hat{j}, \hat{k}$ are the usual three mutually perpendicular unit vectors then what is the value of $\hat{i}.(\hat{j} \times \hat{k}) + \hat{j}.(\hat{i} \times \hat{k}) + \vec{k}.(\hat{j} \times \hat{i})$?

23. What is the angle between $\overrightarrow{x}$ and $\overrightarrow{y}$ if $\overrightarrow{x} . \overrightarrow{y} = |\overrightarrow{x} \times \overrightarrow{y}|$?

24. Write a unit vector in *xy*-plane, making an angle of 30° with the +ve direction of *x*–axis.

25. If $\overrightarrow{a}$, $\overrightarrow{b}$ and $\overrightarrow{c}$ are unit vectors with $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = \overrightarrow{0}$, then what is the value of $\overrightarrow{a} . \overrightarrow{b} + \overrightarrow{b} . \overrightarrow{c} + \overrightarrow{c} . \overrightarrow{a}$?

26. If $\overrightarrow{a}$ and $\overrightarrow{b}$ are unit vectors such that $(\overrightarrow{a} + 2\overrightarrow{b})$ is perpendicular to $(5\overrightarrow{a} - 4\overrightarrow{b})$, then what is the angle between $\overrightarrow{a}$ and $\overrightarrow{b}$?

SHORT ANSWER TYPE QUESTIONS (4 MARKS)

1. If ABCDEF is a regular hexagon then using triangle law of addition prove that :

$$\overrightarrow{AB} + \overrightarrow{AC} + \overrightarrow{AD} + \overrightarrow{AE} + \overrightarrow{AF} = 3\overrightarrow{AD} = 6\overrightarrow{AO}$$

O being the centre of hexagon.

2. Points *L, M, N* divides the sides *BC, CA, AB* of a ΔABC in the ratios 1 : 4, 3 : 2, 3 : 7 respectively. Prove that $\overrightarrow{AL} + \overrightarrow{BM} + \overrightarrow{CN}$ is a vector parallel to $\overrightarrow{CK}$ where *K* divides *AB* in ratio 1 : 3.

3. The scalar product of vector $\hat{i} + \hat{j} + \hat{k}$ with a unit vector along the sum of the vectors $2\hat{i} + 4\hat{j} - 5\hat{k}$ *and* $\lambda\hat{i} + 2\hat{j} + 3\hat{k}$ is equal to 1. Find the value of λ.

4. $\overrightarrow{a}$, $\overrightarrow{b}$ and $\overrightarrow{c}$ are three mutually perpendicular vectors of equal magnitude. Show that $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c}$ makes equal angles with $\overrightarrow{a}$, $\overrightarrow{b}$ and $\overrightarrow{c}$ with each angle as $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$.

5. If $\overrightarrow{\alpha} = 3\hat{i} - \hat{j}$ and $\overrightarrow{\beta} = 2\hat{i} + \hat{j} + 3\hat{k}$ then express $\overrightarrow{\beta}$ in the form of $\overrightarrow{\beta} = \overrightarrow{\beta}_1 + \overrightarrow{\beta}_2$, where $\overrightarrow{\beta}_1$ is parallel to $\overrightarrow{\alpha}$ and $\overrightarrow{\beta}_2$ is perpendicular to $\overrightarrow{\alpha}$.

CHAPTER 12

LINEAR PROGRAMMING

POINTS TO REMEMBER

- Linear programming is the process used to obtain minimum or maximum value of the linear objective function under known linear constraints.
- **Objective Functions :** Linear function $z = ax + by$ where a and b are constants, which has to be maximized or minimized is called a linear objective function.
- **Constraints :** The linear inequalities or inequations or restrictions on the variables of a linear programming problem.
- **Feasible Region :** It is defined as a set of points which satisfy all the constraints including non-negative constraints $x \geq 0,\ y \geq 0$.
- **To Find Feasible Region :** Draw the graph of all the linear inequations and shade common region determined by all the constraints.
- **Feasible Solutions :** Points within and on the boundary of the feasible region represents feasible solutions of the constraints.
- **Optimal Feasible Solution :** Feasible solution which optimizes the objective function is called optimal feasible solution.

LONG ANSWER TYPE QUESTIONS (6 MARKS)

1. Solve the following L.P.P. graphically

   Minimise and maximise $z = 3x + 9y$

   Subject to the constraints $x + 3y \leq 60$

   $x + y \geq 10$

   $x \leq y$

   $x \geq 0,\ y \geq 0$

2. Determine graphically the minimum value of the objective function $z = -50x + 20y$

   Subject to the constraints $2x - y \geq -5$

   $3x + y \geq 3$

$$2x - 3y \leq 12$$

$$x \geq 0,\ y \geq 0$$

3. Two tailors *A* and *B* earn Rs. 150 and *Rs*. 200 per day respectively. *A* can stitch 6 shirts and 4 pants per day, while *B* can stich 10 shirts and 4 pants per day. Formulate the above L.P.P. mathematically and hence solve it to minimise the labour cost to produce at least 60 shirts and 32 pants.

4. There are two types of fertilisers *A* and *B*. *A* consists of 10% nitrogen and 6% phosphoric acid and *B* consists of 5% nitrogen and 10% phosphoric acid. After testing the soil conditions, a farmer finds that he needs at least 14 kg of nitrogen and 14 kg of phosphoric acid for his crop. If *A* costs Rs. 61 kg and *B* costs Rs. 51 kg, determine how much of each type of fertiliser should be used so that nutrient requirements are met at minimum cost. What is the minimum cost.

5. A man has Rs. 1500 to purchase two types of shares of two different companies S_1 and S_2. Market price of one share of S_1 is Rs 180 and S_2 is Rs. 120. He wishes to purchase a maximum to ten shares only. If one share of type S_1 gives a yield of Rs. 11 and of type S_2 Rs. 8 then how much shares of each type must be purchased to get maximum profit? And what will be the maximum profit?

6. A company manufacture two types of lamps say *A* and *B*. Both lamps go through a cutter and then a finisher. Lamp *A* requires 2 hours of the cutter's time and 1 hours of the finisher's time. Lamp *B* requires 1 hour of cutter's and 2 hours of finisher's time. The cutter has 100 hours and finishers has 80 hours of time available each month. Profit on one lamp A is Rs. 7.00 and on one lamp *B* is Rs. 13.00. Assuming that he can sell all that he produces, how many of each type of lamps should be manufactured to obtain maximum profit?

7. A dealer wishes to purchase a number of fans and sewing machines. He has only Rs. 5760 to invest and has space for almost 20 items. A fan and sewing machine cost Rs. 360 and Rs. 240 respectively. He can sell a fan at a profit of Rs. 22 and sewing machine at a profit of Rs. 18. Assuming that he can sell whatever he buys, how should he invest his money to maximise his profit?

8. If a young man rides his motorcycle at 25 km/h, he has to spend Rs. 2 per km on petrol. If he rides at a faster speed of 40 km/h, 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. Express this as L.P.P. and then solve it graphically.

9. A producer has 20 and 10 units of labour and capital respectively which he can use to produce two kinds of goods *X* and *Y*. To produce one unit of *X*, 2 units of capital and 1 unit of labour is required. To produce one unit of *Y*, 3 units of labour and one unit of capital is required. If *X* and *Y* are priced at Rs. 80 and Rs. 100 per unit respectively, how should the producer use his resources to maximise the total revenue?

10. A factory owner purchases two types of machines *A* and *B* for his factory. The requirements and limitations for the machines are as follows :

Machine	***Area Occupied***	***Labour Force***	***Daily Output (In units)***
A	1000 m^2	12 men	60
B	1200 m^2	8 men	40

He has maximum area of 9000 m^2 available and 72 skilled labourers who can operate both the machines. How many machines of each type should he buy to maximise the daily output.

11. A manufacturer makes two types of cups *A* and *B*. There machines are required to manufacture the cups and the time in minute required by each in as given below :

Types of Cup	***Machine***		
	I	***II***	***III***
A	12	18	6
B	6	0	9

Each machine is available for a maximum period of 6 hours per day. If the profit on each cup *A* is 75 paise and on *B* is 50 paise, find how many cups of each type should be manufactured to maximise the profit per day.

12. A company produces two types of belts *A* and *B*. Profits on these belts are Rs. 2 and Rs. 1.50 per belt respectively. A belt of type *A* requires twice as much time as belt of type *B*. The company can produce almost 1000 belts of type *B* per day. Material for 800 belts per day is available. Almost 400 buckles for belts of type *A* and 700 for type *B* are available per day. How much belts of each type should the company produce so as to maximize the profit?

13. To Godowns *X* and *Y* have a grain storage capacity of 100 quintals and 50 quintals respectively. Their supply goes to three ration shop *A*, *B* and *C* whose requirements are 60, 50 and 40 quintals respectively. The cost of transportation per quintals from the godowns to the shops are given in following table :

To / ***From***	***Cost of transportation (in Rs. per quintal***	
	X	***Y***
A	6.00	4.00
B	3.00	2.00
C	2.50	3.00

How should the supplies be transported to minimize the transportation cost?

14. An Aeroplane can carry a maximum of 200 passengers. A profit of Rs. 400 in made on each first class ticket and a profit of Rs. 300 is made on each second class ticket. The airline reserves at least 20 seats for first class. However atleast four times as many passengers prefer to travel by second class than by first class. Determine, how many tickets of each type must be sold to maximize profit for the airline.

15. A diet for a sick person must contain atleast 4000 units of vitamins, 50 units of minerals and 1400 units of calories. Two foods *A* and *B* are available at a cost of Rs. 5 and Rs. 4 per unit respectively. One unit of food *A* contains 200 unit of vitamins, 1 unit of minerals and 40 units of calories whereas one unit of food *B* contains 100 units of vitamins, 2 units of minerals and 40 units of calories. Find what combination of the food *A* and *B* should be used to have least cost but it must satisfy the requirements of the sick person.

- (i) Distance of a point from plane $\vec{r} \cdot \vec{n} = d$ is $\frac{\left|\vec{a} \cdot \vec{n} - d\right|}{\left|\vec{n}\right|}$.

  (ii) Distance of a point (x_1, y_1, z_1) from plane $an + by + cz = d$ is $\frac{\left|ax_1 + by_1 + cz_1 - d\right|}{\left|a^2 + b^2 + c^2\right|}$.

12. (i) Two lines $\vec{r} = \vec{a_1} + \lambda \vec{b_1}$ and $\vec{r} = \vec{a_2} + \mu \vec{b_2}$ are coplanar. Iff $\left(\vec{a_2} - \vec{a_1}\right) \cdot \left(\vec{b_1} \times \vec{b_2}\right) = 0$ and equation of plane. Containing these lines is $\left(\vec{r} - \vec{a_1}\right) \cdot \left(\vec{b_1} \times \vec{b_2}\right) = 0$.

  (ii) Two lines $\frac{x - x_1}{a_1} = \frac{y - y_1}{b_1} = \frac{z - z_1}{c_1}$ and $\frac{x - x_2}{a_2} = \frac{y - y_2}{b_2} = \frac{z - z_2}{c_2}$ are coplanar Iff $\begin{vmatrix} x_2 - x_1 & y_2 - y_1 & z_2 - z_1 \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix} = 0$ and equation of plane containing them is $\begin{vmatrix} x - x_1 & y - y_1 & z - z_1 \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix} = 0$.

- (i) The angle θ between line $\vec{r} = \vec{a} + \lambda \vec{b}$ and plane $\vec{r} \cdot \vec{n} = d$ is given as $\sin\theta = \frac{\vec{b} \cdot \vec{n}}{\left|\vec{b}\right|\left|\vec{n}\right|}$.

  (ii) The angle θ between line $\frac{x - x_1}{a_1} = \frac{y - y_1}{b_1} = \frac{z - z_1}{c_1}$ and plane $a_2x + b_2y + c_2 z = d$ is given as $\sin\theta = \frac{a_1a_2 + b_1b_2 + c_1c_2}{\sqrt{a_1^2 + b_1^2 + c_1^2}\sqrt{a_2^2 + b_2^2 + c_2^2}}$.

  (iii) A line is parallel to plane $\Leftrightarrow \vec{b} \cdot \vec{n} = 0$ or $a_1a_2 + b_1b_2 + c_1c_2 = 0$.

VERY SHORT ANSWER TYPE QUESTIONS (1 MARK)

1. What is the distance of point (a, b, c) from x-axis?
2. What is the angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$?
3. Write the equation of a line passing through (2, –3, 5) and parallel to line $\frac{x - 1}{3} = \frac{y - 2}{4} = \frac{z + 1}{-1}$.
4. In what ratio, the xy plane divides the line segment joining the points (–1, 3, 4) and (2, –5, 6)?
5. Write the equation of a line through (1, 2, 3) and perpendicular to $\vec{r} \cdot \left(\hat{i} - \hat{j} + 3\hat{k}\right) = 5$.

6. What is the value of λ for which the lines $\frac{x-1}{2} = \frac{y-3}{5} = \frac{z-1}{\lambda}$ and $\frac{x-2}{3} = \frac{y+1}{-2} = \frac{z}{2}$ are perpendicular to each other.

7. If a line makes angle α, β, and γ with co-ordinate axes, then what is the value of
$\sin^2\alpha + \sin^2\beta + \sin^2\gamma$?

8. Write line $\vec{r} = (\hat{i} - \hat{j}) + \lambda(2\hat{j} - \hat{k})$ into cartesian form.

9. If the direction ratios of a line are 1, –2, 2 then what are the direction cosines of the line?

10. The foot of perpendicular from (1, 6, 3) on the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-1}{3}$ *is* $(1, 3, q)$; what is the value of *q*.

11. Write equation of a line passing through (0, 1, 2) and equally inclined to co-ordinate axes.

12. What is the perpendicular distance of plane $2x - y + 3z = 10$ from origin?

13. What is the *y*-intercept of the plane $x - 5y + 7z = 10$?

14. What is the distance between the planes $2x + 2y - z + 2 = 0$ and $4x + 4y - 2z + 5 = 0$.

15. What is the equation of the plane which cuts off equal intercepts of unit length on the coordinate axes.

16. Are the planes $x + y - 2z + 4 = 0$ and $3x + 3y - 6z + 5 = 0$ intersecting?

17. What is the equation of the plane through the point (1, 4, – 2) and parallel to the plane $-2x + y - 3z = 7$?

18. Write the vector equation of the plane which is at a distance of 8 units from the origin and is normal to the vector $(2\hat{i} + \hat{j} + 2\hat{k})$.

19. What is equation of the plane if the foot of perpendicular from origin to this plane is (2, 3, 4)?

20. Find the angles between the planes $\vec{r} \cdot (\hat{i} - 2\hat{j} - 2\hat{k}) = 1$ and $\vec{r} \cdot (3\hat{i} - 6\hat{j} + 2\hat{k}) = 0$.

21. What is the angle between the line $\frac{x+1}{3} = \frac{2y-1}{4} = \frac{2-z}{-4}$ and the plane $2x + y - 2z + 4 = 0$?

22. If *O* is origin *OP* = 3 with direction ratios proportional to –1, 2, – 2 then what are the coordinates of *P*?

23. What is the distance between the line $\vec{r} = 2\hat{i} - 2\hat{j} + 3\hat{k} + \lambda(\hat{i} + \hat{j} + 4\hat{k})$ from the plane $\vec{r} \cdot (-\hat{i} + 5\hat{j} - \hat{k}) + 5 = 0$.

24. Write the line $2x = 3y = 4z$ in vector form.

R.K MODERN SCHOOL
PROBABLITY

- **Conditional Probability**

  1. The conditional probability of an event E, given the occurrence of the event F is given by

     $$P\left(\frac{E}{F}\right) = \frac{P(E \cap F)}{P(F)},\ P(F) \neq 0.$$

  2. $0 \leq P(E/F) \leq 1$
  3. $P(E \cap F) = P(E) \cdot P(F/E),\ P(E) \neq 0$
  4. $P(E \cap F) = P(F) \cdot P(E/F),\ P(F) \neq 0$
  5. $P(E'/F) = 1 - P(E/F)$
  6. $P[(E \cup F/G) = P(E/G) + P(F/G) - P((E \cap F)/G)$
  7. If E and F are independent events then $P(E \cap F) = P(E) \cdot P(F)$.
  8. $P(E/F) = P(E),\ P(F),\ \neq 0$
  9. $P(F/E) = P(F),\ P(E) \neq 0$

- **Theorem of Total Probability :** Let $[E_1\ E_2, \ldots\ldots\ldots\ldots E_n]$ be a partition of a sample space and suppose that each of $E_1, E_2, \ldots\ldots\ldots\ldots\ldots E_n$ has non zero probability.

  Let A be any event associated with S *then*

  $P(A) = P(E_1) \cdot P(A/E_1) + P(E_2) \cdot P(A/E_2) \ldots\ldots\ldots\ldots + P(E_n)\ P(A/E_n)$

VERY SHORT ANSWER TYPE QUESTIONS (1 MARK)

1. Find $P(A/B)$ if $P(A) = 0.4$, $P(B) = 0.8$ and $P(B/A) = 0.6$
2. Find $P(A \cap B)$ if A and B are two events such that $P(A) = 0.5$, $P(B) = 0.6$ and $P(A \cup B) = 0.8$
3. A policeman fires three bullets on a dacoit. The probability that the dacoit will be killed by one bullet is 0.7. What is the probability that the dacoit is still alive.
4. What is the probability that a leap year has 53 Sundays?
5. 20 cards are numbered 1 to 20. One card is them drawn at random. What is the probability that the number on the card will be a multiple of 4?
6. Three coins are tossed once. Find the probability of getting at least one head.

7. The probability that a student is not a swimmer is $\frac{1}{5}$. Find the probability that out of 5 students, 4 are swimmers.

8. Find $P(A/B)$, if $P(B) = 0.5$ and $P(A \cap B) = 0.32$

9. A random variable x has the following probability distribution.

X	*0*	*1*	*2*	*3*	*4*	*5*
P(x)	$\frac{1}{15}$	k	$\frac{15k-2}{15}$	k	$\frac{15k-1}{15}$	$\frac{1}{15}$

write the value of k.

10. A random variable X, taking values 0, 1, 2 has the following probability distribution for some number k.

$$P(X) = \begin{cases} k & \text{if } X = 0 \\ 2k & \text{if } X = 1 \\ 3k & \text{if } X = 2 \end{cases} \text{ find } k.$$

ANSWERS

VERY SHORT ANSWER TYPE QUESTIONS

1. 0.3
2. $\frac{3}{10}$
3. $(0.3)^3$
4. $\frac{2}{7}$
5. $\frac{1}{4}$
6. $\frac{7}{8}$
7. $\left(\frac{4}{5}\right)^4$
8. $\frac{16}{25}$
9. $k = \frac{1}{5}$
10. $k = \frac{1}{6}$

SHORT ANSWER TYPE QUESTIONS (4 MARKS)

1. A problem is Mathematics is given to 3 students whose chances of solving it are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$. What is the probability that the problem is solved.

2. A die is rolled. If the outcome is an even number. What is the probability that it is a prime?

3. If A and B are two events such that $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$. Find P (not A and not B).

4. In a class of 25 students with roll numbers 1 to 25. A student is picked up at random to answer a question. Find the probability that the roll number of the selected student is either a multiple of 5 or 7.

5. A car hit a target 4 times in 5 shots B three times in 4 shots, C twice in 3 shots. They fire a volley. What is the probability that two shots at least hit.

6. Two dice are thrown once. Find the probability of getting an even number on the first die or a total of 8.

7. A and B throw a die alternatively till one of them throws a '6' and win the game. Find their respective probabilities of winning if A starts first.

8. If A and B are events such that $P(A) = \frac{1}{2}$, $P(A \cup B) = \frac{3}{5}$ and $P(B) = p$ find p if

   (i) they are mutually exclusive, (ii) they are independent events .

9. A drunkard man takes a step forward with probability 0.4 and backward with probability 0.6. Find the probability that at the end of eleven steps he is one step away from the starting point.

10. Two cards are drawn from a pack of well shuffled 52 cards. Getting an ace or a spade is considered a success. Find the probability distribution for the number of success.

11. In a game, a man wins a rupee for a six and looses a rupee for any other number when a fair die is thrown. The man decided to throw a die thrice but to quit as and when he gets a six. Find the expected value of the amount he win/looses.

12. Suppose that 10% of men and 5% of women have grey hair. A grey haired person is selected at random. What is the probability of this person being male? Assume that there are 60% males and 40% females?

13. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn. What is the probability that they both are diamonds?

14. Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. Find the probability that there is at least are defective egg.

15. Find the variable of the number obtained on a throw of an unbiased die.

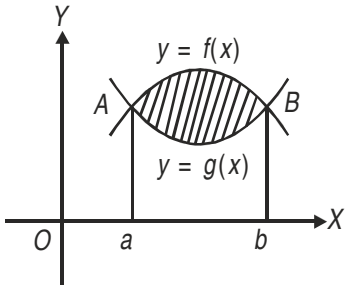
VERY SHORT ANSWER TYPE QUESTIONS

1. $\frac{3}{4}$

2. $\frac{1}{3}$

3. $\frac{3}{8}$

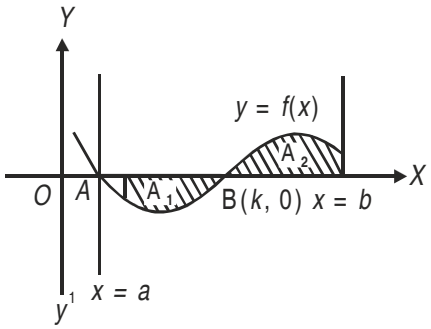
4. $\frac{8}{25}$



$$\text{Area} = \int_a^b [f(x) - g(x)]\, dx$$

- Required Area

$$= \left| \int_a^k f(x)dx \right| + \int_k^b f(x)dx.$$



LONG ANSWER TYPE QUESTION (6 MARKS)

1. Find the area enclosed by circle $x^2 + y^2 = a^2$.
2. Find the area of region bounded by $y^2 = 4x$.
3. Find the area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
4. Find the area of region in the first quadrant enclosed by x–axis the line $y = x$ and the circle $x^2 + y^2 = 32$.
5. Find the area of region $\{(x, y) : y^2 \le 4x, 4x^2 + 4y^2 \le 9\}$
6. Prove that the curve $y = x^2$ and, $x = y^2$ divide the square bounded by $x = 0$, $y = 0$, $x = 1$, $y = 1$ into three equal parts.
7. Find smaller of the two areas enclosed between the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the line

   $bx + ay = ab$.

8. Find the common area bounded by the circles $x^2 + y^2 = 4$ and $(x - 2)^2 + y^2 = 4$.

9. Using integration, find the area of the region bounded by the triangle whose vertices are
   (a) (–1, 0), (1, 3) and (3, 2) (b) (–2, 2) (0, 5) and (3, 2)

10. Using integration, find the area bounded by the lines.
   (i) $x + 2y = 2$, $y - x = 1$ and $2x + y - 7 = 0$
   (ii) $y = 4x + 5$, $y = 5 - x$ and $4y - x = 5$.

11. Find the area of the region $\{(x, y) : x^2 + y^2 \leq 1 \leq x + y\}$.

12. Find the area of the region bounded by
   $y = |x - 1|$ and $y = 1$.

13. Find the area enclosed by the curve $y = \sin x$ between $x = 0$ and $x = \frac{3\pi}{2}$ and x-axis.

14. Find the area bounded by semi circle $y = \sqrt{25 - x^2}$ and x-axis.

15. Find area of region given by $\{(x, y) : x^2 \leq y \leq |x|\}$.

16. Find area of smaller region bounded by ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and straight line $2x + 3y = 6$.

17. Find the area of region bounded by the curve $x^2 = 4y$ and line $x = 4y - 2$.

18. Using integration find the area of region in first quadrant enclosed by x-axis the line $x = \sqrt{3}y$ and the circle $x^2 + y^2 = 4$.

19. Find smaller of two areas bounded by the curve $y = |x|$ and $x^2 + y^2 = 8$.

H.O.T.S.

20. Find the area lying above x-axis and included between the circle $x^2 + y^2 = 8x$ and the parabola $y^2 = 4x$.

21. Using integration, find the area enclosed by the curve $y = \cos x$, $y = \sin x$ and x-axis in the interval $\left(0, \frac{\pi}{2}\right)$.

22. Sketch the graph $y = |x - 5|$. Evaluate $\int_0^6 |x - 5|\, dx$.

23. Find area enclosed between the curves, $y = 4x$ and $x^2 = 6y$.

- $\frac{d}{dx}(u \cdot v) = u \cdot \frac{dv}{dx} + v \cdot \frac{du}{dx}$
- $\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \cdot \frac{dv}{dx} - u \cdot \frac{dv}{dx}}{v^2}$
- If $y = f(u)$, $x = g(u)$ then

$$\frac{dy}{dx} = \frac{f'(u)}{g'(u)}.$$

- If $y = f(u)$ and $u = g(t)$ then $\frac{dy}{dt} = \frac{dy}{du} \times \frac{du}{dt} = f'(u).g'(t)$ (Chain Rule)
- $f(x) = [x]$ is discontinuous at all integral points and continuous for all $x \in R - Z$.
- **Rolle's theorem :** If $f(x)$ is continuous in $[a, b]$ and derivable in (a, b) and $f(a) = f(b)$ then there exists atleast one real number $c \in (a, b)$ such that $f'(c) = 0$.
- **Mean Value Theorem :** If $f(x)$ is continuous in $[a, b]$ and derivable in (a, b) then these exists atleast one real number $c \in (a, b)$ such that $f'(c) = \frac{f(b) - f(a)}{b - a}$.
- $f(x) = \log_e x$, $(x > 0)$ is continuous function.

VERY SHORT ANSWER TYPE QUESTIONS (1 MARK)

1. For what value of x, $f(x) = |2x - 7|$ is not derivable.
2. Write the set of points of continuity of $g(x) = |x - 1| + |x + 1|$.
3. What is derivative of $|x - 3|$ at $x = -1$.
4. What are the points of discontinuity of $f(x) = \frac{(x - 1) + (x + 1)}{(x - 7)(x - 6)}$.
5. Write the number of points of discontinuity of $f(x) = [x]$ in $[3, 7]$.
6. The function, $f(x) = \begin{cases} \lambda x - 3 & \text{if } x < 2 \\ 4 & \text{if } x = 2 \\ 2x & \text{if } x > 2 \end{cases}$ is a continuous function for all $x \in R$, find λ.
7. For what value of K, $f(x) = \begin{cases} \frac{\tan 3x}{\sin 2x}, & x \neq 0 \\ 2K, & x = 0 \end{cases}$ is continuous $\forall\, x \in R$.

8. Write derivative of sin x *w.r.t.* cos x.

9. If $f(x) = x^2 g(x)$ and $g(1) = 6$, $g'(1) = 3$ find value of $f'(1)$.

10. Write the derivatives of the following functions :

(i) $\log_3 (3x + 5)$ (ii) $e^{\log_2 x}$

(iii) $e^{6 \log_e (x-1)}$, $x > 1$ (iv) $\sec^{-1}\sqrt{x} + \text{cosec}^{-1}\sqrt{x}$, $x \geq 1$.

(v) $\sin^{-1}(x^{7/2})$ (vi) $\log_x 5$, $x > 0$.

SHORT ANSWER TYPE QUESTIONS (4 MARKS)

11. Discuss the continuity of following functions at the indicated points.

(i) $f(x) = \begin{cases} \dfrac{x - |x|}{x}, & x \neq 0 \\ 2, & x = 0 \end{cases}$ at $x = 0$.

(ii) $g(x) = \begin{cases} \dfrac{\sin 2x}{3x}, & x \neq 0 \\ \dfrac{3}{2} & x = 0 \end{cases}$ at $x = 0$.

(iii) $f(x) = \begin{cases} x^2 \cos(1/x) & x \neq 0 \\ 0 & x = 0 \end{cases}$ at $x = 0$.

(iv) $f(x) = |x| + |x - 1|$ at $x = 1$.

(v) $f(x) = \begin{cases} x - [x], & x \neq 1 \\ 0 & x = 1 \end{cases}$ at $x = 1$.

(vi) $f(x) = e^{2x + a}$, at $x = 0$ where a is constant.

12. For what value of K, $f(x) = \begin{bmatrix} 3x^2 - kx + 5, & 0 \leq x < 2 \\ 1 - 3x & 2 \leq x \leq 3 \end{bmatrix}$ is continuous $\forall\, x \in [0, 3]$.

13. For what values of a and b

$$f(x) = \begin{cases} \dfrac{x + 2}{|x + 2|} + a & \text{if } x < -2 \\ a + b & \text{if } x = -2 \\ \dfrac{x + 2}{|x + 2|} + 2b & \text{if } x > -2 \end{cases}$$ is continuous at $x = 2$.

14. Prove that $f(x) = |x + 1|$ is continuous at $x = -1$, but not derivable at $x = -1$.

15. For what value of p,

$$f(x) = \begin{cases} x^p \sin(1/x,) & x \neq 0 \\ 0 & x = 0 \end{cases}$$ is derivable at $x = 0$.

16. If $y = \frac{1}{2}\left[\tan^{-1}\left(\frac{2x}{1-x^2}\right) + 2\tan^{-1}\left(\frac{1}{x}\right)\right]$, $0 < x < 1$ find $\frac{dy}{dx}$.

17. If $y = \sin\left[2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right]$ then $\frac{dy}{dx} = ?$

18. If $5^x + 5^y = 5^{x+y}$ then prove that $\frac{dy}{dx} + 5^{y-x} = 0$.

19. If $x\sqrt{1-y^2} + y\sqrt{1-x^2} = a$ then show that $\frac{dy}{dx} = -\sqrt{\frac{1-y^2}{1-x^2}}$.

20. If $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$ then show that $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$.

21. If $(x + y)^{m+n} = x^m \cdot y^n$ then prove that $\frac{dy}{dx} = \frac{y}{x}$.

22. Find the derivative of $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ w.r.t. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$.

23. Find the derivative of $\log_e(\sin x)$ w.r.t. $\log_a(\cos x)$.

24. If $x^y + y^x + x^x = m^n$, then find the value of $\frac{dy}{dx}$.

25. If $x = a\cos^3\theta$, $y = a\sin^3\theta$ then find $\frac{d^2y}{dx^2}$.

26. If $x = ae^t$ (sint – cos t)

$y = ae^t$ (sint + cost) then show that $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$ is 1.

27. If $y = \sin^{-1}\left[x\sqrt{1-x} - \sqrt{x}\sqrt{1-x^2}\right]$ then $\frac{dy}{dx}$.

(ii) $x = c$ is a point of local minima if $f'(c) = 0$ and $f''(c) > 0$. Then $f(c)$ is the local minimum value of f.

(iii) The test fails if $f'(c) = 0$ and $f''(c) = 0$.

VERY SHORT ANSWER TYPE QUESTIONS

1. The side of a square is increasing at a rate of 0.2 cm/sec. Find the rate of increase of perimeter of the square.
2. The radius of the circle is increasing at the rate of 0.7 cm/sec. What is the rate of increase of its circumference?
3. If the radius of a soap bubble is increasing at the rate of $\frac{1}{2}$cm/sec. At what rate its volume increasing when the radius is 1 cm.
4. A stone is dropped into a quiet lake and waves move in circles at a speed of 4 cm/sec. At the instant when the radius of the circular wave is 10 cm, how fast is the enclosed area increasing?
5. The total revenue in rupees received from the sale of x units of a product is given by

   $R(x) = 13x^2 + 26x + 15$. Find the marginal revenue when $x = 7$.
6. Find the maximum and minimum values of function $f(x) = \sin 2x + 5$.
7. Find the maximum and minimum values if any of the function $f(x) = -|x - 1| + 7 \ \forall \ x \in R$.
8. Find the value of a for which the function $f(x) = x^2 - 2ax + 6$, $x > 0$ is strictly increasing.
9. Write the interval for which the function $f(x) = \cos x$, $0 \le x \le 2\pi$ is decreasing.
10. What is the interval on which the function $f(x) = \frac{\log x}{x}$ is increasing?
11. For which values of x, the functions $y = x^4 - \frac{4}{3}x^3$ is increasing?
12. Write the interval for which the function $f(x) = \frac{1}{x}$ is strictly decreasing.
13. Find the sub-interval of the interval $(0, \pi/2)$ in which the function $f(x) = \sin 3x$ is increasing.
14. Without using derivatives, find the maximum and minimum value of $y = |3 \sin x + 1|$.
15. It is given that at $x = 1$, the function $f(x) = x^4 - 62\ x^2$ tax + 9 attains its maximum value is the interval [0, 2]. Find the value of a.
16. Write the interval in which the function $f(x) = x^9 + 3x^7 + 64$ is increasing.
17. What is the slope of the tangent to the curve $f = x^3 - 5x + 3$ at the point whose x co-ordinate is 2?

18. At what point on the curve $y = x^2$ does the tangent make an angle of 45° with the x-axis?

19. Find the point on the curve $y = 3x^2 - 12x \times 9$ at which the tangent is parallel to x-axis.

20. What is the slope of the normal to the curve $y = 5x^2 - 4 \sin x$ at $x = 0$.

21. Find the point on the curve $y = 3x^2 + 4$ at which the tangent is perpendicular to the live with slope $-\frac{1}{6}$.

22. Find the point on the curve $y = x^2$ where the slope of the tangent is equal to the y – co-ordinate.

23. If the curves $y = 2e^x$ and $y = ae^{-x}$ intersect orthogonally (cut at right angles). What is the value of a?

24. Find the slope of the normal to the curve $y = 8x^2 - 3$ at $x = \frac{1}{4}$.

25. Find the rate of change of the total surface area of a cylinder of radius r and height h with respect to radius when height is equal to the radius of the base of cylinder.

26. Find the rate of change of the area of a circle with respect to its radius. How fast is the area changing w.r.t. its radius when its radius is 3 cm?

27. For the curve $y = (2x + 1)^3$ find the rate of change of slope as $x = 1$.

28. Find the slope of the normal to the curve

$$x = 1 - a \sin \theta \quad ; \quad y = b \cos^2\theta \quad \text{at} \quad \theta = \frac{\pi}{2}$$

29. If a manufacturer's total cost function is $C(x) = 1000 + 40x + x^2$, where x is the out put, find the marginal cost for producing 20 units.

30. Find a for which $f(x) = (x + \sin x) + a$ is increasing.

ANSWERS

1. 0.8 cm/sec.
2. 4.4 cm/sec.
3. 2 cm^3/sec.
4. 80 cm^2/sec.
5. Rs. 208.
6. Minimum value = 4, maximum value = 6.
7. Maximum value = 7, minimum value does not exist.
8. $a \leq 0$.
9. $(0, \pi]$
10. $(0, e]$
11. $x \geq 1$
12. R
13. $\left(0, \frac{\pi}{6}\right)$.
14. Maximum value = 4, minimum valve = 0.

(i) If $|A| \neq 0$, system is consistent and has a unique solution.

(ii) If $|A| = 0$ and $(adj\ A)\ B \neq 0$ then system is inconsistent and has no solution.

(iii) If $|A| = 0$ and $(adj\ A)\ B = 0$ then system is consistent and has infinite solution.

VERY SHORT ANSWER TYPE QUESTIONS (1 Mark)

1. If $\begin{bmatrix} x+3 & 4 \\ y-4 & x+y \end{bmatrix} = \begin{bmatrix} 5 & 4 \\ 3 & 9 \end{bmatrix}$, find x and y.

2. If $A = \begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix}$ and $B = \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$, find AB.

3. Find the value of $a_{23} + a_{32}$ in the matrix $A = [a_{ij}]_{3 \times 3}$

   where $a_{ij} = \begin{cases} |2i - j| & \text{if } i > j \\ -i + 2j + 3 & \text{if } i \leq j \end{cases}$.

4. If B be a 4×5 type matrix, then what is the number of elements in the third column.

5. If $A = \begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$ find $3A - 2B$.

6. If $A = \begin{bmatrix} 2 & -3 \\ -7 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 2 & -6 \end{bmatrix}$ find $(A+B)'$.

7. If $A = [1 \quad 0 \quad 4]$ and $B = \begin{bmatrix} 2 \\ 5 \\ 6 \end{bmatrix}$ find AB.

8. If $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x+1 \end{bmatrix}$ is symmetrix matrix, then find x.

9. For what value of x the matrix $\begin{bmatrix} 0 & 2 & -3 \\ -2 & 0 & -4 \\ 3 & 4 & x+5 \end{bmatrix}$ is skew symmetrix matrix.

10. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 0 \end{bmatrix} = P + Q$ where P is symmetric and Q is skew-symmetric matrix, then find the matrix Q.

R.K ODERN SCHOOL
DETERMINATS

11. Find the value of $\begin{vmatrix} a + ib & c + id \\ -c + id & a - ib \end{vmatrix}$

12. If $\begin{vmatrix} 2x + 5 & 3 \\ 5x + 2 & 9 \end{vmatrix} = 0$, find x.

13. For what value of K, the matrix $\begin{bmatrix} k & 2 \\ 3 & 4 \end{bmatrix}$ has no inverse.

14. If $A = \begin{bmatrix} \sin 30^\circ & \cos 30^\circ \\ -\sin 60^\circ & \cos 60^\circ \end{bmatrix}$, what is $|A|$.

15. Find the cofactor of a_{12} in $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$.

16. Find the minor of a_{23} in $\begin{vmatrix} 1 & 3 & -2 \\ 4 & -5 & 6 \\ 3 & 5 & 2 \end{vmatrix}$.

17. Find the value of P, such that the matrix $\begin{bmatrix} -1 & 2 \\ 4 & P \end{bmatrix}$ is singular.

18. Find the value of x such that the points (0, 2), (1, x) and (3, 1) are collinear.

19. Area of a triangle with vertices (k, 0), (1, 1) and (0, 3) is 5 unit. Find the value (s) of k.

20. If A is a square matrix of order 3 and $|A| = -2$, find the value of $|-3A|$.

21. If $A = 2B$ where A and B are of square matrices of order 3×3 and $|B| = 5$. What is $|A|$?

22. What is the condition that a system of equation $AX = B$ has no solution.

23. Find the area of the triangle with vertices (0, 0), (6, 0) and (4, 3).

24. If $\begin{vmatrix} 2x & 4 \\ -1 & x \end{vmatrix} = \begin{vmatrix} 6 & -3 \\ 2 & 1 \end{vmatrix}$, find x.

25. If $A = \begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ 1 & 1 & 1 \end{vmatrix}$, write the value of det A.

26. If $A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$ such that $|A| = -15$, find $a_{11} C_{21} + a_{12} C_{22}$ where C_{ij} is cofactors of a_{ij} in $A = [a_{ij}]$.

$\sec^{-1}x = \cos^{-1}(1/x), \ \forall \ |x| \geq 1$

- $\sin^{-1}(-x) = -\sin^{-1}x \ \forall \ x \in [-1, 1]$

  $\tan^{-1}(-x) = -\tan^{-1}x \ \forall \ x \in R$

  $\text{cosec}^{-1}(-x) = -\text{cosec}^{-1}x \ \forall \ |x| \geq 1$

- $\cos^{-1}(x) = \pi - \cos^{-1}x \ \forall \ \times \in [-1, 1]$

  $\cot^{-1}(-x) = \pi - \cot^{-1}x \ \forall \ x \in -R$

  $\sec^{-1}(-x) = \pi - \sec^{-1}x \ \forall \ |x| \geq 1$

- $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}, \quad x \in [-1, 1]$

  $\tan^{-1}x + \cot^{-1}x = \frac{\pi}{2} \ \forall \ x \in R$

  $\sec^{-1}x + \text{cosec}^{-1}x = \frac{\pi}{2} \ \forall \ |x| \geq 1$

- $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right); \quad xy < 1.$

- $\tan^{-1}x - \tan^{-1}y = \tan^{-1}\left(\frac{x-y}{1+xy}\right); \quad xy > -1.$

- $2\tan^{-1}x = \tan^{-1}\left(\frac{2x}{1-x^2}\right), |x| < 1$

VERY SHORT ANSWER TYPE QUESTIONS (1 MARK)

1. Write the principal value of

(i) $\sin^{-1}\left(-\sqrt{3}/2\right)$ (ii) $\sin^{-1}\left(\sqrt{3}/2\right)$.

(iii) $\cos^{-1}\left(-\sqrt{3}/2\right)$ (iv) $\cos^{-1}\left(\sqrt{3}/2\right)$.

(v) $\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right)$ (vi) $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$.

(vii) $\text{cosec}^{-1}(-2)$. (viii) $\text{cosec}^{-1}(2)$

(ix) $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$ (x) $\cot^{-1}\left(\frac{1}{\sqrt{3}}\right)$.

(xi) $\sec^{-1}(-2)$. (xii) $\sec^{-1}(2)$.

(xiii) $\sin^{-1}\left(\frac{-\sqrt{3}}{2}\right) + \cos^{-1}\left(\frac{-1}{2}\right) + \tan^{-1}\left(-1/\sqrt{3}\right)$

2. What is value of the following functions (using principal value).

(i) $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right) - \sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$. (ii) $\sin^{-1}\left(-\frac{1}{2}\right) - \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$.

(iii) $\tan^{-1}(1) - \cot^{-1}(-1)$. (iv) $\cos^{-1}\left(-\frac{1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$.

(v) $\tan^{-1}\left(\sqrt{3}\right) + \cot^{-1}\left(\frac{1}{\sqrt{3}}\right)$. (vi) $\operatorname{cosec}^{-1}\left(\sqrt{2}\right) + \sec^{-1}\left(\sqrt{2}\right)$.

(vii) $\tan^{-1}(1) + \cot^{-1}(1) + \sin^{-1}(1)$. (viii) $\cot^{-1}\left(\sqrt{3}\right) - \sin^{-1}\left(-\frac{1}{2}\right)$.

(ix) $\sin^{-1}\left(\sin\frac{4\pi}{5}\right)$. (x) $\cos^{-1}\left(\cos\frac{7\pi}{5}\right)$.

(xi) $\tan^{-1}\left(\tan\frac{5\pi}{6}\right)$. (xii) $\operatorname{cosec}^{-1}\left(\operatorname{cosec}\frac{3\pi}{4}\right)$.

SHORT ANSWER TYPE QUESTIONS (4 MARKS)

3. Show that $\tan^{-1}\left(\frac{\sqrt{1+\cos x}+\sqrt{1-\cos x}}{\sqrt{1+\cos x}-\sqrt{1-\cos x}}\right) = \frac{\pi}{4} + \frac{x}{2}$.

4. Prove $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right) - \cot^{-1}\left(\sqrt{\frac{1+\cos x}{1-\cos x}}\right) = \frac{\pi}{4}$ $x \in (0, \pi/2)$.

5. Prove $\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right) = \sin^{-1}\frac{x}{a} = \cos^{-1}\left(\frac{\sqrt{a^2-x^2}}{a}\right)$.

6. Prove $\cot^{-1}\left[2\tan\left(\cos^{-1}\frac{8}{17}\right)\right] + \tan^{-1}\left[2\tan\left(\sin^{-1}\frac{8}{17}\right)\right] = \tan^{-1}\left(\frac{300}{161}\right)$.

7. Prove $\tan^{-1}\left(\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right) = \frac{\pi}{4} + \frac{1}{2}\cos^{-1}x^2$.

8. Solve $\cot^{-1}2x + \cot^{-1}3x = \frac{\pi}{4}$.

9. Prove that $\tan^{-1}\left(\frac{m}{n}\right) - \tan^{-1}\left(\frac{m-n}{m+n}\right) = \frac{\pi}{4}, m, n > 0$

10. Prove that $\tan\left[\frac{1}{2}\sin^{-1}\left(\frac{2x}{1+x^2}\right) + \frac{1}{2}\cos^{-1}\left(\frac{1-y^2}{1+y^2}\right)\right] = \frac{x+y}{1-xy}$

11. Solve for x, $\cos^{-1}\left(\frac{x^2-1}{x^2+1}\right) + \frac{1}{2}\tan^{-1}\left(\frac{-2x}{1-x^2}\right) = \frac{2\pi}{3}$

12. Prove that $\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{7} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$

13. Solve for x, $\tan(\cos^{-1}x) = \sin(\tan^{-1}2);\ x > 0$

14. Prove that $2\tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{4}\right) = \tan^{-1}\left(\frac{32}{43}\right)$

15. Evaluate $\tan\left[\frac{1}{2}\cos^{-1}\left(\frac{3}{\sqrt{11}}\right)\right]$

H.O.T.S.

16. Prove that $\tan^{-1}\left(\frac{a\cos x - b\sin x}{b\cos x + a\sin x}\right) = \tan^{-1}\left(\frac{a}{b}\right) - x$

17. Prove that $\cot\left\{\tan^{-1}x + \tan^{-1}\left(\frac{1}{x}\right)\right\} + \cos^{-1}(1-2x^2) + \cos^{-1}(2x^2-1) = \pi,\ x > 0$

16. Prove that $\tan^{-1}\left(\frac{a-b}{1+ab}\right) + \tan^{-1}\left(\frac{b-c}{1+bc}\right) + \tan^{-1}\left(\frac{c-a}{1+ca}\right) = 0$ where $a, b, c > 0$

17. Solve for x, $2\tan^{-1}(\cos x) = \tan^{-1}(2\operatorname{cosec} x)$

18. Express $\sin^{-1}\left(x\sqrt{1-x} - \sqrt{x}\sqrt{1-x^2}\right)$ in simplest form.

19. If $\tan^{-1}a + \tan^{-1}b + \tan^{-1}c = \pi$ then

Prove that $a + b + c = abc$

20. If $\sin^{-1}x > \cos^{-1}x$ then x belong to which interval.

ANSWERS

1. (i) $-\frac{\pi}{3}$ (ii) $\frac{\pi}{3}$ (iii) $\frac{5\pi}{6}$ (iv) $\frac{\pi}{6}$

(v) $\frac{-\pi}{6}$ (vi) $\frac{\pi}{6}$ (vii) $\frac{-\pi}{6}$ (viii) $\frac{\pi}{6}$

(ix) $\frac{2\pi}{3}$ (x) $\frac{\pi}{3}$ (xi) $\frac{2\pi}{3}$ (xii) $\frac{\pi}{3}$

(xiii) $\frac{\pi}{6}$.

2. (i) 0 (ii) $\frac{-\pi}{3}$ (iii) $-\frac{\pi}{2}$ (iv) $\frac{\pi}{2}$

(v) $\frac{2\pi}{3}$ (vi) $\frac{\pi}{2}$ (vii) π (viii) $\frac{\pi}{3}$

(ix) $\frac{\pi}{5}$ (x) $\frac{3\pi}{5}$ (xi) $\frac{-\pi}{6}$ (xii) $\frac{\pi}{4}$.

8. 1

9. $\tan\frac{\pi}{12} = 2 - \sqrt{3}$

11. $\frac{\sqrt{5}}{3}$

13. $\sqrt{\frac{\sqrt{11}-3}{3+\sqrt{11}}}$

17. $x = \frac{\pi}{4}$.

18 $\sin^{-1}x - \sin^{-1}\sqrt{x}$.

20. $\left[\frac{1}{\sqrt{2}}, 1\right]$

DIFFERENTIAL

VERY SHORT ANSWER TYPE QUESTIONS (1 MARK)

1. Write the order and degree of the following differential equations.

(i) $\frac{dy}{dx} + \cos y = 0.$

(ii) $\left(\frac{dy}{dx}\right)^2 + 3\frac{d^2y}{dx^2} = 4.$

(iii) $\frac{d^4y}{dx^4} + \sin x = \left(\frac{d^2y}{dx^2}\right)^5.$

(iv) $\frac{d^5y}{dx^5} + \log\left(\frac{dy}{dx}\right) = 0.$

*(v) $\sqrt{1 + \frac{dy}{dx}} = \left(\frac{d^2y}{dx^2}\right)^{1/3}.$

(vi) $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2} = K\frac{d^2y}{dx^2}.$

(vii) $\left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{d^2y}{dx^2}\right)^3 = \sin x.$

2. Write the general solution of following differential equations.

(i) $\frac{dy}{dx} = x^5 + x^2 - \frac{2}{x}.$

(ii) $(e^x + e^{-x})\,dy = (e^x - e^{-x})dx$

(iii) $\frac{dy}{dx} = x^3 + e^x + x^e.$

(iv) $\frac{dy}{dx} = 5^{x+y}.$

(v) $\frac{dy}{dx} = \frac{1 - \cos 2x}{1 + \cos 2y}.$

(vi) $\frac{dy}{dx} = \frac{1 - 2y}{3x + 1}.$

3. Write integrating factor of the following differential equation

(i) $\frac{dy}{dx} + y\cos x = \sin x$

(ii) $\frac{dy}{dx} + y\sec^2 x = \sec x + \tan x$

(iii) $x^2 \frac{dy}{dx} + y = x^4$.

(iv) $x \frac{dy}{dx} + y \log x = x + y$

(v) $x \frac{dy}{dx} - 3y = x^3$

(vi) $\frac{dy}{dx} + y \tan x = \sec x$

4. Write order of the differential equation of the family of following curves

(i) $y = Ae^x + Be^{x+c}$

(ii) $Ay = Bx^2$

(iii) $(x - a)^2 + (y - b)^2 = 9$

(iv) $Ax + By^2 = Bx^2 - Ay$

(v) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$.

SHORT ANSWER TYPE QUESTIONS (4 MARKS)

5. (i) Show that $y = e^{m \sin^{-1} x}$ is a solution of $\left(1 - x^2\right) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - m^2 y = 0$.

(ii) Show that $y = \sin(\sin x)$ is a solution of differential equation

$$\frac{d^2y}{dx^2} + (\tan x) \frac{dy}{dx} + y \cos^2 x = 0.$$

(iii) Show that $y = Ax + \frac{B}{x}$ is a solution of $\frac{x^2 dy^2}{dx^2} + x \frac{dy}{dx} - y = 0$.

(iv) Show that $y = a \cos (\log x) + b \sin (\log x)$ is a solution of

$$x^2 \frac{dy^2}{dx^2} + x \frac{dy}{dx} + y = 0.$$

(v) Find the differential equation of the family of curves $y = e^x (A \cos x + B \sin x)$, where A and B are arbitrary constants.

(vi) Find the differential equation of an ellipse with major and minor axes $2a$ and $2b$ respectively.

(vii) Form the differential equation corresponding to the family of curves $y = c(x - c)^2$.

(viii) Form the differential equation representing the family of curves $(y - b)^2 = 4(x - a)$.

6. Solve the following diff. equations.

(i) $\frac{dy}{dx} + y \cot x = \sin 2x.$ (ii) $x \frac{dy}{dx} + 2y = x^2 \log x.$

(iii) $\frac{dx}{dy} + \frac{1}{x} . y = \cos x + \frac{\sin x}{x}, \quad x > 0.$

(iv) $\cos^3 x \frac{dy}{dx} + \cos x = \sin x.$

7. Solve each of the following differential equations :

(i) $y - x \frac{dy}{dx} = 2\left(y^2 + \frac{dy}{dx} \right).$ (ii) $\cos y \, dx + (1 + 2e^{-x}) \sin y \, dy = 0.$

(iii) $x\sqrt{1 - y^2}dy + y\sqrt{1 - x^2}dx = 0.$ (iv) $\sqrt{\left(1 - x^2\right)\left(1 - y^2\right)} \, dy + xy \, dx = 0.$

(v) $(xy^2 + x) \, dx + (yx^2 + y) \, dy = 0; \; y(0) = 1.$

(vi) $\frac{dy}{dx} = y \sin^3 x \cos^3 x + xy \, e^x.$

(vii) $\tan x \tan y \, dx + \sec^2 x \sec^2 y \, dy = 0$

8. Solve the following differential equations :

(i) $x^2 y \, dx - (x^3 + y^3) \, dy = 0.$ (ii) $x^2 \frac{dy}{dx} = x^2 + xy + y^2.$

(iii) $\left(x^2 - y^2\right) dx + 2xy \, dy = 0, \quad y(1) = 1.$

(iv) $\left(y \sin \frac{x}{y} \right) dx = \left(x \sin \frac{x}{y} - y \right) dy.$ (v) $\frac{dy}{dx} = \frac{y}{x} + \tan\left(\frac{y}{x} \right).$

(vi) $\frac{dy}{dx} = \frac{2xy}{x^2 + y^2}$ (vii) $\frac{dy}{dx} = e^{x+y} + x^2 e^y.$

(xii) $\frac{dy}{dx} = \sqrt{\frac{1 - y^2}{1 - x^2}}.$

9. (i) Form the differential equation of the family of circles touching y-axis at (0, 0).

(ii) Form the differential equation of family of parabolas having vertex at (0, 0) and axis along the (i) positive y-axis (ii) positive x-axis.

(iii) Form differential equation of family of circles passing through origin and whose centre lie on x-axis.

10. Show that the differential equation $\frac{dy}{dx} = \frac{x + 2y}{x - 2y}$ is homogeneous and solve it.

11. Show that the differential equation :

$(x^2 + 2xy - y^2)\, dx + (y^2 + 2xy - x^2)\, dy = 0$ is homogeneous and solve it.

12. Solve the following differential equations :

(i) $\frac{dy}{dx} - 2y = \cos 3x.$

(ii) $\sin x \frac{dy}{dx} + y \cos x = 2 \sin^2 x \cos x$ if $y\left(\frac{\pi}{2}\right) = 1$

LONG ANSWER TYPE QUESTIONS (6 MARKS)

13. Solve the following differential equations :

(i) $(x^3 + y^3)\, dx = (x^2y + xy^2)dy.$ (ii) $x\, dy - y\, dx = \sqrt{x^2 + y^2}dx.$

(iii) $y\left\{x \cos\left(\frac{y}{x}\right) + y \sin\left(\frac{y}{x}\right)\right\} dx - x\left\{y \sin\left(\frac{y}{x}\right) - x \cos\left(\frac{y}{x}\right)\right\} dy = 0.$

(iv) $x^2dy + y(x + y)\, dx = 0$ given that $y = 1$ when $x = 1$.

(v) $xe^{\frac{y}{x}} - y + x \frac{dy}{dx} = 0$ if $y(e) = 0$

(vi) $(x^3 - 3xy^2)\, dx = (y^3 - 3x^2y)dy.$

VERY SHORT ANSWER TYPE QUESTIONS (1 MARKS)

14. (i) Write the order and degree of the differential equation $\frac{dy}{dx} + \tan\left(\frac{dy}{dx}\right) = 0.$

(ii) What will be the order of the differential equation, corresponding to the family of curves $y = a \cos (x + b)$, where a is arbitrary constant.

(iii) What will be the order of the differential education $y = a + be^{x+c}$ where a, b, c are arbitrary constant.

(iv) Find the integrating factor for solving the differential education $\frac{dy}{dx} + y \tan x = \cos x$.

(v) Find the integrating factor for solving the differential equation $\frac{dy}{dx} + \frac{1}{1+x^2} y = \sin x$.

15. (i) Form the differential equation of the family of circles in the first quadrant and touching the coordinate axes.

(ii) Verify that $y = \log\left(x + \sqrt{x^2 + a^2}\right)$ satisfies the differential education

$$\left(a^2 + x^2\right)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = 0.$$

(iii) Show that the general solution of the differential equation $\frac{dy}{dx} + \frac{y^2 + y + 1}{x^2 + x + 1} = 0$ is given by $(x + y + 1) = A(1 - x - y - 2xy)$. Write A is parameter.

16. Solving the following differential equation

(i) $\cos^2 \frac{dy}{dx} = \tan x - y$.

(ii) $x \cos x \frac{dy}{dx} + y\left(x \sin x + \cos x\right) = 1$.

(iii) $\left(1 + e^{\frac{x}{y}}\right)dx + e^{\frac{x}{y}}\left(1 - \frac{x}{y}\right)dy = 0$.

(iv) $(y - \sin x)\, dx + \tan x\, dy = 0,\ y(0) = 0$.

LONG ANSWER TYPE QUESTIONS (6 MARKS EACH)

17. Solve the following differential equation

(i) $\left(x\, dy - y\, dx\right) y \sin\left(\frac{y}{x}\right) = \left(y\, dx + x\, dy\right) x \cos\left(\frac{y}{x}\right)$

(ii) $3e^x \tan y\, dx + (1 - e^x) \sec^2 y\, dy = 0$ given that $y = \frac{\pi}{4}$, when $x = 1$.

(iii) $\frac{dy}{dx} + y \cot x = 2x + x^2 \cot x$ given that $y(0) = 0$.

R. K MODERN SCHOOL
RELATION FUNCTION

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VERY SHORT ANSWER TYPE QUESTIONS

1. If A is the set of students of a school then write, which of following relations are. (Universal, Empty or neither of the two).

   R_1 = {(a, b) : a, b are ages of students and $|a - b| \geq 0$}

   R_2 = {(a, b) : a, b are weights of students, and $|a - b| < 0$}

   R_3 = {(a, b) : a, b are students studying in same class}

   R_4 = {(a, b) : a, b are age of students and $a > b$}

2. Is the relation R in the set A = {1, 2, 3, 4, 5} defined as R = {(a, b) : $b = a + 1$} reflexive?

R. K MODERN SCHOOL
RELATION FUNCTION

3. If R, be a relation in set N given by

   $R = \{(a, b) : a = b - 3, b > 5\}$

   Does elements $(5, 7) \in$ R?

4. If $f : \{1, 3\} \to \{1, 2, 5\}$ and $g : \{1, 2, 5\} \to \{1, 2, 3, 4\}$ be given by

   $f = \{(1, 2), (3, 5)\}$, $g = \{(1, 3), (2, 3), (5, 1)\}$

   Write down gof.

5. Let $g, f : R \to R$ be defined by

   $g(x) = \frac{x+2}{3}, f(x) = 3x - 2$. Write fog.

6. If $f : R \to R$ defined by

   $f(x) = \frac{2x-1}{5}$

   be an invertible function, write $f^{-1}(x)$.

7. If $f(x) = \frac{x}{x+1} \forall x \neq -1$, Write $fo\, f(x)$.

8. Let * is a Binary operation defined on R, then if

   (i) $a * b = a + b + ab$, write $3 * 2$

   (ii) $a * b = \frac{(a+b)^2}{3}$, Write $(2 * 3) * 4$.

   (iii) $a * b = 4a - 9b^2$, Write $(1 * 2) * 3$.

9. If $n(A) = n(B) = 3$, Then how many bijective functions from A to B can be formed?

10. If $f(x) = x + 1$, $g(x) = x - 1$, Then (gof) (3) = ?

11. If $f : N \to N$, $f(x) = x^2$ is one-one, given reason.

12. If $f : R \to A$, given by

    $f(x) = x^2 - 2x + 2$ is onto function, find set A.

13. If $f : A \to B$ is bijective function such that $n(A) = 10$, then $n(B)$ = ?

14. If $f : R \to R$, $g : R \to R$ are two functions, then (fog) (x) and gof (x) are equal always?

15. $R = \{(a, b) : a, b \in N, a \neq b$ and a divides $b\}$. Is R reflexive? Give reason?

16. Is $f : R \to R$, given by $f(x) = |x - 1|$ is one-one? Give reason? (True or False)

17. $f : R \to B$ given by $f(x) = \sin x$ is onto function, then write set B.

18. Is $f : R \to R$, $f(x) = x^3$ is bijective function?

19. If '*' is a binary operation on set Q of rational numbers given by $a * b = \frac{ab}{5}$ then write the identity element in Q.

20. If * is Binary operation on N defined by $a * b = a + ab \ \forall \ a, b \in N$. Write the identity element in N if it exists.

SHORT ANSWER TYPE QUESTIONS (4 Marks)

21. Check the following functions for one-one and onto.

    (a) $f : R \to R, \quad f(x) = \frac{2x-3}{7}$

    (b) $f : R \to R$, $f(x) = x^2 + 2$

    (c) $f : R \to R$, $f(x) = |x + 1|$

    (d) $f : R - \{2\} \to R, \ f(x) = \frac{3x-1}{x-2}$

    (e) $f : R \to R$, $f(x) = \sin x$

    (f) $f : R \to [-1, 1]$, $f(x) = \sin^2 x$

    (g) $f : R \to R$, $f(x) = x^2 - 2x + 3$

22. Show $f : R \to R$ given by $f(x) = \frac{3x-1}{5}$ is bijective. Also find f^{-1}.

23. See $f : R - \left\{\frac{-4}{3}\right\} \to R - \left\{\frac{4}{3}\right\}$ be a function given by $f(x) = \frac{4x}{3x+4}$. Show that f is invertible with $f^{-1}(x) = \frac{4x}{4-3x}$.

24. Let R be the relation on set $A = \{x : x \in Z, 0 \le x \le 10\}$ given by $R = \{(a, b) : (a - b)$ is multiple of 4$\}$, is an equivalence relation. Also, write all elements related to 4.

25. Show that function $f : A \to B$ defined as $f(x) = \frac{3x + 4}{5x - 7}$ where $A = R - \left\{\frac{7}{5}\right\}$, $B = R - \left\{\frac{3}{5}\right\}$ is invertible and hence find f^{-1}.

26. Let * be a binary operation on Q. Such that $a * b = a + b - ab$.

    (i) Prove that * is Commutative and associative.

    (ii) Find identify element of * in Q (if exists).

R.K. MODERN SCHOOL
SESSION – 2022-2023
CLASS – XII
SUBJECT – PHYSICS

CHAPTER- 1

Electric Charges and Fields

1. Which orientation of an electric dipole in a uniform electric field would correspond to stable equilibrium?

2. Define the term electric dipole moment of a dipole. State its S.I. unit.

3. Why must electrostatic field be normal to the surface at every point of a charged conductor?

4. A charge ‘q’ is placed at the centre of a cube of side l. What is the electric flux passing through each face of the cube?

5. Why do the electric field lines not form closed loops?

6. Two charges of magnitudes – 2Q and + Q are located at points (a, 0) and (4a,0) respectively. What is the electric flux due to these charges through a sphere of radius ‘3a’ with its centre at the origin?

7. Write the expression for the work done on an electric dipole of dipole moment p in turning it from its position of stable equilibrium to a position of unstable equilibrium in a uniform electric field E.

8. Why do the electric field lines never cross each other?

9. Why are electric field lines perpendicular at a point on an equipotential surface of a conductor?

10. A point charge +Q is placed in the vicinity of a conducting surface. Draw the electric field lines between the surface and the charge.lens? Give reason .

11. A point charge +Q is placed in the vicinity of a conducting surface. Draw the electric field lines between the surface and the charge.

12. Derive an expression for the torque experienced by an electric dipole kept in a uniform electric field.

13. A thin straight infinitely long conducting wire having charge density X is enclosed by a cylindrical surface of radius r and length l, its axis coinciding with the length of the wire. Find the expression for the electric flux through the surface of the cylinder.

14. A small metal sphere carrying charge +Q is located at the centre of a spherical cavity in a large uncharged metallic spherical shell. Write the charges on the inner and outer surfaces of the shell. Write the expression for the electric field at the point P_1

15. State Gauss' law in electrostatics. Using this law derive an expression for the electric field due to a uniformly changed infinite plane sheet.

16. Two point charges + q and -2q are placed at the vertices 'B' and 'C' of an equilateral triangle ABC of side as given in the figure. Obtain the expression for (i) the magnitude and (ii) the direction of the resultant electric field at the vertex A due to these two charges.

17. A charge is distributed uniformly over a ring of radius 'a'. Obtain an expression for the electric intensity E at a point on the axis of the ring. Hence show that for points at large distances from the ring, it behaves like a point charge.

18. Derive the expression for electric field at a point on the equatorial line of an electric dipole.

19. Expression for electric field due to dipole on its axial line.

20. two point charges 4 C and +1 C are separated by a distance of 2 m in air. Find the point on the line-joining charges at which the net electric field of the system is zero.

CHAPTER- 2
Electrostatic Potential and Capacitance

1. What is the work done in moving a test charge q through a distance of 1 cm along the equatorial axis of an electric dipole?

2. Define the term 'potential energy' of charge 'q' at a distance V in an external electric field.

3. A hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V. What is the potential at the centre of the sphere?

4. Why must the electrostatic potential inside a hollow charged conductor be the same at every point?

5. Two point charges 4Q, Q are separated by lm in air. At what point on the line joining the charges is the electric field intensity zero? Also calculate the electrostatic potential energy of the system of charges, taking the value of charge, $Q = 2 \times 10^{-7}C$
6. Net capacitance of three identical capacitors in series is 3 pF. What will be their net capacitance if connected in parallel?
7. An electric dipole of length 4 cm, when placed with its axis making an angle of 60° with a uniform electric field, experiences a torque of $4\sqrt{3}$ Nm. Calculate the potential energy of the dipole, if it has charge ± 8 nC.
8. A parallel plate capacitor of capacitance C is charged to a potential V. It is then connected to another uncharged capacitor having the same capacitance. Find out the ratio of the energy stored in the combined system to that stored initially in the single capacitor.
9. Draw the equipotential surfaces due to an electric dipole. Locate the points where the potential due to the dipole is zero.
10. Two thin concentric shells of radii r_1 and r_2 ($r_2 > r_1$) have charges q_1 and q_2. Write the expression for the potential at the surface of inner and outer shells.
11. Obtain the expression for the energy stored per unit volume in a charged parallel plate capacitor.

12. Derive the expression for the capacitance of a parallel plate capacitor having plate area A and plate separation d.

13. Two capacitors of unknown capacitances C_1 and C_2 are connected first in series and then in parallel across a battery of 100 V. If the energy stored in the two combinations is 0.045 J and 0.25 J respectively, determine the value of C_1 and C_2. Also calculate the charge on each capacitor in parallel combination.

14. Calculate the potential difference and the energy stored in the capacitor C_2 in the circuit shown in the figure. Given potential at A is 90 V, C_1 = 20 μF, C_2 = 30 μF and C_3 = 15 μF.

15. A 12 pF capacitor is connected to a 50 V battery. How much electrostatic energy is stored in the capacitor? If another capacitor of 6 pF is connected in series with it with the same battery connected across the combination, find the charge stored and potential difference across each capacitor.

16. Write two properties of equipotential surfaces. Depict equipotential surfaces due to an isolated point charge.

17. Obtain the expression for the potential due to a point charge.

18. A 500 μC charge is at the centre of a square of side 10 cm. Find the work done in moving a charge of 10 μC between two diagonally opposite points on the square.

CHAPTER- 3
Current Electricity

1. Write the expression for the drift velocity of charge carriers in a conductor of length T across which a potential difference 'V' is applied.
2. How does one explain increase in resistivity of a metal with increase of temperature?
3. Two metallic wires of the same material have the same length but cross-sectional area is in the ratio 1: 2. They are connected
   (i) in series and
   (ii) in parallel. Compare the drift velocities of electrons in the two wires in both the cases (i) and (ii).
4. A battery of emf 6 V and internal resistance 2Ω is connected to a resistor. If the current in the circuit is 0.25 A, find
   (i) the resistance of the resistors;
   (ii) the terminal voltage of the battery.
5. State the principle of a potentiometer. Describe briefly, with the help of a circuit diagram, how this device is used to compare the emf's of two cells.
6. Two identical cells, each of emf E, having negligible internal resistance, are connected in parallel with each other across an external resistance R. What is the current through this resistance?
7. Define the term 'Mobility' of charge carriers in a conductor. Write its S.I. unit.
8. Define the term 'electrical conductivity' of a metallic wire. Write its S.I. unit.
9. Define the term 'drift velocity' of charge carriers in a conductor and write its relationship with the current flowing through it.
10. How does the random motion of free electrons in a conductor get affected when a potential difference is applied across its ends?
11. Define current sensitivity and voltage sensitivity of a galvanometer. Increasing the current sensitivity may not necessarily increase the voltage sensitivity of a galvanometer. Justify..

12. A wire of 15 Ω resistance is gradually stretched to double its original length. It is then cut into two equal parts. These parts are then connected in parallel across a 3.0 volt battery. Find the current drawn from the battery.

13. A wire of 20 Ω resistance is gradually stretched to double its original length. It is then cut into two equal parts. These parts are then connected in parallel across a 4.0 volt battery. Find the current drawn from the battery.

14. A battery of emf 10 V and internal resistance 3Ω is connected to a resistor. If the current in the circuit is 0.5 A, find
(i) the resistance of the resistor;
(ii) the terminal voltage of the battery.

15. A battery of emf 6 V and internal resistance 2Ω is connected to a resistor. If the current in the circuit is 0.25 A, find
(i) the resistance of the resistors;
(ii) the terminal voltage of the battery. Name the phenomenon which shows the quantum nature of electromagnetic radiation.

16. Use Kirchhoff's rules to obtain conditions for the balance condition in a Wheatstone bridge.

17. Two cells of emfs 1.5 V and 2.0 V having internal resistance 0.2 Ω and 0.3 Ω respectively are connected in parallel. Calculate the emf and internal resistance of the equivalent cell.

18. Prove that the current density of a metallic conductor is directly proportional to the drift speed of electrons

19. State Kirchhoff's rules for an electric network. Using Kirchhoff's rules, obtain the .balance condition in terms of the resistances
of four arms of Wheatstone bridge.

20. State the working principle of a potentiometer with help of a circuit diagram, explain how the internal resistance of a cell is determined.

CHAPTER- 4
Moving Charges and Magnetism

1. What is the direction of the force acting on a charged particle q, moving with a velocity v in a uniform magnetic field B?
2. Why should the spring/suspension wire in a moving coil galvanometer have low torsional constant?
3. Magnetic field lines can be entirely confined within the core of a toroid, but not within a straight solenoid. Why?
4. An electron does not suffer any deflection while passing through a region of uniform magnetic field. What is the direction of the magnetic field?
5. Depict the trajectory of a charged particle moving with velocity v as it enters a uniform magnetic field perpendicular to the direction of its motion.
6. Write the expression in vector form, for the magnetic force F acting on a charged particle moving with velocity V in the presence of a magnetic field B.
7. Using the concept of force between two infinitely long parallel current carrying conductors, define one ampere of current.
8. A particle of mass 'm' and charge 'q' moving with velocity V enters the region of uniform magnetic field at right angle to the direction of its motion. How does its kinetic energy get affected?
9. Write the underlying principle of a moving coil galvanometer.
10. A coil, of area A, carrying a steady current I, has a magnetic moment, $\vec{m}$, associated with it. Write the relation between $\vec{m}$ I and A in vector form.
11. Using Ampere's circuital law, obtain an expression for the magnetic field along the axis of a current carrying solenoid of length l and having N number of turns.
12. State Biot-Savart law.
13. Write the expression for Lorentz magnetic force on a particle of charge 'q' moving with velocity $\vec{v}$ in a magnetic field $\vec{B}$. Show that no work is done by this force on the charged particle.
14. A particle of mass 5×10^{-3} kg and charge 4 μC enters into a uniform electric field of 2×10^{5} NC^{-1}, moving with a velocity of 30 ms^{-1} in a direction opposite to that of the field. Calculate the distance it would travel before coming to rest.

15. Derive an expression for the magnetic moment ($\vec{\mu}$) of an electron revolving around the nucleus in terms of its angular momentum ($\vec{l}$). What is the direction of the magnetic moment of the electron with respect to its angular momentum?

16. Draw the magnetic field lines due to a current passing through a long solenoid.

17. A rectangular coil of sides 'V and 'b' carrying a current I is subjected to a uniform magnetic field B acting perpendicular to its plane. Obtain the expression for the torque acting on it.

18. Write the expression for the magnitude of the magnetic field at the centre of a circular loop of radius r carrying a steady current I. Draw the field lines due to the current loop.

19. A square shaped plane coil of area 100 cm2 of 200 turns carries a steady current of 5A. It is placed in a uniform magnetic field of 0.2 T acting perpendicular to the plane of the coil. Calculate the torque on the coil when its plane makes an angle of 60° with the direction of the field. In which orientation will the coil be in stable equilibrium?

20. A circular coil of 200 turns and radius 10 cm is placed in a uniform magnetic field of 0.5 T, normal to the plane of the coil. If the current in the coil is 3.0 A, calculate the
(a) total torque on the coil.
(b) total force on the coil.

CHAPTER- 5
Magnetism and Matter

1. The permeability of a magnetic material is 0.9983. Name the type of magnetic materials it represents. Write any two characteristic properties of nuclear force.

2. Where on the surface of Earth is the angle of dip 90°?

3. Where on the surface of Earth is the angle of dip zero?

4. Where on the surface of Earth is the vertical component of Earth's magnetic field zero?
5. The horizontal component of the earth's magnetic field at a place is B and angle of dip is 60°. What is the value of vertical component of earth's magnetic field at equator?

6. Current flows through a circular loop. Depict the north and south pole of its equivalent magnetic dipole.

7. What are permanent magnets? Give one example.

8. Which of the following substances are diamagnetic?
   Bi, Al, Na, Cu, Ca and Ni

9. Relative permeability of a material, $\mu_r = 0.5$. Identify the nature of the magnetic material and write its relation to magnetic susceptibility.

10. Relative permeability of a material $\mu_r = 400$. Identify the nature of the magnetic material

11. At a place, the horizontal component of earth's magnetic field is B and angle of dip is 60°. What is the value of horizontal component of the earth's magnetic field at the equator?

12. Draw magnetic field lines when a
(i) diamagnetic,
(ii) paramagnetic substance is placed in an external magnetic field.

13. A magnetic needle free to rotate in a vertical plane parallel to the magnetic meridian has its north tip down at 60° with the horizontal. The horizontal component of the earth's magnetic field at the place is known to be 0.4 G. Determine the magnitude of the earth's magnetic field at the place.

14. A circular coil of N turns and diameter 'd' carries a current 'I'. It is unwound and rewound to make another coil of diameter '2d', current T remaining the same. Calculate the ratio of the magnetic moments of the new coil and the original coil.

15. State two characteristic properties distinguishing the behaviour of diamagnetic and ferromagnetic materials. .

CHAPTER- 6
Electromagnetic Induction

1. Define self-inductance of a coil. Write its S.I. unit.

2. State Lenz's law.

3. State Faraday's law of electromagnetic induction.

4. The motion of copper plate is damped when it is allowed to oscillate between the two poles of a magnet. What do the cause of this damping?

5. Derive an expression for the self-inductance of a long air-cored solenoid of length l and number of turns N.

6. What are eddy currents? Write any two applications of eddy currents.

7. A metallic rod of 'L' length is rotated with angular frequency of 'ω' with one end hinged at the centre and the other end at the circumference of a circular metallic ring of radius L, about an axis passing through the centre and perpendicular to the plane of the ring. A constant and uniform magnetic field B parallel to the axis is present everywhere. Deduce the expression for the emf between the centre and the metallic ring.

8. State the law that gives the polarity of the induced emf.

9. Derive the expression for the magnetic energy stored in a solenoid in terms of magnetic field B, area A and length l of the solenoid carrying a steady current I. How does this magnetic energy per unit volume compare with the electrostatic energy density stored in a parallel plate capacitor?

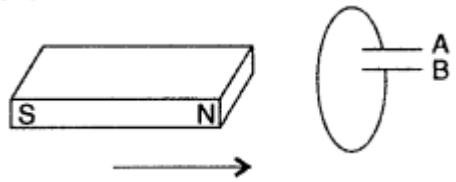
10. Define mutual inductance between a pair of coils. Derive an expression for the mutual inductance of two long coaxial solenoids of same length wound one over the other.

11. State Lenz's law. Explain, by giving examples that Lenz's law is a consequence of conservation of energy.

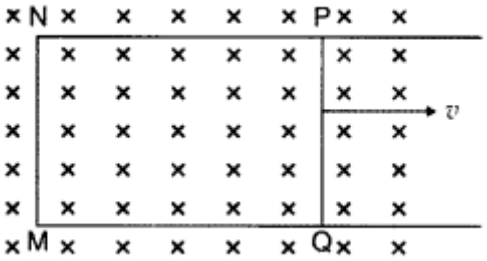
12. The current through two inductors of self-inductance 12 mH and 30 mH is increasing with time at the same rate. Draw graphs showing the variation of the
(a) emf induced with the rate of change of current in each inductor
(b) energy stored in each inductor with the current flowing through it.

13. Deduce an expression for the mutual inductance of two long coaxial solenoids but having different radii and different number of turns.

14. State Lenz's law. Use it to predict the polarity of the capacitor in the situation given below :

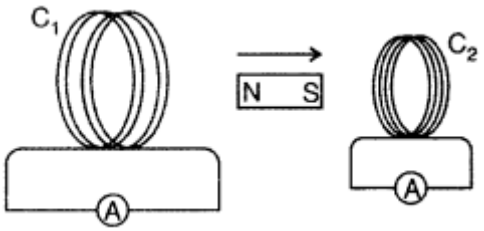


15. A rectangular loop PQMN with movable arm PQ of length 20 cm and resistance 5 Ω is placed in a uniform magnetic field of 0.2 T acting perpendicular to the plane of the loop as is shown in the figure.

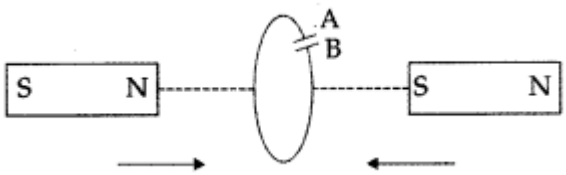


The resistances of the arms MN, NP and MQ are negligible. Calculate the
(i) emf induced in the arm PQ and
(ii) current induced in the loop when arm PQ is moved with velocity 15m/s

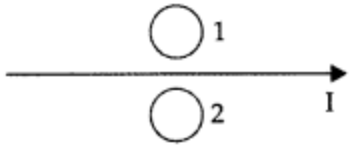
16. A magnet is quickly moved in the direction indicated by an arrow between two coils C_1 and C_2 as shown in the figure. What will be the direction of induced current in each coil as seen from the magnet? Justify your answer.



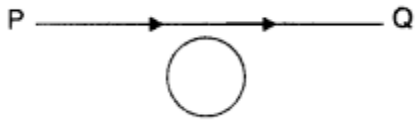
17. In the figure given, mark the polarity of plates A and B of a capacitor when the magnets are quickly moved towards the coil.



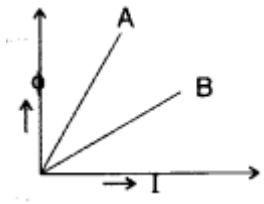
18. What is the direction of induced currents in metal rings 1 and 2 when current I in the wire is increasing steadily?



19. A conducting loop is held below a P current carrying wire PQ as shown. Predict the direction of the induced current in the loop when the current in the wire is constantly increasing.



20. A plot of magnetic flux (ϕ) versus current (I) is shown in the figure for two inductors A and B. Which of the two has larger value of self inductance?



CHAPTER- 7
Alternating Current

1. The instantaneous current and voltage of an a.c. circuit are given by i = 10 sin 300 t A and V = 200 sin 300 t V. What is the power dissipation in the circuit?

2. The instantaneous current and voltage of an a.c. circuit are given by i = 10 sin 314 t A and v = 50 sin 314 t V. What is the power dissipation in the circuit?

3. Mention the two characteristic properties of the material suitable for making core of a transformer.
4. Define capacitor reactance. Write its S.I. units.

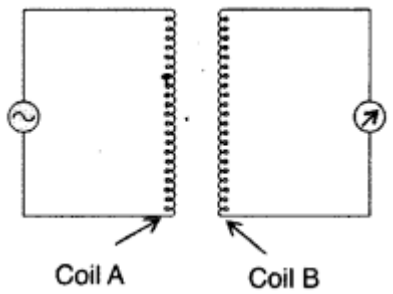
5. Plot a graph showing variation of capacitive reactance with the change in the frequency of the AC source.

6. Define ‘quality factor’ of resonance in series LCR circuit. What is its SI unit?

7. Prove that an ideal capacitor in an a.c. circuit does not dissipate power.

8. Derive an expression for the impedance of an a.c. circuit consisting of an inductor and a resistor.

9. he circuit arrangement as shown in the diagram shows that when an a.c. passes through the coil A, the current starts flowing in the coil B.
   i) State the underlying principle involved.
   (ii) Mention two factors on which the current produced in the coil B depends.

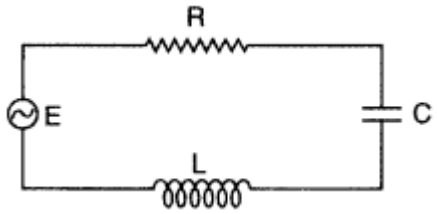


10. An electric lamp having coil of negligible inductance connected in series with a capacitor and an a.c. source is glowing with certain brightness. How does the brightness of the lamp change on reducing the
(i) capacitance, and
(ii) the frequency?

11. A light bulb is rated 100 W for 220 V ac supply of 50 Hz. Calculate
(i) the resistance of the bulb;
(ii) the rms current through the bulb.

12. An alternating voltage given by V = 280 sin 50πt is connected across a pure resistor of 40 Ω. Find
(i) the frequency of the source.
(ii) the rms current through the resistor.

13. he figure shows a series LCR circuit connected to a variable frequency 200 V source with L = 50 mH, C = 80 μF and R = 40 Ω.
Determine
(i) the source frequency which derives the circuit in resonance;
(ii) the quality factor (Q) of the circuit.



14. Derive an expression for the average power consumed in a series LCR circuit connected to a.c. source in which the phase difference between the voltage and the current in the circuit is 0.

15. When an ac source is connected across an ideal inductor, show on a graph the nature of variation of the voltage and the current over one complete cycle.

CHAPTER- 8
Electromagnetic Waves

1. Write the following radiations in ascending order in respect of their frequencies X-rays, Microwaves, UV rays and radiowaves.

2. Which part of electromagnetic spectrum has largest penetrating power?

3. Which of the following has the shortest wavelength :
Microwaves, Ultraviolet rays, X-rays.

4. How are X-rays produced?

5. How are microwaves produced?

6. What are the directions of electric and magnetic field vectors relative to each other and relative to the direction of propagation of electromagnetic waves?

7. Do electromagnetic waves carry energy and momentum?

8. Draw a sketch of a plane electromagnetic wave propagating along the z-direction. Depict clearly the directions of electric and magnetic fields varying sinusoidally with z

9. An e.m. wave, Y_1, has a wavelength of 1 cm while another e.m. wave, Y_2, has a frequency of 10^{15} Hz. Name these two types of waves and write one useful application for each.

10. Name the electromagnetic waves used for studying crystal structure of solids. What is its frequency range?

11. What is intensity of electromagnetic wave? Give its relation in terms of electric field E and magnetic field B.

12. An electromagnetic wave with frequency 5.70×1014×1014 propagates with a speed of 2.17×108×108 in a certain piece of glass. Find
(a) the wavelength of the wave in the glass;

CHAPTER- 9

Ray optics and optical instruments

1. How does the power of a convex lens vary, if the incident red light is replaced by violet light?

2. A tank is filled with water to a height of 12.5 cm. The apparent depth of a needle lying at the bottom of the tank is measured by a microscope to be 9.4 cm. What is the refractive index of water? If water is replaced by a liquid of refractive index 1.63 up to the same height, by what distance would the microscope have to be moved to focus on the needle again?

3. A glass lens of refractive index 1.45 disappears when immersed in a liquid. What is the value of refractive index of the liquid?

4. A person with a normal near point (25 cm) using a compound microscope with objective of focal length 8.0 mm and an eyepiece of focal length 2.5 cm can bring an object placed at 9.0 mm from the objective in sharp focus. What is the separation between the two lenses? Calculate the magnifying power of the microscope.

5. A small telescope has an objective lens of focal length 144 cm and an eyepiece of focal length 6.0 cm. What is the magnifying power of the telescope? What is the separation between the objective and the eyepiece?

6. State the conditions for the phenomenon of total internal reflection to occur.

7. **(a)** A giant refracting telescope at an observatory has an objective lens of focal length 15 m. If an eyepiece of focal length 1.0 cm is used, what is the angular magnification of the telescope?
   (b) If this telescope is used to view the moon, what is the diameter of the image of the moon formed by the objective lens? The diameter of the moon is 3.48×10^6 m and the radius of lunar orbit is 3.8×10^8 sm.

8. Calculate the speed of light in a medium whose critical angle is 30°

9. When light travels from a rarer to a denser medium, the speed decreases. Does this decrease in speed imply a decrease in the energy carried by the light wave? Justify your answer.

10. When monochromatic light travels from one medium to another its wavelength changes but frequency remains the same. Explain.

11. For the same value of angle of incidence, the angles of refraction in three media A, B and C are 15°, 25° and 35° respectively. In which medium would the velocity of light be minimum?

12. A biconvex lens made of a transparent material of refractive index 1.25 is immersed in water of refractive index 1.33. Will the lens behave as a converging or a diverging lens? Give reason.

13. A biconvex lens made of a transparent material of refractive index 1.5 is immersed in water of refractive index 1.33. Will the lens behave as a converging or a diverging lens? Give reason.

14. A concave lens of refractive index 1.5 is immersed in a medium of refractive index 1.65. What is the nature of the lens?

15. 1) What is the relation between critical angle and refractive index of a material?

(ii) Does critical angle depend on the colour of light? Explain.

16. The radii of curvature of the faces of a double convex lens are 10 cm and 15 cm. If focal length of the lens is 12 cm, find the refractive index of the material of the lens.

17. A biconvex lens has a focal length 2/3 times the radius of curvature of either surface. Calculate the refractive index of lens material.

18. Find the radius of curvature of the convex surface of a plano-convex lens, whose focal length is 0.3 m and the refractive index of the material of the lens is 1.5.

19. A small illuminated bulb is at the bottom of a tank, containing a liquid of refractive index upto a height H. Find the expression for the diameter of an opaque disc, floating symmetrically on the liquid surface in order to cut-off the light from the bulb.

20. What is the magnifying power of the telescope?

CHAPTER- 10
Wave Optics

1. Draw a diagram to show cylindrical wave front.

2. What is the shape of the wave front when light is diverging from a point source**?**

3. State the conditions that must be satisfied for two light sources to be coherent**.**

4. In Young's double slit experiment. The distance between the slits is halved, what change in the fringe width will take place?

5. Obtain an expression for the ratio of intensities at maxima and minima in an interference pattern.

6. Write two points of difference between interference and diffraction.

7. Can white light produce interference? What is the nature?

8. The refractive index of glass is 1.5. What is the speed of light in glass? Speed of light in vacuum is 3.0×10^8 m/s.

9. The speed of light in vacuum.

10. The speed of light in a medium (say, glass or water), depends.

11. In a Young's double slit experiment, the slits are repeated at 0.24 mm. The screen is 1.2 m away from the slits. The fringe width is 0.03cm. Calculate the wavelength of light used in the experiment?

12. In double-slit experiment using light of wavelength 600nm, the angular width of a fringe formed on a distant screen is 0.1° What is the spacing between the two slits?

13. Two coherent sources whose intensity ratio is 81:1 produce interference fringes. Calculate the ratio of intensity of maxima and minima in the interference pattern?

14. Using Huygens's principle, deduce the laws of refraction.

15. State Huygens's principle for constructing wave fronts.

16. Using Huygens's principle, deduce the laws of reflection of light.

17. Derive all expressions for the fringe width in Young's double slit experiment.

18. If the two slits in Young's double slit experiment have width ratio 4:1deduce the ratio of intensity of maxima and minima in the interference pattern.

19. How does the fringe width of interference fringes change, when the whole apparatus of Young's experiment is kept in a liquid of refractive index 1.3?

20. In a single slit diffraction experiment, the width of the slit is reduced to half its original width. How would this affect the size and intensity of the central maximum?

CHAPTER- 11
Dual Nature of Radiation and Matter

1. An electron and alpha particle have the same de-Broglie wavelength associated with them. How are their kinetic energies related to each other?

2. The stopping potential in an experiment on photoelectric effect is 1.5 V. What is the maximum kinetic energy of the photoelectrons emitted?

3. The maximum kinetic energy of a photoelectron is 3 eV. What is its stopping potential?

4. Show graphically, the variation of the de- Broglie wavelength (λ) with the potential (V) through which an electron is accelerated from rest.

5. Define the term ‘stopping potential’ in relation to photoelectric effect.

6. State de-Broglie hypothesis

7. A proton and an electron have same kinetic energy. Which one has greater de-Broglie wavelength and why?

8. Define ‘intensity’ of radiation in photon picture of light.

9. Why is photoelectric emission not possible at all frequencies?

10. Write the expression for the de Broglie wavelength associated with a charged particle having charge ‘q’ and mass ‘m’, when it is accelerated by a potential V.

11. Show on a plot the nature of variation of photoelectric current with the intensity of radiation incident on a photosensitive surface.

12. Find the ratio of de-Broglie wavelengths associated with two electrons accelerated through 25 V and 36 V.

13. efine intensity of radiation on the basis of photon picture of light. Write its S.I. unit.

14. An electron is revolving around the nucleus with a constant speed of 2.2×10^8 m/s. Find the de-Broglie wavelength associated with it.

15. Draw a plot showing the variation of de Broglie wavelength of electron as a function of its K.E.

16. Name the phenomenon which shows the quantum nature of electromagnetic radiation.

17. State one factor which determines the intensity of light in the photon picture of light.

18. State one reason to explain why wave theory of light does not support photoelectric effect.

19. An electron is accelerated through a potential difference of 100 volts. What is the de-Broglie wavelength associated with it? To which part of the electromagnetic spectrum does this value of wavelength correspond?

20. Write Einstein's photoelectric equation. State clearly the three salient features observed in photoelectric effect, which can be explained on the basis of the above equation.

CHAPTER- 12
Atoms

1. Define ionisation energy. What is its value for a hydrogen atom?

2. Write the expression for Bohr's radius in hydrogen atom.

3. What is the ratio of radii of the orbits corresponding to first excited state and ground state in a hydrogen atom?

4. The radius of innermost electron orbit of a hydrogen atom is 5.3×10^{-11} m. What is the radius of orbit in the second excited state?

5. The ground state energy of hydrogen atom is -13.6 eV. What are the kinetic and potential energies of electron in this state?

6. Why is the classical (Rutherford) model for an atom of electron orbitting around the nucleus not able to explain the atomic structure?

7. When is Ha line of the Balmer series in the emission spectrum of hydrogen atom obtained?

8. What is the maximum number of spectral lines emitted by a hydrogen atom when it is in the third excited state?

9. using Rutherford model of the atom, derive the expression for the total energy of the electron in hydrogen atom. What is the significance of total negative energy possessed by the electron?

10. Show that the radius of the orbit in hydrogen atom varies as n^2, where n is the principal quantum number of the atom.

11. When an electron in hydrogen atom jumps from the third excited state to the ground state, how would the de Broglie wavelength associated with the electron change? Justify your answer.

12. Calculate the shortest wavelength in the Balmer series of hydrogen atom. In which region (infra-red, visible, ultraviolet) of hydrogen spectrum does this wavelength lie?

13. The electron, in a hydrogen atom, is in its second excited state. Calculate the wavelength of the lines in the Lyman series, that can be emitted through the permissible transitions of this electron. (Given the value of Rydberg constant, $R = 1.1 \times 107\ m^{-1}$)

14. Find the ratio between the wavelengths of the 'most energetic' spectral lines in the Balmer and Paschen series of the hydrogen spectrum.

15. Write two important limitations of Rutherford nuclear model of the atom.

16. Find out the wavelength of the electron orbiting in the ground state of hydrogen atom.

17. A 12.5 eV electron beam is used to excite a gaseous hydrogen atom at room temperature. Determine the wavelengths and the corresponding series of the lines emitted.

18. The ground state energy of hydrogen atom is -13.6 eV. If an electron makes a transition from an energy level -1.51 eV to -3.4 eV, calculate the wavelength of the spectral line emitted and name the series of hydrogen spectrum to which it belongs.

19. Calculate the shortest wavelength of light emitted in the Paschen series of hydrogen spectrum. Which part of the electromagnetic spectrum, does it belong to ? (Given : Rydberg constant, $R = 1.1 \times 10^7\ m^{-1}$)

20. Calculate the longest wavelength of the photons emitted in the Balmer series of hydrogen spectrum. Which part of the e.m. spectrum, does it belong to?

CHAPTER- 13
Nuclei

1. Two nuclei have mass numbers in the ratio 1: 2. What is the ratio of their nuclear densities?

2. Write any two characteristic properties of nuclear force.

3. What is the Q-value of a nuclear reaction?

4. Express 16mg mass into equivalent energy in electron volt.

5. Why is nuclear fusion not possible in the laboratory?

6. A neutron is absorbed by a 3Li nucleus with subsequent emission of alpha particles. Write the corresponding nuclear reaction?

7. Distinguish between isotopes and isobars. Give one example for each of the species.

8. How is the radius of a nucleus related to its mass number?

9. A 1000 MW fission reactor consumes half of its fuel in 5.00 y. How much $_{92}^{235}U$ did it contain initially? Assume that the reactor operates 80% of the time, that all the energy generated arises from the fission of $_{92}^{235}U$ and that this nuclide is consumed only by the fission process.

10. Calculate and compare the energy released by a) fusion of 1.0 kg of hydrogen deep within the sun and b) the fission of 1.0 kg of 235U in a fission reactor.

11. What will be the ratio of the radii of two nuclei of mass numbers A_1 and A_2?

12. A nucleus of mass number A has a mass defect Δm. Give the formula, for the binding energy per nucleon of this nucleus.

13. Why does the process of spontaneous nuclear fission occur in heavy nuclei?

14. Draw the curve showing the binding energy/nucleon with a mass number of different nuclei. Briefly state, how nuclear fusion and nuclear fission can be explained on the basis of this graph.

15. Distinguish between nuclear fission and fusion.

16. A nucleus of mass number A has a mass defect Δm. Give the formula, for the binding energy per nucleon of this nucleus.

17. Given the mass of the iron nucleus as 55.85 u and A = 56. Find the nuclear density?

18. Explain by giving necessary reactions, how energy is released during (i) fission? (ii) fusion?

19. Calculate the energy release in MeV in the deuterium-tritium fusion reaction.

20. A nucleus with mass number A = 240 and BE/A= 7.6 MeV breaks into two fragments each of A = 120 with BE/ A= 8.5 MeV. Calculate the released energy.

CHAPTER- 14
Semiconductor Electronics
Materials Devices and Simple Circuits

1. State the reason, why GaAs is most commonly used in making of a solar cell.

2. Why should a photodiode be operated at a reverse bias?

3. What is the difference between an n-type and a p-type intrinsic semiconductor?

4. he figure shows the V-I characteristic of a semi conductor device. Identify this device. Explain briefly, using the necessary circuit diagram, how this device is used as a voltage regulator.

5. How does the depletion region of a p-n junction diode get affected under reverse bias?

6. What is the function of a photodiode?

7. Show variation of resistivity of Si with temperature in a graph.

8. Plot a graph showing variation of current versus voltage for the material GaAs.

9. Draw the circuit diagram of an illuminated photodiode in reverse bias. How is photodiode used to measure light intensity?

10. How is forward biasing different from reverse biasing in a pn junction diode?

11. Explain how a depletion region is formed in a junction diode.

12. Explain the V-I characteristic of a semiconductor diode.

13. Write any two distinguishing features between conductors, semiconductors and insulators on the basis of energy band diagrams.

14. With what considerations in view, a photodiode is fabricated? State its working with the help of a suitable diagram.

15. Draw the circuit diagram of a half wave rectifier and explain its working.

16. Explain briefly with the help of necessary diagrams, the forward and the reverse biasing of a p-n junction diode. Also draw their characteristic curves in the two cases.

17. Explain the two processes involved in the formulation of a p-n junction diode. Hence define the term ‘barrier potential.

18. What is a light emitting diode (LED)?

19. Draw the V-I characteristic of an LED.

20. Using the necessary circuit diagrams, show how the V-I characteristics of a p-n junction are obtained in Forward biasing.