

XII B

Summer Vacation

HOLIDAY HOMEWORK

SESSION 2026-27

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meaningful, fun-filled
and full of learning!

Name : _____

Class & Section : _____

Roll No. : _____

EXPLORE

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PHYSICS

ELECTRIC CHARGES AND FIELDS

Choose the correct options for the following questions:

Q1. A force of 4N is acting between two charges in air. If the space between them is completely filled with glass (relative permittivity = 8), then the new force will be

- (a) 2N (b) 5N (c) 0.5N (d) 0.2N

Q2. A charge q is placed at the centre of the line joining two equal charges Q . The system of three charges will be in equilibrium if q is equal to

- (a) $-Q/2$ (b) $-Q/4$ (c) $Q/2$ (d) $Q/4$

Q3. Two point charges Q and $-3Q$ are placed some distance apart. If the electric field at the location of Q is E , the field at the location of $-3Q$ is

- (a) E (b) $-E$ (c) $E/3$ (d) $-E/3$

Q4. An electric dipole when placed in a uniform electric field will have minimum potential energy, if the angle between dipole moment and electric field is

- (a) Zero (b) $\pi/2$ (c) $\pi/3$ (d) π

Q5. An electric dipole consists of two opposite charges of magnitude $1\mu\text{C}$ separated by a distance of 2cm . The dipole is placed in an electric field 10^5 V/m . The maximum torque

- (a) 10^{-3} Nm (b) 2×10^{-13} Nm (c) 3×10^{-3} N (d) 4×10^{-3} Nm

Q6. An infinite line of charge has a linear charge density of 10^{-7} C/m. What will be the magnitude of the force acting on an alpha particle placed at a distance of 4 cm from the line of charge?

- (a) $14.4 \times 10^{-15} \text{ N}$ (b) $7.2 \times 10^{-15} \text{ N}$ (c) $4.5 \times 10^4 \text{ N}$ (d) $9 \times 10^4 \text{ N}$

Q7. The angle between the electric lines of force and the equipotential surface is

- (a) 0° (b) 90° (c) 180° (d) 45°

Q8. A Sphere conductor of radius 10cm has a charge $3.2 \times 10^{-7}\text{C}$ distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere?

- (a) $1.28 \times 10^4 \text{ N/C}$ (b) $1.28 \times 10^5 \text{ N/C}$ (c) $1.28 \times 10^6 \text{ N/C}$ (d) $1.28 \times 10^7 \text{ N/C}$

Q9. Two-point charges A and B having charges $+Q$ and $-Q$ respectively, are placed at a distance apart and the force acting between them is F . If 25% charge on A is transferred to B, then the force between the charges becomes

- (a)4F/3 (b) F (c) 9F/16 (d)16F/9

Q10. A hemisphere is uniformly charged positively. The electric field at a point on a diameter away from the centre is directed

- (a) perpendicular to the diameter
- (b) parallel to the diameter
- (c) at an angle tilted towards the diameter
- (d) at an angle tilted away from the diameter.

Q11. The Electric field at a point is

- (a) always continuous. (b) continuous if there is no charge at that point.
(c) discontinuous only if there is a negative charge at that point.
(d) discontinuous if there is a charge at that point.

- Q23.** A uniform electric field $E = 2 \times 10^3 \text{ N/C}$ is acting along the positive x axis. The flux in (NC^{-1}m^2) of this field through a square of 10cm on a side whose plane is parallel to the y-z plane is

PREVIOUS YEARS QUESTIONS

- Q32.** Two metal spheres (radii a and b) are very far apart but are connected by a wire. Their combine charge Q
What is the charge on each and their absolute potential?
- Q33.** Two protons are released when they are 2×10^{-14} m apart . Find their speeds when they are 5×10^{-14} m apart. Mass of proton = 1.67×10^{-27} kg.
- Q34.** Three charges each are placed at the vertices of an equilateral triangle of side a find the work done to displace the charges to the vertices of an equilateral triangle of side $a/2$.
- Q35.** Use Gauss' law to obtain an expression for the electric field due to an infinitely long thin straight wire with uniform linear charge density.
- Q36.** A thin spherical shell of radius R has a uniform surface charge density . Using Gauss' law, deduce an expression for electric field (i) outside and (ii) inside the shell.
- Q37.** Two long straight thin wires AB and CD have linear charge densities 10 micro C/m and -20 micro C/m , respectively. They are kept parallel to each other at a distance 1 m . Find magnitude and direction of the net electric field at a point midway between them.

ELECTROSTATIC POTENTIAL AND CAPACITANCE

Choose the correct options for the following questions:

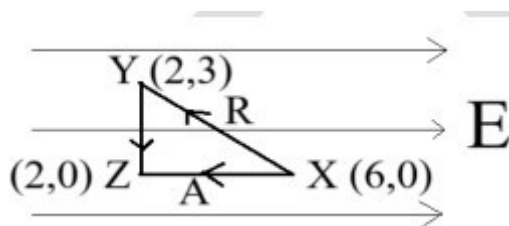
- Q1.** If potential applied on a capacitor is increased from V to $2V$, choose the correct conclusion.
- (a) Q remains the same, C is doubled (b) Q is doubled, C doubled
(c) C remains same, Q doubled (d) Both Q and C remain same
- Q2.** A parallel plate capacitor is charged. If the plates are pulled apart
- (a) The capacitance increases (b) The potential difference increases
(c) The total charge increases (d) The charge & potential difference remain the same
- Q3.** Which of the following is an example of a molecule whose centre of mass of positive and negative charges coincide each other?
- (a) CO_2 (b) CO (c) CH_3OH (d) NH_3
- Q4.** What is the angle between electric field and equipotential surface?
- (a) 90° always (b) 0° always (c) 0° to 90° (d) 0° to 180°
- Q5.** If we carry a charge once around an equipotential path, then work done by the charge is:
- (a) Infinity (b) Positive (c) Negative (d) Zero
- Q6.** Capacitance of a spherical capacitor may depend upon
- (a) radius of capacitor (b) dielectric medium
(c) applied potential difference (d) both (a) and (b)
- Q7.** An electron is accelerated from rest through a potential difference V . Its final speed is proportional to:
- (a) V (b) $V/2$ (c) $\sqrt{V}$ (d) $1/V$
- Q8.** Capacitors A and B are identical. Capacitor A is charged so it stores 4 J of energy and capacitor B is uncharged. The capacitors are then connected in parallel. The total stored energy in the capacitors is now:
- (a) 16 J (b) 8 J (c) 4 J (d) 2 J
- Q9.** If both the plate area and the plate separation of a parallel-plate capacitor are doubled, the capacitance is:

- (a) gets doubled (b) no effect (c) halved (d) becomes three times

Q23. Three capacitors of 3, 3 and 6 micro farad are connected in series to a 10V source. The charge on the 3 micro farad capacitor is

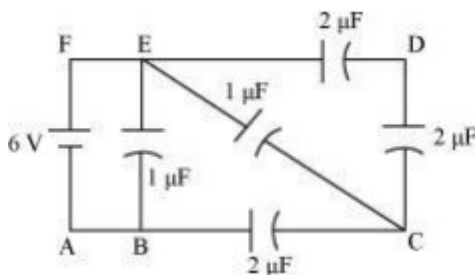
- (a) $5 \mu\text{C}$ (b) $12 \mu\text{C}$ (c) $15 \mu\text{C}$ (d) $10 \mu\text{C}$

Q24. Two charges of same nature and magnitude $+q$ are kept fixed at points X inside a uniform electric field. Now to shift the charges, Rahul used a path $X \rightarrow Y \rightarrow Z$ (shown as 'R' in the diagram) and Amol used a different path of direct $X \rightarrow Z$ (shown as 'A' in the diagram). Find the ratio of their work done to move the charge from X to Y.



- (a) 2:1 (b) 1:2 (c) 1:3 (d) 1:1

Q25. Find the total energy stored in the capacitors in the given network.



- (a) $3.6 \times 10^{-5} \text{ J}$ (b) $3.6 \times 10^{-6} \text{ J}$ (c) $7.2 \times 10^{-6} \text{ J}$ (d) $7.2 \times 10^{-5} \text{ J}$

ASSERTION AND REASON BASED QUESTIONS

Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

- (a) Both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
 (b) Both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
 (c) Assertion is correct, Reason is incorrect
 (d) Both Assertion and Reason are correct

Q26. Assertion : A parallel plate capacitor is connected across battery through a key. A dielectric slab of dielectric constant K is introduced between the plates. The energy which is stored becomes K times.

Reason : The surface density of charge on the plate remains constant or unchanged.

Q27. Assertion: A spherical equipotential surface is not possible for a point charge.

Reason: A spherical equipotential surface is not possible inside a spherical capacitor.

Q28. Assertion: The equatorial plane of a dipole is an equipotential surface.

Reason: The electric potential at any point on equatorial plane is zero.

Q29. Assertion: Electric potential and electric potential energy are different quantities.

Reason: For a system of positive test charge and point charge electric potential energy = electric potential.

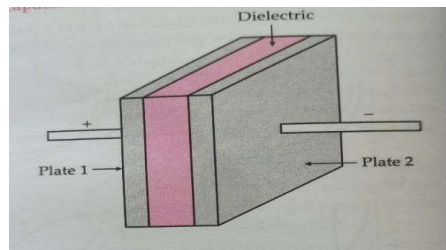
Q30.Assertion: Two equipotential surfaces cannot intersect each other.

Reason: Two equipotential surfaces are parallel to each other

CASE BASED QUESTIONS

Read the given case carefully and answer the following questions

An arrangement of two conductors separated by an insulating medium can be used to store electric charge and electric energy. Such a system is called a capacitor. The more charge a capacitor can store, the greater is its capacitance. Usually, a capacitor consists of two conductors having equal and opposite charge $+Q$ and $-Q$. Hence, there is a potential difference V between them. By the capacitance of a capacitor, we mean the ratio of the charge Q to the potential difference V . By the charge on a capacitor we mean only the charge Q on the positive plate. Total charge of the capacitor is zero. The capacitance of a capacitor is a constant and depends on geometric factors, such as the shapes, sizes and relative positions of the two conductors, and the nature of the medium between them. The unit of capacitance is farad (F), but the more convenient units are μF and pF . A commonly used capacitor consists of two long strips or metal foils, separated by two long strips of dielectrics, rolled up into a small cylinder. Common dielectric materials are plastics (such as polyesters and polycarbonates) and aluminium oxide. Capacitors are widely used in radio, television, computer, and other electric circuits.



1. A parallel plate capacitor C has a charge Q . The actual charge on its plates are
(a) Q, Q (b) $Q/2, Q/2$ (c) $Q, -Q$ (d) $Q/2, -Q/2$
2. A parallel plate capacitor is charged. If the plates are pulled apart .
(a) the capacitance increases (b) the potential difference increases
(c) the total charge increases (d) the charge & potential difference remains same
3. Three capacitors of $2, 3$ & $6 \mu\text{F}$ are connected in series to a 10 V source. The charge on the $3 \mu\text{F}$ capacitor is
(a) $5 \mu\text{C}$ (b) $10 \mu\text{C}$ (c) $12 \mu\text{C}$ (d) $15 \mu\text{C}$
4. If n capacitors each of capacitance C are connected in series, then the equivalent capacitance of the combination is
(a) NC (b) n^2C (c) C/n (d) C/n^2

PREVIOUS YEARS QUESTIONS

- Q32.** Two charges, q_1 , a negative source charge, and q_2 , a test charge. The test charge q_2 is initially positive and then changed into a negative charge of the same magnitude.
- (a) Will the potential at the position of charge q_2 due to the source charge q_1 (i) remain the same, (ii) increase or (iii) decrease?
 - (b) Will the potential energy of the q_1 & q_2 charge system (i) remain the same, (ii) increase (iii) decrease? Give an explanation in each case.
- Q33.** A small ball is suspended by an insulated thread in the space between the plates of the capacitor. The

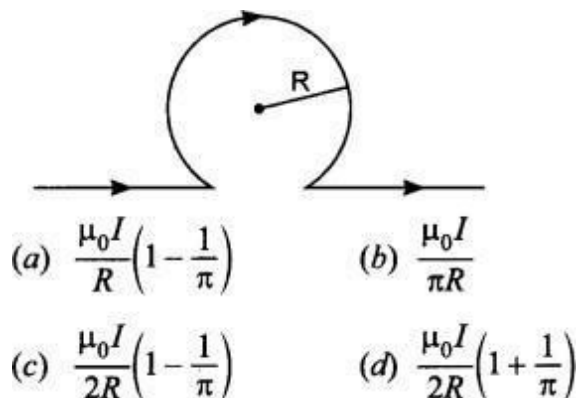
thread makes an angle θ with the vertical at equilibrium.

- Q34.** Two identical capacitors of plate dimensions $l \times b$ and plate separation d have dielectric slabs filled in between the plates as shown below. Obtain a relation between dielectric constants K , K_1 , and K_2 .
- Q35.** The plates of a parallel plate capacitor have an area of 90 cm^2 each and are separated by 2.5 mm . The capacitor is charged by connecting it to a 400 V supply. How much electrostatic energy is stored by the capacitor? View this energy as stored in the electrostatic field between the plates, and obtain the energy per unit volume u . Hence, arrive at a relation between u and the magnitude of electric field E .
- Q36.** Three charges are placed at the corners of an equilateral triangle ABC of side 2.00 m . Calculate the electric potential energy of the system of three charges.
- Q37.** If the air between the capacitor is replaced by a dielectric medium of dielectric constant 3 , what will be the potential difference between the two conductors?
- Q38.** A parallel plate capacitor (A) of capacitance C is charged by a battery to voltage V . The battery is disconnected and an uncharged capacitor (B) of capacitance $2C$ is connected across A. Find the ratio of
 (i) final charges on A and B.
 (ii) total electrostatic energy stored in A and B finally and that stored in A initially.

MAGNETIC EFFECTS OF CURRENT AND MAGNETISM

Choose the correct options for the following questions:

- Q1** A circular coil of radius 4 cm and of 20 turns carries a current of 3 amperes . It is placed in a magnetic field of intensity of 0.5 weber/m^2 . The magnetic dipole moment of the coil is
 a) $0.15 \text{ A}\cdot\text{m}^2$ b) $0.3 \text{ A}\cdot\text{m}^2$ c) $0.45 \text{ A}\cdot\text{m}^2$ d) $0.6 \text{ A}\cdot\text{m}^2$
- Q2** A flat circular coil of 100 turns and radius 10 cm carries a current of 1 A . Then the magnetic dipole moment of the coil is A .
 a) $\pi \text{ A}\cdot\text{m}^2$ b) $\pi/2 \text{ A}\cdot\text{m}^2$ c) $2\pi \text{ A}\cdot\text{m}^2$ d) $\pi/4 \text{ A}\cdot\text{m}^2$
- Q3** The strength of magnetic field at the Centre of circular coil is



- Q4.** The maximum current that can be measured by a galvanometer of resistance 40Ω is 10 mA . It is converted into voltmeter that can read up to 50 V . The resistance to be connected in the series with the galvanometer is

a) $2010\ \Omega$ b) $4050\ \Omega$ c) $5040\ \Omega$ d) $4960\ \Omega$

Q5. Two α -particles have the ratio of their velocities as 3: 2 on entering the field. If they move in different circular paths, then the ratio of the radii of their paths is

a) 2 : 3

b) 3 : 2

c) 9 : 4

d) 4 : 9

Q6. The time period of a charged particle undergoing a circular motion in a uniform magnetic field is independent of:

(a) speed of the particle

(b) mass of the particle

(c) charge of the particle

(d) magnetic field of the particle

Q7. If an ammeter is to be used in place of a voltmeter, then we must connect with the ammeter a:

(a) low resistance in parallel

(b) high resistance in parallel

(c) high resistance in series

(d) low resistance in series

Q8. A particle of charge q and mass m moves in a circular orbit of radius r with angular speed ω . The ratio of the magnitude of its magnetic moment to that of its angular momentum depends on

(a) ω and q (b) ω , q and m (c) q and m (d) ω and m

Q9. According to the Right hand thumb rule, direction of which physical quantity is indicated by the thumb?

(a) Electric current

(b) Magnetic field

(c) Magnetic force

(d) Motion of conductor

Q10. What is the shape of magnetic field lines passing through the centre of current carrying circular ring?

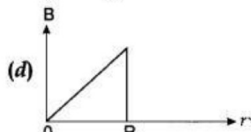
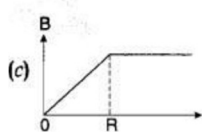
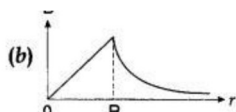
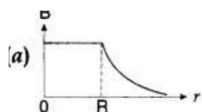
(a) Circular

(b) Straight line

(c) Ellipse

(d) no definite shape

Q11. The correct plot of the magnitude of magnetic field B vs distance r from centre of the wire is, if the radius of wire is R



Q12. In a current-carrying loop, the magnetic field is strongest:

(a) At the centre of the loop

(b) Along the edges of the loop

(c) Inside the loop

(d) Outside the loop

Q13. The magnetic field inside a current-carrying conductor.

(a) increases with the increase in current

(b) decreases with the increase in current

(c) remains constant with the increase in current

(d) is zero

Q14. The direction of the magnetic field at the centre of a current-carrying circular loop is:

(a) Along the axis of the loop

(b) Parallel to the plane of the loop

(c) Radially inward

(d) Tangential to the loop

Q15. Which of the following statements is correct regarding the magnetic field around a straight current-carrying conductor?

(a) The magnetic field lines form concentric circles centred on the conductor.

(b) The magnetic field lines form straight lines parallel to the conductor.

(c) The magnetic field lines form radial lines away from the conductor.

(d) The magnetic field lines form hyperbolic curves around the conductor.

Q16. A current carrying closed loop of an irregular shape lying in more than one plane when placed in uniform magnetic field, the force acting on it

- (a) Will be more in the plane where its larger position is covered.
- (b) Is zero.
- (c) Is infinite.
- (d) May or may not be zero.

Q17. A strong magnetic field is applied on a stationary electron. Then the electron

- (a) Moves in the direction of the field.
- (b) Remained stationary.
- (c) moves perpendicular to the direction of the field
- (d) moves opposite to the direction of the field

Q18. Relative permittivity and permeability of a material are ϵ_r and μ_r respectively. Which of the following values of these quantities are allowed for a diamagnetic material?

- (a) $\epsilon_r = 1.5$, $\mu_r = 1.5$
- (b) $\epsilon_r = 0$, $\mu_r = 1.5$
- (c) $\epsilon_r = 1.5$, $\mu_r = 0.5$
- (d) $\epsilon_r = 0.5$, $\mu_r = 0.5$

Q19. The relative magnetic permeability of a substance X is slightly less than unity and that of substance Y is slightly more than unity, then

- (a) X is paramagnetic and Y is ferromagnetic
- (b) X is diamagnetic and Y is ferromagnetic
- (c) X and Y both are paramagnetic
- (d) X is diamagnetic and Y is paramagnetic

Q20. An iron bar magnet of length 10 cm and cross-section 1 cm² has a magnetization of 102 A/m. Magnet's pole strength is

- (a) 0.0025 Am
- (b) 0.0015 Am
- (c) 0.01 Am
- (d) 0.002Am

Q21. A short bar magnet placed with its axis at 30° with a uniform external magnetic field of 0.25 T experiences a torque of magnitude equal to 4.5×10^{-2} J. What is the magnitude of magnetic moment of the magnet?

- (a) 0.26 J/T
- (b) 0.36 J/T
- (c) 0.43 J/T
- (d) 0.30 J/T

Q22. A short bar magnet has a magnetic moment 1.2 Am². The magnetic field at a distance 0.1 m on its axis will be ($\mu_0 = 4\pi \times 10^{-7}$ T.m / A)

- (a) 1.2×10^{-4} T
- (b) 2.4×10^{-4} T
- (c) 2.4×10^4 T
- (d) 1.2×10^4 T

Q23. A short bar magnet free to rotate on horizontal plane has a magnetic moment of 0.48 J/T. Magnetic field produced by the magnet at a distance of 10 cm from the centre of the magnet on the equatorial lines (normal bisector) of the magnet has a direction and magnitude of

- (a) 0.43 G along N-S direction
- (b) 0.38 G along N-S direction
- (c) 0.55 G along N-S direction
- (d) 0.48 G along N-S direction

Q24. The force between two magnetic poles is F. If the distance between the poles and pole strengths of each pole are doubled, then the force experienced is :

- (a) F
- (b) F / 4
- (c) 2F
- (d) F / 2

Q25. A cube-shaped permanent magnet is made of a ferromagnetic material with a magnetization M of 4×10^5 A/m. The side length is 2 cm. Magnetic field due to the magnet at a point 10 cm from the magnet along its axis is

- (a) 0.003T
- (b) 0.001T
- (c) 0.002T
- (d) 0.004T

Chemistry

MCQs for CUET

Chapter: Solutions

Q1 The molarity of a solution depends on:

- A) Mass of solute only
B) Volume of solution
C) Temperature
D) Both B and C

Q2 Raoult's law is applicable to:

- A) Non-ideal solutions
B) Ideal solutions
C) Colloids
D) Suspensions

Q3 Which of the following is a colligative property?

- A) Density
B) Osmotic pressure
C) Surface tension
D) Viscosity

Q4 Van't Hoff factor is represented by:

- A) α
B) π
C) i
D) K

Q5 The boiling point of a solution is:

- A) Lower than pure solvent
B) Higher than pure solvent
C) Equal to pure solvent
D) Unpredictable

Q6 Molality is defined as:

- A) Moles of solute per litre of solution
B) Moles of solute per kg of solvent
C) Gram of solute per litre
D) Gram of solute per kg

Q7 Reverse osmosis is used for:

- A) Distillation
B) Water purification
C) Crystallization
D) Sublimation

Q8 The unit of molarity is:

- A) mol kg^{-1}
B) mol L^{-1}
C) g L^{-1}

Q9 Depression in freezing point depends on:

- A) Nature of solvent only
B) Number of solute particles
C) Temperature only
D) Pressure only

Q10 An azeotrope is:

- A) Ideal solution
B) Solution boiling at constant temperature
C) Saturated solution
D) Unsaturated solution

Q11 Chapter: Electrochemistry

Oxidation occurs at:

- A) Cathode
B) Anode
C) Salt bridge
D) Electrolyte

Q12 The SI unit of conductivity is:

- A) ohm
B) $\text{ohm}^{-1} \text{ cm}^{-1}$
C) S m^{-1}
D) volt

Q13 In a galvanic cell, electrons flow from:

- A) Cathode to anode
B) Anode to cathode
C) Salt bridge to cathode
D) Electrolyte to electrode

Q15 The standard electrode potential of SHE is:

- A) 1 V
B) 0.5 V
C) 0 V
D) -1 V

Q16 Corrosion of iron forms:

- A) FeO
B) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$
C) FeCl_3
D) FeSO_4

Q17 The Nernst equation is used to determine:

- A) Pressure
B) Cell potential
C) Temperature
D) Conductance

Q18 Faraday constant is approximately:

- A) Increasing activation energy
B) Decreasing activation energy

D) Increasing concentration

Q27 Order of reaction can be:

A) Fractional

B) Zero

C) Integral

D) All of these

Q28 Molecularity can never be:

A) 1

B) 2

C) Fractional

D) 3

Q29 The rate law for a zero-order reaction is:

A) Rate = $k[A]$

B) Rate = k

C) $\text{Rate} = k[A]^2$

D) $\text{Rate} = k/[A]$

Q30 The slope of Arrhenius plot gives:

A) R

B) E_a/R

C) $-Ea/R$

D) k

Q31 Faster reactions have:

A) High activation energy

B) Low activation energy

C) Zero energy

D) Infinite energy

Chapter: d and f Block Elements

Q32 Transition elements belong to:

A) s-block

B) p-block

C) d-block

D) f-block

Q 33 Lanthanides show:

A) Variable oxidation states

B) Lanthanide contraction

C) High electronegativity

D) Low density

Q34 KMnO_4 acts as:

A) Reducing agent

B) Oxidising agent

C) Catalyst only

D) Acid

(d) Nature of catalyst only

(d) Energy of products

- (a) $-k/2.303$
(b) $-2.303/k$
(c) $-1/k$
(d) k

(d) It depends on heat of reaction

- Q24. In a first-order reaction, time required to reduce concentration to $1/8$ of initial value is:

- Q25. Which factor does not affect rate constant?

- Q26. For a unimolecular reaction, molecularity is:

- Q27. Which one is incorrect?

- Q28. For a zero-order reaction, rate of reaction depends on:

- (a) Concentration of reactants
(b) Rate constant only
(c) Both concentration and temperature
(d) Catalyst only

Q29. In a reaction, concentration of reactant is reduced to 25% in two hours. If reaction is first order, half-life is:

- (a) 1 h
(b) 2 h
(c) 3 h
(d) 4 h

Chemical kinetics

Q1 what is the difference between rate law and law of mass action

Q2 what is the difference between order of reaction and molecularities of reaction

Q3 what is the difference between rate of reaction and rate constant

Q4 what is the difference between average rate of reaction and instantaneous rate of reaction

Q5 Define pseudo first order reaction with example

Q6 numerical based on Zero order and first order reaction formula

Q1 What is the difference between ideal and non ideal solution

Q2 Define

D and F block elements

1 Explain variation of atomic radii in first transition series

2 why second and third transition series have almost similar size

3 why most of the transition elements show variable oxidation state

4 Why transition elements and their compound act as catalyst

5 Why transition elements form interstitial compounds

6 why transition elements form alloy

7 why transition elements have high atomisation enthalpy

8 Define Lanthanoid contraction and its causes and consequences

9 Difference between Lanthanide and actinides

10 Why Cu^{+1} ion is not stable in aqueous solution?

11 Why $E^0 \text{ Cu}^{+2}/\text{Cu}$ value is positive for Copper?

12 Out of these Fe^{+2} and Cr^{+2} is stronger reducing agent and why?

13 Why Sm^{+2} , Eu^{+2} is strong reducing agent while Ce^{+2} is strong oxidising agent?

14 preparation of KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ and their chemical properties

15 Why transition element form large number of compound?

16 Explain magnetic properties of transition element

Physical Education

Instructions for Students

- **Complete all questions in neat handwriting.**
- **Use separate notebook sheets for each chapter.**
- **Draw diagrams wherever required.**
- **Submit homework after summer vacation.**
- **Revise all chapters regularly.**

Chapter 1: Management of Sporting Events

MCQ (1 Mark Each)

- 1. Which committee manages the money of sports events?**
 - a) Technical Committee**
 - b) Finance Committee**
 - c) Transport Committee**
 - d) Boarding Committee**
- 2. Intramural tournaments are organized:**
 - a) Between schools**
 - b) Within the school**
 - c) At national level**
 - d) International level**
- 3. The motto of Olympics is:**
 - a) Faster, Higher, Stronger**
 - b) Unity in Diversity**
 - c) Play and Win**
 - d) Sports for All**
- 4. Which committee prepares the ground?**
 - a) Boarding Committee**
 - b) Technical Committee**
 - c) Ground & Equipment Committee**
 - d) Medical Committee**
- 5. League tournament is also known as:**
 - a) Knock-out tournament**
 - b) Round Robin tournament**
 - c) Combination tournament**
 - d) Fixture tournament**

- a) Gets second chance
- b) Continues playing
- c) Gets eliminated
- d) Plays final directly

7. Sports Day is an example of:

- a) Intramural activity
b) Extramural activity
c) International activity
d) None of these

8. Bye is given in:

- a) League tournament
b) Knockout tournament
c) Both
d) None

9. The number of matches in league tournament is calculated by:

- a) $N(N-1)$
- b) $N(N-1)/2$
- c) $N+1$
- d) $N-2$

10. Which committee looks after first aid?

- a) Reception Committee
b) Medical Committee
c) Boarding Committee
d) Transport Committee

2 Marks Questions

- 1. Define intramural tournament.**
- 2. What is a knockout tournament?**
- 3. Write any two objectives of sports events.**
- 4. What do you mean by fixture?**
- 5. Name any two committees of sports management.**
- 6. What is extramural activity?**
- 7. Define league tournament.**
- 8. What is a bye in tournament?**
- 9. Mention any two functions of Technical Committee.**
- 10. Write two advantages of intramural activities.**

- 1. Female athlete triad is related to:**
 - a) Men**
 - b) Women athletes**
 - c) Children**
 - d) Coaches**
- 2. Motor development means development of:**
 - a) Intelligence**
 - b) Physical skills**
 - c) Emotions**
 - d) Personality**
- 3. Which hormone is important during adolescence?**
 - a) Thyroxine**
 - b) Estrogen**
 - c) Insulin**

d) Adrenaline

4. Bullying in sports affects:

- a) Confidence
- b) Health
- c) Performance
- d) All of these

5. Female athlete triad includes:

- a) Obesity
- b) Amenorrhea
- c) Fever
- d) Diabetes

6. Growth refers to increase in:

- a) Skill
- b) Size of body
- c) Thinking
- d) Behaviour

7. Which exercise is best for children?

- a) Heavy weight training
- b) Recreational activities
- c) No exercise
- d) Extreme exercise

8. Menarche is related to:

- a) Boys
b) Girls
c) Coaches
d) Teachers

9. Women generally have more flexibility due to:

- a) Muscles
- b) Hormones
- c) Height
- d) Diet

10. Child abuse in sports can be:

- a) Physical
- b) Emotional
- c) Sexual
- d) All of these

1. Explain female athlete triad in detail.
2. Describe the importance of sports participation for women.
3. Explain growth and development during childhood.
4. Discuss the effects of bullying and its prevention.
5. Explain the stages of motor development.
6. Describe the benefits of physical activities for children.
7. Explain the role of sports in empowerment of women.
8. Discuss the precautions for women athletes during training.
9. Explain the importance of balanced diet for children and women athletes.
10. Write detailed notes on exercise guidelines for children.

d) 5

- a) આલાપ
b) તાન

- c) लोकगीत
d) खटका

14. 'तिरिप्' किसका प्रकार है ?

- a) आलाप
b) गमक
c) मीड
d) कण स्वर

15. तीन स्वरो का अर्ध गोलाई आकार में बोलना कहलाता है?

- a) मुर्की
b) खटका
c) कण
d) मात्रा

रचनात्मक प्रश्न

- 1) किन्ही भी तीन तालो मे 2-2 अलंकारों की रचना करके लिखो
- 2) रागो के स्वर विस्तार को तान कहते है और तान अनेक प्रकार की होती है किन्ही भी 4 प्रकार की तानो की रचना करो
- 3) रागो के समय सिद्धांत का सम्पूर्ण वर्णन करो

MATHEMATICS

CBSE Board Examination 2026 answer sheets are being evaluated with the help of computer-assisted checking and strict marking schemes. Therefore, writing proper steps in Mathematics plays a very important role in scoring good marks. Even if the final answer is correct, marks may be deducted for missing or improper steps. To help you improve your presentation and answer-writing skills, some previous years CBSE questions along with marking-scheme-based solutions have been provided in this homework. Students are instructed to carefully observe and analyse each step of the solutions before writing them in their notebooks.

Important Instructions:

1. Write all questions neatly in your Mathematics holiday homework notebook.
2. Follow the CBSE marking scheme while solving every question.
3. Write complete steps clearly and systematically. Avoid skipping steps.
4. Mention the marks allotted to each step on the right-hand margin of the notebook exactly according to the marking scheme given in the PDF.
5. Proper presentation, correct mathematical notation, and neat diagrams (where required) should be maintained.
6. Use blue pen for writing and pencil for graphs, figures, and margin work.
7. Highlight final answers properly by boxing them.
8. Revise formulas and concepts before attempting the questions.
9. Maintain cleanliness and discipline in your notebook work.
10. The test will be conducted from the Holiday Homework questions.
11. Homework will be checked on the basis of:

Note: Students are advised to practice each question sincerely, as stepwise solving technique is extremely important for Board Examination preparation and helps in securing maximum marks.

Part-A

- At least 10 mathematical activity and 1 project in file

Part-B

Q.1

Q23.

A ladder 13 m long is leaning against the wall. The bottom of the ladder is pulled along the ground away from the wall at the rate of 2 m/s. How fast is the height on the wall decreasing when the foot of the ladder is 12 m away from the wall ?

9

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Ans

$$x^2 + y^2 = 169$$

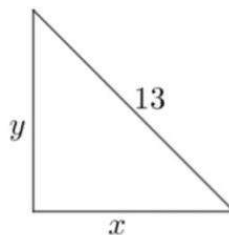
Differentiate both sides w.r.t. t

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

$$\Rightarrow 12(2) + 5 \left(\frac{dy}{dt} \right) = 0 [\because \text{when } x = 12m, y = 5m]$$

$$\Rightarrow \frac{dy}{dt} = -\frac{24}{5}$$

Hence, the height decreases at the rate of $\frac{24}{5}$ m/s

 $\frac{1}{2}$

1

 $\frac{1}{2}$

Q2

Q22.

If $e^y (x + 1) = 1$, prove that $\frac{dy}{dx} = -e^y$.

Ans

$$e^y(x+1)=1 \Rightarrow e^y = \frac{1}{x+1}$$

$$\Rightarrow y = -\log(x+1)$$

$$\Rightarrow \frac{dy}{dx} = -\frac{1}{x+1}$$

$$=-e^y \quad \left[\because \frac{1}{x+1} = e^y \right]$$

 $\frac{1}{2}$

1

 $\frac{1}{2}$

Q3

Q26.	Find the maximum slope of the curve $y = -x^3 + 3x^2 + 9x - 30$.	
Ans	$y = -x^3 + 3x^2 + 9x - 30$ Slope of the curve, $m = \frac{dy}{dx} = -3x^2 + 6x + 9$ $\Rightarrow \frac{dm}{dx} = -6x + 6$ For maximum/ minimum slope, put $\frac{dm}{dx} = 0$ $\Rightarrow x = 1$ As $\frac{d^2m}{dx^2} = -6 < 0 \therefore m$ is maximum at $x = 1$ Maximum slope $= -3(1)^2 + 6(1) + 9 = 12$	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

Q4

Q32.	If $A = \begin{bmatrix} 3 & 2 & 1 \\ 4 & -1 & 2 \\ 7 & 3 & -3 \end{bmatrix}$, find A^{-1}. Using A^{-1}, solve the given system of equations $3x + 4y + 7z = 14$; $2x - y + 3z = 4$; $x + 2y - 3z = 0$.	
Ans	$A = 3(-3) - 2(-26) + 1(19) = 62 \neq 0 \Rightarrow A^{-1}$ exists. cofactor Matrix $= \begin{bmatrix} -3 & 26 & 19 \\ 9 & -16 & 5 \\ 5 & -2 & -11 \end{bmatrix}$ $adjA = \begin{bmatrix} -3 & 9 & 5 \\ 26 & -16 & -2 \\ 19 & 5 & -11 \end{bmatrix}$ $A^{-1} = \frac{1}{62} \begin{bmatrix} -3 & 9 & 5 \\ 26 & -16 & -2 \\ 19 & 5 & -11 \end{bmatrix}$ Given system of equations can be written as $A' \cdot X = B$ where $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, $B = \begin{bmatrix} 14 \\ 4 \\ 0 \end{bmatrix}$ Now, $A' \cdot X = B \Rightarrow X = (A')^{-1} \cdot B$ $\Rightarrow X = (A^{-1})' \cdot B = \frac{1}{62} \begin{bmatrix} -3 & 26 & 19 \\ 9 & -16 & 5 \\ 5 & -2 & -11 \end{bmatrix} \begin{bmatrix} 14 \\ 4 \\ 0 \end{bmatrix}$ $= \frac{1}{62} \begin{bmatrix} 62 \\ 62 \\ 62 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ $\Rightarrow x = 1, y = 1, z = 1$	$\frac{1}{2}$ 2 $\frac{1}{2}$ $\frac{1}{2}$ 1

21.	Find the value of $\cos^{-1}\left(\frac{1}{2}\right) - \tan^{-1}\left(-\frac{1}{\sqrt{3}}\right) + \operatorname{cosec}^{-1}(-2)$.	
Ans	$\cos^{-1}\left(\frac{1}{2}\right) - \tan^{-1}\left(-\frac{1}{\sqrt{3}}\right) + \operatorname{cosec}^{-1}(-2)$ $= \frac{\pi}{3} + \frac{\pi}{6} - \frac{\pi}{6}$ $= \frac{\pi}{3}$	$1\frac{1}{2}$ $\frac{1}{2}$

Q6

Q22.	(a) Find the principal value of $\cos^{-1}\left(-\frac{1}{2}\right) + 2 \sin^{-1}\left(\frac{1}{2}\right)$. OR (b) Prove that : $\tan^{-1}\sqrt{x} = \frac{1}{2} \cos^{-1}\left(\frac{1-x}{1+x}\right), x \in [0, 1]$	
Ans	(a) $\begin{aligned} & \cos^{-1}\left(-\frac{1}{2}\right) + 2 \sin^{-1}\left(\frac{1}{2}\right) \\ &= \left(\pi - \frac{\pi}{3}\right) + 2\left(\frac{\pi}{6}\right) \\ &= \pi \end{aligned}$ OR (b) Put $x = \tan^2 \theta \Rightarrow \theta = \tan^{-1} \sqrt{x}$ $\begin{aligned} \text{RHS} &= \frac{1}{2} \cos^{-1}\left(\frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}\right) \\ &= \frac{1}{2} \cos^{-1}(\cos 2\theta) \\ &= \frac{1}{2}(2\theta) \\ &= \theta = \tan^{-1} \sqrt{x} = \text{LHS} \end{aligned}$	$1 + \frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$

Q7

22.	(a) If $y = (\sin^{-1} x)^2$, then find $(1 - x^2) \frac{d^2 y}{dx^2} - x \frac{dy}{dx}$. OR (b) If $y^x = x^y$, then find $\frac{dy}{dx}$.	
Ans	(a) $\frac{dy}{dx} = \frac{2\sin^{-1} x}{\sqrt{1-x^2}} \Rightarrow (1-x^2) \left(\frac{dy}{dx}\right)^2 = 4y$ Differentiating with respect to 'x', we get $(1-x^2) 2 \frac{dy}{dx} \frac{d^2 y}{dx^2} - 2x \left(\frac{dy}{dx}\right)^2 = 4 \frac{dy}{dx}$ $\Rightarrow (1-x^2) \frac{d^2 y}{dx^2} - x \frac{dy}{dx} = 2$ Or	1 $\frac{1}{2}$ $\frac{1}{2}$

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P.T.O.

65/S/1

	(b) $y^x = x^y \Rightarrow x \log y = y \log x$ Differentiating with respect to 'x', $\frac{x}{y} \frac{dy}{dx} + \log y = \frac{y}{x} + \frac{dy}{dx} \log x$ $\Rightarrow \frac{dy}{dx} = \frac{y}{x} \left(\frac{y - x \log y}{x - y \log x} \right)$	$\frac{1}{2}$ 1 $\frac{1}{2}$
	$\log x$	

Q8

Q33.	(a) If $y = \cos x^2 + \cos^2 x + \cos^2 (x^2) + \cos (x^x)$, find $\frac{dy}{dx}$. OR (b) Find the intervals in which the function given by $f(x) = \frac{3}{10}x^4 - \frac{4}{5}x^3 - 3x^2 + \frac{36}{5}x + 11$ is : (i) strictly increasing. (ii) strictly decreasing.	
Ans(a)	$y = \cos x^2 + \cos^2 x + \cos^2 (x^2) + \cos(x^x)$ $\frac{d}{dx}(\cos x^2) = -2x \sin x^2$ $\frac{d}{dx}(\cos^2 x) = 2 \cos x (-\sin x) = -2 \sin x \cos x$ $\frac{d}{dx}(\cos^2 (x^2)) = 2 \cos (x^2) (-\sin (x^2))(2x) = -4x \sin x^2 \cos x^2$ $\frac{d}{dx}(\cos(x^x)) = -\sin(x^x) [x^x(1 + \log x)]$ $\frac{dy}{dx} = -2x \sin x^2 - 2 \sin x \cos x - 4x \sin x^2 \cos x^2 - \sin(x^x) [x^x(1 + \log x)]$	1 1 1 1½ ½
OR		
Ans(b)	$f(x) = \frac{3}{10}x^4 - \frac{4}{5}x^3 - 3x^2 + \frac{36}{5}x + 11$ $\Rightarrow f'(x) = \frac{6}{5}x^3 - \frac{12}{5}x^2 - 6x + \frac{36}{5} = \frac{6}{5}(x^3 - 2x^2 - 5x + 6)$ $= \frac{6}{5}(x-1)(x+2)(x-3)$ For strictly inc/dec, put $f'(x) = 0$ $\Rightarrow x = 1, -2, 3$ (i) f is strictly increasing when $x \in (-2, 1) \cup (3, \infty)$ (ii) f is strictly decreasing when $x \in (-\infty, -2) \cup (1, 3)$ Note: Closed intervals are also acceptable.	2 1 1 1

Q9

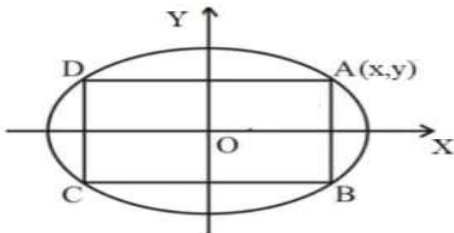
27.	Find the inverse (if it exists) of the matrix $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$.	
Sol.	$ A = 1 \neq 0$ $\therefore A$ is invertible and so A^{-1} exists. $\text{adj } A = \begin{bmatrix} 3 & 1 & 2 \\ 2 & 1 & 2 \\ 6 & 2 & 5 \end{bmatrix}' = \begin{bmatrix} 3 & 2 & 6 \\ 1 & 1 & 2 \\ 2 & 2 & 5 \end{bmatrix}$ $\Rightarrow A^{-1} = \begin{bmatrix} 3 & 2 & 6 \\ 1 & 1 & 2 \\ 2 & 2 & 5 \end{bmatrix}$	1 1½ ½

Q11

Q27(b)	Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$.	
Ans	Here $A = 1(3-0) - 2(-1-0) - 2(2-0)$ $= 3 + 2 - 4 = 1$ $A_{11} = 3, A_{12} = 1, A_{13} = 2$ $A_{21} = 2, A_{22} = 1, A_{23} = 2$ $A_{31} = 6, A_{32} = 2, A_{33} = 5$ cofactor matrix = $\begin{bmatrix} 3 & 1 & 2 \\ 2 & 1 & 2 \\ 6 & 2 & 5 \end{bmatrix}$ $\Rightarrow adjA = \begin{bmatrix} 3 & 2 & 6 \\ 1 & 1 & 2 \\ 2 & 2 & 5 \end{bmatrix}$ $\therefore A^{-1} = \frac{1}{ A } adjA = \frac{1}{1} \begin{bmatrix} 3 & 2 & 6 \\ 1 & 1 & 2 \\ 2 & 2 & 5 \end{bmatrix} = \begin{bmatrix} 3 & 2 & 6 \\ 1 & 1 & 2 \\ 2 & 2 & 5 \end{bmatrix}$	1 1 1

Q12

Q33(a)	A wire of length 36 m is to be cut into two pieces. One of the pieces is to be made a square and the other, a circle. What would be the lengths of the two pieces, so that the combined area of the square and the circle is minimum ?	
Ans	Let the length of the one piece bent into shape of a square be x m then the length of the other piece bent into the shape of a circle is $(36-x)$ m. Let side of square be 'a' and radius of circle be 'r'. Then, $4a = x, 2\pi r = 36 - x \Rightarrow a = \frac{x}{4}, r = \frac{36 - x}{2\pi}$ Combined area $A = a^2 + \pi r^2$ $\Rightarrow A = \frac{x^2}{16} + \frac{1}{4\pi}(36 - x)^2$ $\frac{dA}{dx} = \frac{x}{8} - \frac{1}{2\pi}(36 - x)$ For maxima/minima, put $\frac{dA}{dx} = 0$ $\Rightarrow \frac{x}{8} = \frac{1}{2\pi}(36 - x) \Rightarrow x = \frac{144}{\pi + 4} m$ Also, $\frac{d^2A}{dx^2} = \frac{1}{8} + \frac{1}{2\pi} > 0$ at $x = \frac{144}{\pi + 4}$, so A is minimum. Lengths of two pieces are $\frac{144}{\pi + 4} m$ and $\frac{36\pi}{\pi + 4} m$ respectively.	1 1 1 1 $\frac{1}{2}$ $\frac{1}{2}$
OR		

Q37		
	Case Study – 2 Read the following passage and answer the questions given below : “In an elliptical sports field, the authority wants to design a rectangular soccer field with the maximum possible area. The sports field is given by the graph of $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.” (i) If the length and breadth of the rectangular soccer field be $2x$ and $2y$ respectively, then find the area function $A(x)$ in terms of x. 1 (ii) Find the critical point(s) of the area function $A(x)$. 1 (iii) (a) Using first derivative test, find the length $2x$ and breadth $2y$ of the soccer field (in terms of a and b) that maximize the area. 2 OR (b) Using second derivative test, find the length $2x$ and breadth $2y$ of the soccer field (in terms of a and b) that maximize the area. 2	
Ans(i)	 Area of soccer field = $(2x)(2y) = 4xy$ $\Rightarrow A(x) = 4x \times \frac{b}{a} \sqrt{a^2 - x^2} = \frac{4bx}{a} \sqrt{a^2 - x^2}$	$\frac{1}{2}$ $\frac{1}{2}$

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Ans(ii)	$\frac{dA}{dx} = \frac{4b}{a} \left(\sqrt{a^2 - x^2} + \frac{x(-2x)}{2\sqrt{a^2 - x^2}} \right) \text{ or } \frac{dA}{dx} = \frac{4b}{a} \left(\frac{a^2 - 2x^2}{\sqrt{a^2 - x^2}} \right)$ $\frac{dA}{dx} = 0 \Rightarrow x = \pm \frac{a}{\sqrt{2}}$ $\therefore \text{Critical point is } x = \frac{a}{\sqrt{2}}$	$\frac{1}{2}$ $\frac{1}{2}$
Ans (iii)(a)	$\frac{dA}{dx} > 0 \text{ for values of } x \text{ close to } \frac{a}{\sqrt{2}} \text{ and to the left of } \frac{a}{\sqrt{2}}$ $\text{and } \frac{dA}{dx} < 0 \text{ for values of } x \text{ close to } \frac{a}{\sqrt{2}} \text{ and to the right of } \frac{a}{\sqrt{2}}$ $\therefore A \text{ is maximum at } x = \frac{a}{\sqrt{2}}.$ $\text{Length} = 2x = \sqrt{2} a \text{ and breadth} = 2y = \sqrt{2} b$	$\left. \begin{array}{l} \\ \\ \end{array} \right\} 1$ 1
OR		
Ans (iii)(b)	$\frac{d^2 A}{dx^2} = \frac{4b}{a} \left[\frac{(\sqrt{a^2 - x^2})(-4x) - (a^2 - 2x^2) \left(\frac{-2x}{2\sqrt{a^2 - x^2}} \right)}{(a^2 - x^2)} \right] < 0 \text{ at } x = \frac{a}{\sqrt{2}}$ $\therefore A \text{ is maximum at } x = \frac{a}{\sqrt{2}}.$ $\text{Length} = 2x = \sqrt{2} a \text{ and breadth} = 2y = \sqrt{2} b$	1 1
Q38	For providing water to the families of a colony, a large water tank with two inlet	

Q18

Q36

Case Study – 1

Rohini wants to give a rectangular plot of land for a school in her village. When she was asked to mention the dimensions of the plot, she told that if its length is decreased by 50 m and breadth is increased by 50 m, then its area does not alter, but if its length is decreased by 10 m and breadth is decreased by 20 m, then its area will decrease by 5300 sq m.

Based on the above information, answer the following questions :

- (i) Assuming x m and y m as the length and breadth of the plot respectively, write the system of linear equations in x and y .
- (ii) Write the system of linear equations obtained in (i) in the matrix equation $AX = B$.
- (iii) (a) Determine A^{-1} .

OR

- (b) Find the area of the plot.

Ans(i)

$$(x-50)(y+50)=xy \Rightarrow x-y=50$$

$$\text{and } (x-10)(y-20)+5300=xy \Rightarrow 2x+y=550$$

 $\frac{1}{2}$ $\frac{1}{2}$

Ans(ii)

$$\begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 50 \\ 550 \end{bmatrix}$$

1

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	where, $A = \begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix}$, $X = \begin{bmatrix} x \\ y \end{bmatrix}$, $B = \begin{bmatrix} 50 \\ 550 \end{bmatrix}$	
Ans (iii) (a)	$ A = 3$ and $\text{adj}A = \begin{bmatrix} 1 & 1 \\ -2 & 1 \end{bmatrix}$ $\therefore A^{-1} = \frac{1}{3} \begin{bmatrix} 1 & 1 \\ -2 & 1 \end{bmatrix}$	 1 1
OR		
Ans (iii)(b)	$X = \begin{bmatrix} x \\ y \end{bmatrix} = A^{-1}B = \frac{1}{3} \begin{bmatrix} 1 & 1 \\ -2 & 1 \end{bmatrix} \begin{bmatrix} 50 \\ 550 \end{bmatrix} = \frac{1}{3} \begin{bmatrix} 600 \\ 450 \end{bmatrix} = \begin{bmatrix} 200 \\ 150 \end{bmatrix}$ $\therefore \text{Area} = xy = 200 \times 150 = 30,000 \text{ sq m}$	 1½ ½

Q19

27.

(a) If $y = e^{a \cos^{-1} x}$, then show that $(1 - x^2) \frac{d^2 y}{dx^2} - x \frac{dy}{dx} - a^2 y = 0$.

OR

(b) Find $\frac{dy}{dx}$, if $y = x^{\cos x} - 2^{\sin x}$.

Ans

(a) $\frac{dy}{dx} = e^{a \cos^{-1} x} \frac{-a}{\sqrt{1-x^2}} = -\frac{ay}{\sqrt{1-x^2}}$, squaring we get

$$\left(\frac{dy}{dx}\right)^2 (1-x^2) = a^2 y^2, \text{ differentiating again with respect to 'x'.}$$

$$(1-x^2)2\frac{dy}{dx}\frac{d^2y}{dx^2}+\left(\frac{dy}{dx}\right)^2(-2x)=2a^2y\frac{dy}{dx}\Rightarrow(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}-a^2y=0$$

Or

(b) Let $y = u - v \Rightarrow \frac{dy}{dx} = \frac{du}{dx} - \frac{dv}{dx}$, where $u = x^{\cos x}$, $v = 2^{\sin x}$

$$\log u = \cos x \log x \Rightarrow \frac{du}{dx} = x^{\cos x} \left[\frac{\cos x}{x} - \sin x \log x \right], \quad \frac{dv}{dx} = 2^{\sin x} \cos x \log 2$$

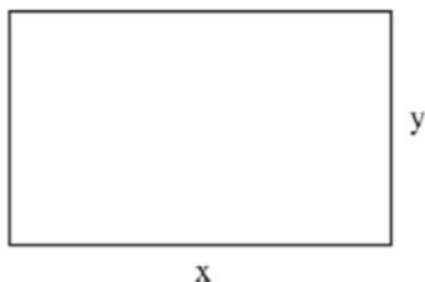
$$\frac{dy}{dx} = x^{\cos x} \left[\frac{\cos x}{x} - \sin x \log x \right] - 2^{\sin x} \cos x \log 2$$

 $1\frac{1}{2}$ $1\frac{1}{2}$ $1\frac{1}{2}+1$ $\frac{1}{2}$

Q20

36.

An architect is developing a plot of land for a commercial complex. When asked about the dimensions of the plot, he said that if the length is decreased by 25 m and the breadth is increased by 25 m, then its area increases by 625 m^2 . If the length is decreased by 20 m and the breadth is increased by 10 m, then its area decreases by 200 m^2 .



On the basis of the above information, answer the following questions :

- (i) Formulate the linear equations in x and y to represent the given information.
- (ii) Find the dimensions of the plot of land by matrix method.

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Ans

$$(i) \quad (x - 25)(y + 25) = xy + 625 \Rightarrow x - y = 50$$

$$(x - 20)(y + 10) = xy - 200 \Rightarrow x - 2y = 0$$

(ii) The system of linear equations can be written in matrix form as

$$\Rightarrow \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 1 & -2 \end{bmatrix}^{-1} \begin{bmatrix} 50 \\ 0 \end{bmatrix} = - \begin{bmatrix} -2 & 1 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} 50 \\ 0 \end{bmatrix} = \begin{bmatrix} 100 \\ 50 \end{bmatrix}$$

$x = 100\text{m}$, $y = 50\text{m}$

1

1

 $\frac{1}{2}$

1

 $\frac{1}{2}$

prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

OR

(b) Find $\frac{dy}{dx}$, if $y = (\cos x)^x + \cos^{-1} \sqrt{x}$.

Ans

$$(a) \quad x = \frac{\sin y}{\sin(a+y)} \Rightarrow \frac{dx}{dy} = \frac{\sin(a+y)\cos y - \sin y \cos(a+y)}{\sin^2(a+y)}$$

$$\Rightarrow \frac{dx}{dy} = \frac{\sin a}{\sin^2(a+y)}, \therefore \frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$$

Or

(b) Let $y = u + v \Rightarrow \frac{dy}{dx} = \frac{du}{dx} + \frac{dv}{dx}$

$$u = (\cos x)^x \Rightarrow \log u = x \log \cos x$$

$$\Rightarrow \frac{du}{dx} = (\cos x)^x [\log \cos x - x \tan x]$$

$$v = \cos^{-1} \sqrt{x} \Rightarrow \frac{dv}{dx} = -\frac{1}{2\sqrt{x}\sqrt{1-x}}$$

$$\therefore \frac{dy}{dx} = (\cos x)^x [\log \cos x - x \tan x] - \frac{1}{2\sqrt{x}\sqrt{1-x}}$$

2

1

 $\frac{1}{2}$

1

1

 $\frac{1}{2}$

Q22

26.

(a) Find a matrix A such that

$$A \begin{bmatrix} 4 & 0 \\ -1 & -2 \end{bmatrix} = \begin{bmatrix} 17 & 10 \\ 0 & -16 \end{bmatrix}.$$

Also, find A^{-1} .

OR

(b) Given a square matrix A of order 3 such that $A^2 = \begin{bmatrix} 3 & -4 & 4 \\ 0 & -1 & 0 \\ -2 & 2 & -3 \end{bmatrix}$,

show that $A^3 = A^{-1}$.

Ans

$$\begin{aligned} \text{(a) } A &= \begin{bmatrix} 17 & 10 \\ 0 & -16 \end{bmatrix} \begin{bmatrix} 4 & 0 \\ -1 & -2 \end{bmatrix}^{-1} \\ &= -\frac{1}{8} \begin{bmatrix} 17 & 10 \\ 0 & -16 \end{bmatrix} \begin{bmatrix} -2 & 0 \\ 1 & 4 \end{bmatrix} \\ &= \begin{bmatrix} 3 & -5 \\ 2 & 8 \end{bmatrix} \\ \text{Also, } A^{-1} &= \frac{1}{34} \begin{bmatrix} 8 & 5 \\ -2 & 3 \end{bmatrix} \end{aligned}$$

 $\frac{1}{2}$

1

 $\frac{1}{2}$

1

65/S/1

Or

(b) $\mathbf{A}^3 = \mathbf{A}^{-1} \Leftrightarrow \mathbf{A}^4 = \mathbf{I}$

$$\mathbf{A}^4 = \mathbf{A}^2 \mathbf{A}^2 = \begin{bmatrix} 3 & -4 & 4 \\ 0 & -1 & 0 \\ -2 & 2 & -3 \end{bmatrix} \begin{bmatrix} 3 & -4 & 4 \\ 0 & -1 & 0 \\ -2 & 2 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \mathbf{I}$$

 $1\frac{1}{2}$ $1\frac{1}{2}$

For the Year 2026

**Mathematics/
Applied
Mathematics – 319
Syllabus for
CUET(UG)**

Section B1: Mathematics

UNIT I: RELATIONS AND FUNCTIONS

1. Relations and Functions

Types of relations: Reflexive, symmetric, transitive and equivalence relations. One to one and onto functions.

2. Inverse Trigonometric Functions

Definition, range, domain, principal value branches. Graphs of inverse trigonometric functions.

UNIT II: ALGEBRA

1. Matrices

Concept, notation, order, equality, types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operations on matrices: Addition, multiplication and multiplication with a scalar. Simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

2. Determinants

Determinant of a square matrix (up to 3×3 matrices), minors, cofactors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

UNIT III: CALCULUS

1. Continuity and Differentiability

Continuity and differentiability, chain rule, derivatives of inverse trigonometric functions, like $\sin^{-1} x$, $\cos^{-1} x$ and $\tan^{-1} x$, derivative of implicit functions. Concepts of exponential, logarithmic functions. Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms. Second-order derivatives.

- 2. Applications of derivatives:** Rate of change of quantities, increasing/decreasing functions, maxima and minima (first derivative test motivated geometrically and second derivative test given as provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

3. Integrals

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, Evaluation of simple integrals of the following types and problems based on them.

$$\int \frac{dx}{x^2 + a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{a^2 - x^2}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}$$

$$\int \frac{(px + q)dx}{ax^2 + bx + c}, \int \frac{(px + q)dx}{\sqrt{ax^2 + bx + c}}, \int \sqrt{a^2 \pm x^2} dx, \int \sqrt{x^2 - a^2} dx, \int \sqrt{ax^2 + bx + c} dx$$

Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

4. Applications of the Integrals

Applications in finding the area under simple curves, especially lines, circles/parabolas/ellipses (in standard form only)

5. Differential Equations

Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, solutions of homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type:

$$\frac{dy}{dx} + Py = Q, \text{ where P and Q are functions of x or constants}$$

$$\frac{dx}{dy} + Px = Q, \text{ where P and Q are functions of y or constants}$$

UNIT IV: VECTORS AND THREE-DIMENSIONAL GEOMETRY

1. Vectors

Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios of a vector. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Definition, Geometrical interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors.

2. Three-dimensional Geometry

Direction cosines and direction ratios of a line joining two points. Cartesian equation and vector equation of a line, skew lines, shortest distance between two lines. Angle between two lines.

Unit V: Linear Programming

Introduction, related terminology such as constraints, objective function, optimization, graphical method of solution for problems in two variables, feasible and infeasible regions (bounded or unbounded), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

Unit VI: Probability

Conditional probability, Multiplications theorem on probability, independent events, total probability, Baye's theorem.

value of $\begin{vmatrix} 3x & -x+y & -x+z \\ x-y & 3y & z-y \\ x-z & y-z & 3z \end{vmatrix}$ is

- (a) $3(xy + yz + zx)$ (b) $xy + yz + zx$
(c) 0 (d) 1

Q2

• If $x = a \left(\cos t + \log \tan \frac{t}{2} \right)$, $y = a \sin t$, then value of $\frac{dy}{dx}$

at $t = \frac{\pi}{4}$ is

- (a) 0 (b) 1 (c) -1 (d) 2

Q3

A function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = \frac{x}{x^2 + 1}$, is (where

$\mathbb{R}$ is a set of real number)

- (a) one-one but not onto
- (b) onto but not one-one
- (c) neither one-one nor onto
- (d) both one-one and onto

Q4.

Consider a closed cylinder of radius r with a fixed surface area. The volume of the cylinder is maximum when its height is

- (a) $3r$ (b) $\frac{1}{3}r$ (c) $\frac{1}{2}r$ (d) $2r$

Q5.

The domain of $y = \cos^{-1}(x^2 - 4)$ is

- $[0, \pi]$
- $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$
- $[-\sqrt{5}, -\sqrt{3}] \cap [-\sqrt{5}, \sqrt{3}]$
- $[-1, 1]$

Q6.

The matrix $A = \begin{bmatrix} 0 & 0 & 5 \\ 0 & 5 & 0 \\ 5 & 0 & 0 \end{bmatrix}$ is a

- A. Diagonal matrix B. Scalar matrix
C. Square matrix D. Symmetric matrix

Choose the **correct** answer from the options given below:

- (a) A, B and C only (b) B and C only
(c) C and D only (d) A and D only

(a) A-II, B-IV, C-I, D-III
(b) A-I, B-II, C-III, D-IV
(c) A-III, B-IV, C-I, D-II
(d) A-IV, B-III, C-II, D-I

$$\begin{array}{ll} (a) & \alpha = -\frac{2}{3}, \beta = \frac{1}{6} \\ (b) & \alpha = -\frac{2}{3}, \beta = -\frac{1}{6} \\ (c) & \alpha = \frac{2}{3}, \beta = \frac{1}{6} \\ (d) & \alpha = \frac{2}{3}, \beta = -\frac{1}{6} \end{array}$$

Q9.

(a) $-x \frac{dy}{dx}$ (b) $x \frac{dy}{dx}$ (c) $\frac{y}{x} \frac{dy}{dx}$ (d) $-\frac{y}{x} \frac{dy}{dx}$

Q10.

If the function $f(x) = \begin{cases} \frac{\sin 3x}{x}, & \text{if } x \neq 0 \\ \frac{3k}{2} & \text{if } x = 0 \end{cases}$ is continuous

at $x = 0$, then the value of k is

(d) -5

- (a) 0 (b) -1 (c) 1 (d) $\frac{1}{2}$

- (a) A and B only (b) A, B and C only
(c) A, B, C and D (d) B, C and D only

(a) $(-\infty, -3) \cup (3, \infty)$ (b) $(-3, 3)$
(c) $(-3, 0) \cup (0, 3)$ (d) $\mathbb{R} - \{0\}$

Q22

(a) $\left[-\frac{1}{7}, \frac{1}{7}\right]$ (b) $[-7, 7]$
(c) $[0, 7]$ (d) $[-1, 1]$

Q23

(a) 0.96 (b) 0.72 (c) 0.36 (d) 0.42

- $$(c) \quad \frac{1}{11} \begin{bmatrix} 14 & 5 \\ 5 & 1 \end{bmatrix} \qquad (d) \quad -\frac{1}{11} \begin{bmatrix} 15 & 11 \\ 1 & 0 \end{bmatrix}$$

(a) 8 (b) 9 (c) $\frac{1}{9}$ (d) $\frac{-1}{27}$

- (a) continuous and differentiable at $x = 0$ only
- (b) continuous at $x = 0$ but nowhere differentiable
- (c) continuous everywhere and differentiable at all points except at $x = 0$
- (d) continuous but not differentiable at $x = 1$

BIOLOGY

ALL QUESTIONS ARE COMPULSORY

☐ **MULTIPLE CHOICE QUESTIONS**

Q1. In angiosperms, double fertilization involves:

- A. Fertilization of the egg cell and central cell
- B. Fertilization of two egg cells
- C. Fertilization of the synergid and antipodal cell
- D. Fertilization of the antipodal and central cell

Q2. The functional megaspore in an ovule develops into:

- A. Endosperm
B. Embryo
C. Female gametophyte
D. Ovary

Q3. Which of the following is a post-fertilization event in flowering plants?

- A. Formation of flower
- B. Development of endosperm and embryo
- C. Development of pollen tube
- D. Formation of male gametes

Q4. In a typical angiosperm, how many nuclei are involved in double fertilization?

- A. Two
B. Three
C. Four
D. Five

Q5. The hormone responsible for ovulation in females is:

Q6. Which of the following cells in the testis secrete testosterone?

- A. Sertoli cells
B. Spermatogonia
C. Leydig cells
D. Spermatids

Q7. The structure that helps in the implantation of the embryo into the uterus is:

- A. Amnion
B. Chorion
C. Trophoblast
D. Yolk sac

Q8. Fertilization in humans normally occurs in the:

- A. Uterus
- B. Cervix
- C. Fallopian tube
- D. Vagina

Q9. The technique called Medical Termination of Pregnancy (MTP) is legally permitted up to how many weeks of pregnancy in India (as per 2021 amendment)?

- A. 10 weeks
B. 20 weeks
C. 24 weeks
D. 30 weeks

Q10. Which of the following is a barrier method of contraception?

- A. Copper-T
B. Oral pills
C. Condom
D. Surgical sterilization

Q11. Which disease is not sexually transmitted?

- A. Gonorrhea
B. Syphilis
C. AIDS
D. Diphtheria

Q12. The component of RCH (Reproductive and Child Health) programme includes:

- A. Birth control
B. Maternal health
C. Sex education
D. All of the above

Q13. Which method is temporary and hormonal in nature?

- A. Vasectomy
B. Copper-T
C. Oral contraceptive pills
D. Tubectomy

Q14. The surgical method of contraception in females is called:

- A. Vasectomy
B. Tubectomy
C. Hysterectomy
D. Oophorectomy

Q15. Which contraceptive method also protects against STDs?

- A. Oral pills
B. IUCD
C. Condom
D. Implants

Q16. Saheli, a contraceptive pill for females, was developed by:

- A. WHO
B. ICMR
C. DRDO
D. CDRI

Q17. Copper-T acts by:

- A. Blocking sperm entry
- B. Preventing ovulation
- C. Inhibiting implantation
- D. Killing the egg

Q18. Which of the following is an example of a natural method of contraception?

- A. Copper-T
B. Lactational ammenorhea
C. Condom
D. Diaphragm

Q19. The full form of MTP is:

- A. Male Temporary Procedure
- B. Medical Temporary Prevention
- C. Medical Termination of Pregnancy
- D. Motherhood and Temporary Planning

Q20. Which of the following can cause infertility in both males and females?

- A. Cancer
B. Unhealthy lifestyle
C. Hormonal imbalance
D. All of the above

Q21. Which of these is not a function of contraceptive pills?

- A. Inhibiting ovulation
- B. Increasing sperm motility
- C. Altering cervical mucus
- D. Changing endometrial lining

Answer: B. Increasing sperm motility

Q22. Assisted reproductive technology that involves transfer of zygote into fallopian tube is:

- A. ZIFT
B. GIFT
C. ICSI
D. IVF

Q23. Which technique involves placing gametes directly into the fallopian tube?

- A. IVF
B. GIFT
C. IUI
D. ZIFT

Q24. Which of the following is not a component of reproductive health?

- A. Contraception
- B. Safe sex practices
- C. Genetic engineering
- D. Maternal care

Q25. What is the main objective of the Reproductive and Child Health (RCH) programme?

- A. Reducing agricultural population
- B. Controlling genetic disorders
- C. Creating awareness about reproductive health
- D. Promoting nuclear families

Q26. Who is known as the "Father of Genetics"?

- A. Charles Darwin
B. Hugo de Vries
C. Gregor Mendel
D. Watson

Q27. A cross between two heterozygous tall pea plants ($Tt \times Tt$) will give what genotypic ratio?

- A. 3:1
B. 1:2:1
C. 9:3:3:1
D. 2:1:1

Q28. Which law of Mendel explains the separation of alleles during gamete formation?

- A. Law of Dominance
B. Law of Segregation
C. Law of Independent Assortment
D. Law of Incomplete Dominance

Q29. In a dihybrid cross, the phenotypic ratio obtained in F₂ generation is:

- A. 3:1
B. 1:2:1
C. 9:3:3:1
D. 1:1

Q30. Which of the following traits in garden pea is recessive?

- A. Round seed shape
- B. Yellow seed color
- C. Green pod color
- D. Tall plant

Q31. In co-dominance, the F1 generation:

- A. Shows only dominant trait
- B. Shows only recessive trait
- C. Shows both parental traits equally
- D. Shows an intermediate trait

Q32. Incomplete dominance is shown in:

- A. Garden pea
B. Antirrhinum majus and . *Mirabilis jalapa*
C. Drosophila
D. Human blood groups

Q33. The ABO blood group in humans is an example of:

- A. Polygenic inheritance
- B. Multiple allelism
- C. Incomplete dominance
- D. Dihybrid cross

Q34. What is the phenotype of a person with genotype IAi?

- A. Blood group A
B. Blood group B
C. Blood group AB
D. Blood group O

Q35. A woman with blood group A marries a man with blood group B. The child has blood group O. What are the genotypes of the parents?

Q36. Which of the following disorders is due to a recessive autosomal mutation?

- A. Down syndrome
B. Hemophilia
C. Sickle cell anemia
D. Turner's syndrome

Q37. Haemophilia is a:

- A. Dominant autosomal disorder
B. Recessive autosomal disorder
C. Dominant sex-linked disorder
D. Recessive sex-linked disorder

Q38. A condition in which a female has only one X chromosome (XO) is called:

- A. Down syndrome
B. Klinefelter's syndrome
C. Turner's syndrome
D. Edwards syndrome

Q39. If both parents are carriers for Thalassemia, the chance of their child being affected is:

- A. 25%
- B. 50%
- C. 75%
- D. 100%

Reason (R): Alleles do not mix and separate during gamete formation.

Assertion (A): In humans, males are more commonly affected by X-linked recessive disorders.

Reason (R): Males have only one X chromosome, so a single recessive allele is enough to express the disorder.

☐ Ch. 2: Sexual Reproduction in Flowering Plants

Q3.

Assertion (A): Double fertilization is a unique feature of angiosperms.

Reason (R): One male gamete fuses with the egg, and the other fuses with polar nuclei.

Q4.

Assertion (A): Tapetum is the innermost wall layer of the microsporangium.

Reason (R): Tapetum provides nourishment to developing pollen grains.

Q5.

Assertion (A): Apomixis leads to genetically diverse offspring.

Reason (R): Apomixis involves sexual reproduction.

☐♂ Ch. 3: Human Reproduction

Q6.

Assertion (A): LH surge is responsible for ovulation in females.

Reason (R): LH induces rupture of the Graafian follicle and release of ovum.

Q7.

Assertion (A): Sperm motility is essential for fertilization.

Reason (R): Sperm motility helps sperm to reach the ampullary region of the fallopian tube.

Assertion (A): Placenta is a temporary endocrine gland.

Reason (R): Placenta secretes hormones like hCG, estrogen, and progesterone during pregnancy.

☐ Ch. 4: Reproductive Health

Q9.

Assertion (A): Use of condoms is a barrier method that prevents STDs.

Reason (R): Condoms prevent physical contact of genitals during intercourse.

Q10.

Assertion (A): Copper-T is a hormonal contraceptive method.

Reason (R): Copper-T releases progesterone that prevents fertilization.

☐ **SHORT QUESTION ANSWERS:**

1. **Q:** Name the process that produces gametes.
2. **Q:** What is a pedigree chart used for?
3. **Q:** Which syndrome results from the presence of an extra chromosome 21?
4. **Q:** What is the sex chromosome composition of a normal female?
5. **Q:** What is the male gamete in flowering plants called?
6. **Q:** What is the term for fusion of male and female gametes?
7. **Q:** What structure carries pollen grains to the stigma?
8. **Q:** Name the haploid cell that forms after meiosis in the ovule.
9. **Q:** What hormone triggers ovulation?
10. **Q:** Name the site of fertilization in humans.
11. **Q:** Where does spermatogenesis occur?
12. **Q:** Which hormone maintains the uterine lining during pregnancy?

Case Study 1: Menstrual Cycle and Hormonal Regulation

Passage:

The menstrual cycle in human females is a complex process regulated by hormones. It typically lasts about 28 days and is divided into several phases: the menstrual phase, follicular phase, ovulation, and luteal phase. The cycle is controlled by the interplay of hormones from the hypothalamus, pituitary gland, and ovaries. Key hormones involved include Gonadotropin-Releasing Hormone (GnRH), Follicle-Stimulating Hormone (FSH), Luteinizing Hormone (LH), estrogen, and progesterone.

Questions:

1. **What is the role of LH in the menstrual cycle?**
2. **Which hormone is primarily responsible for the thickening of the endometrial lining?**
3. **At what point in the cycle does ovulation typically occur?**
4. **What is the function of progesterone during the luteal phase?**
5. **How does a decrease in estrogen and progesterone levels affect the menstrual cycle?**

Case Study 2 : Reproductive Health and Family Planning

Passage:

In many countries, including India, reproductive health is a critical aspect of public health. It encompasses the well-being of the reproductive system at all stages of life. Family planning plays a vital role in reproductive health by enabling individuals and couples to anticipate and attain their desired number of children and the spacing of their births. Various methods are available, including natural methods, barrier methods, hormonal methods, and surgical methods. The choice of method depends on individual health, convenience, and personal preferences.

Questions:

1. What is the significance of reproductive health in society?

Answer: Reproductive health ensures that individuals can have a responsible, satisfying, and safe sex life, and the capability to reproduce and the freedom to decide if, when, and how often to do so.

2. Name two natural methods of family planning.

3. What is the primary purpose of barrier methods of contraception?

4. Explain the role of hormonal methods in family planning.

5. What are the advantages of surgical methods of contraception?

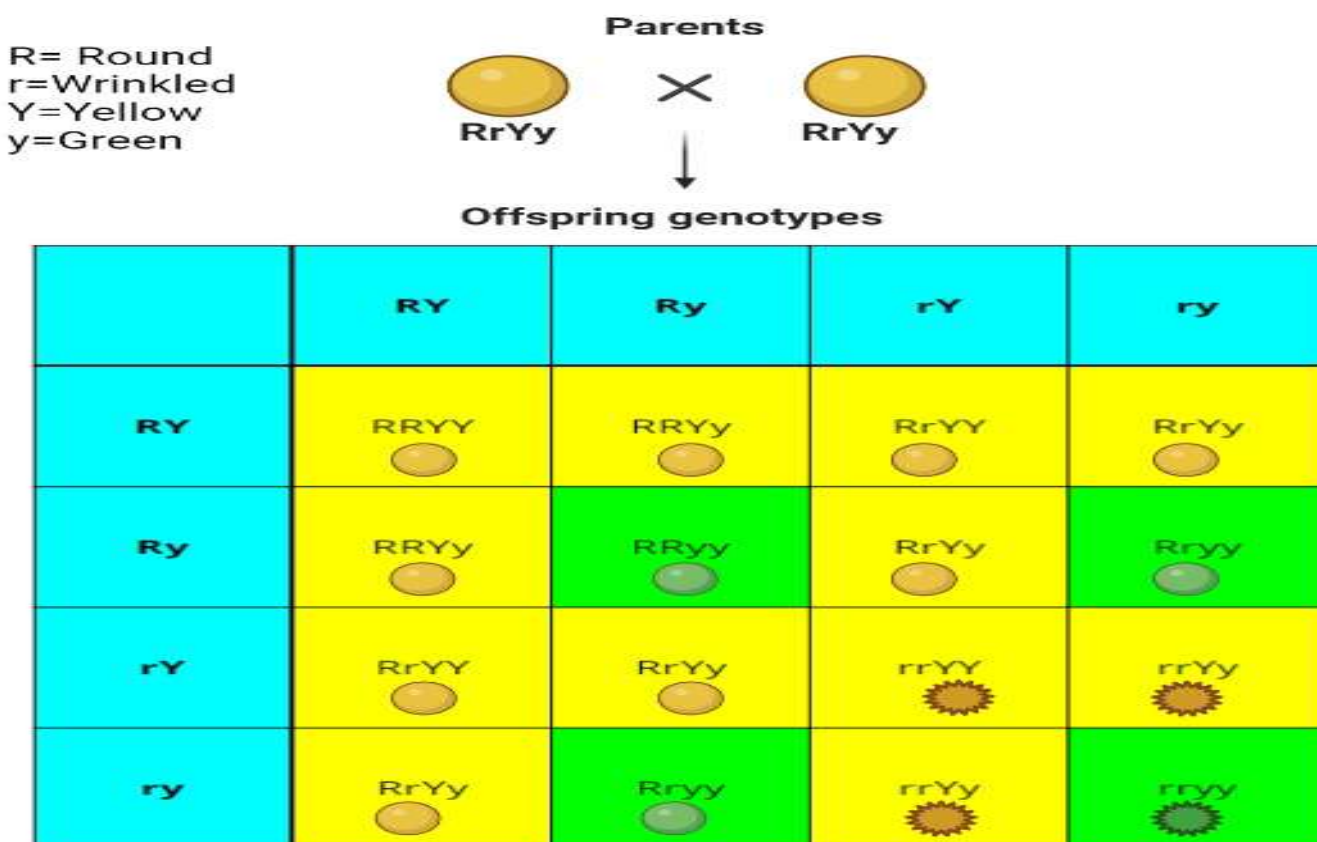
PICTURE BASED QUESTIONS:

Q1. Observe the figure and answer the following questions:

(i) State the law which explained by this cross.

(ii) write phenotypic ratio.

(iii) Is all the offspring resembles to parents or any new offsprings are formed if yes name them.



☐ **Chapter 4: Reproductive Health**

Q:

Why is the implementation of sex education in schools considered essential for reproductive health?

☐ **Chapter 5: Principles of Inheritance and Variation**

Q:

If a trait is recessive, how can it reappear in the F₂ generation even though it was not seen in the F₁ generation?

☐ **PROJECTS:**

MAKE 3D MODEL

ROLL NO. – 1-5 – MAKE 3D MODEL OF SPERM AND OVUM

<https://youtu.be/ALpTD91pZZU?si=xt0M4H52WVpKikXE>

<https://youtu.be/FC8GRCUvzuY?si=PKugh7j40QgwWRaU>

ROLL NO. – 6-10 – MAKE 3D MODEL OF FLOWER

https://youtu.be/fXszFjMTFcU?si=C-hL8Mr_ZNpPoaf7

ROLL NO. – 11-15 – MAKE 3D MODEL OF DNA

<https://youtu.be/lnJ0zh9TnD0?si=F4ilAD0XxjN1Xkml>

ROLL NO. – 16-20 – MAKE 3D MODEL OF MENSTRUAL CYCLE

https://youtube.com/shorts/SDbIp_kP19M?si=AKOCdtp_NFBgdSNL

N

Computer Science

Topic: Python Basics (Print Command, Input Command & Conditional Statements)

Instructions: Answer all questions neatly in your notebook. Write programs wherever required.

1. Explain the importance of Python in Computer Science. Mention any five applications of Python.
2. What is the print() command? Explain different ways of using the print() function with examples.
3. Write a Python program to display personal details (Name, Class, School, Stream) using the print() command.
4. Explain the purpose of the input() function with syntax and example.
5. Write a Python program to input marks of five subjects and display the total marks.
6. What are decision-making statements in Python? Explain their importance.
7. Explain if, if-else, and nested if statements with examples.
8. Write a Python program to check whether a number is positive, negative, or zero.
9. Write a Python program to check whether a student has passed or failed (passing marks = 33).
10. Write a Python program to find the largest among three numbers entered by the user.

English Core

A. Literature – Flamingo

1. Character & Theme Analysis

Choose any 2 from the list below. Write 200 words on each:

- The peddler in The Rattrap – How kindness changes him
- Saheb and Mukesh in Lost Spring – Lost childhood and dreams

2. Poetic Devices & Central Idea

Pick 1 poem from Flamingo and write:

- Central idea in 120 words
- 3 poetic devices with examples from the poem

Options: My Mother at Sixty-Six, Keeping Quiet, A Thing of Beauty

3. Diary Entry

Imagine you are M. Hamel on the last day of French class. Write a 150-word diary entry expressing your feelings.

B. Writing Skills

4. Article Writing

Write a 250-word article on any one:

- “Impact of Social Media on Youth”
- “Role of Youth in Nation Building”
- “Mental Health: Breaking the Stigma”

5. Letter Writing

Write a formal letter to the Editor of a newspaper about increasing road accidents due to rash driving.

C. Vocabulary

6. Revision Work

- Make a vocabulary list of 25 words from Flamingo with meanings and one sentence each.

D. Project Work

7. Project on Any One Topic

Prepare a 1200-1500 word project file on A4 sheets with index, acknowledgment, bibliography. Choose from:

1. Women Empowerment in India – Case study of Kalpana Chawla/Kiran Bedi (you can select any other also)
2. The Lost Generation – Analysis of Hemingway's influence on modern youth
3. Child Labour in India – Link it with Lost Spring
4. Role of Art in Healing Trauma – Link it with A Thing of Beauty

Include: Pictures, charts, newspaper clippings, conclusion.

E. Creative Task

8. Poster/Slogan Making

Make an A4 poster on either:

- "Say No to Plastic"
- "Save Water, Save Life"
- "Stop Child Labour"

Submission Guidelines

1. Written work in a separate neat notebook or ruled sheets.
2. Project work in a separate file with cover page.
3. Label with Name, Class, Sec, Roll No.
4. Original work will get more marks. Avoid copy-paste.