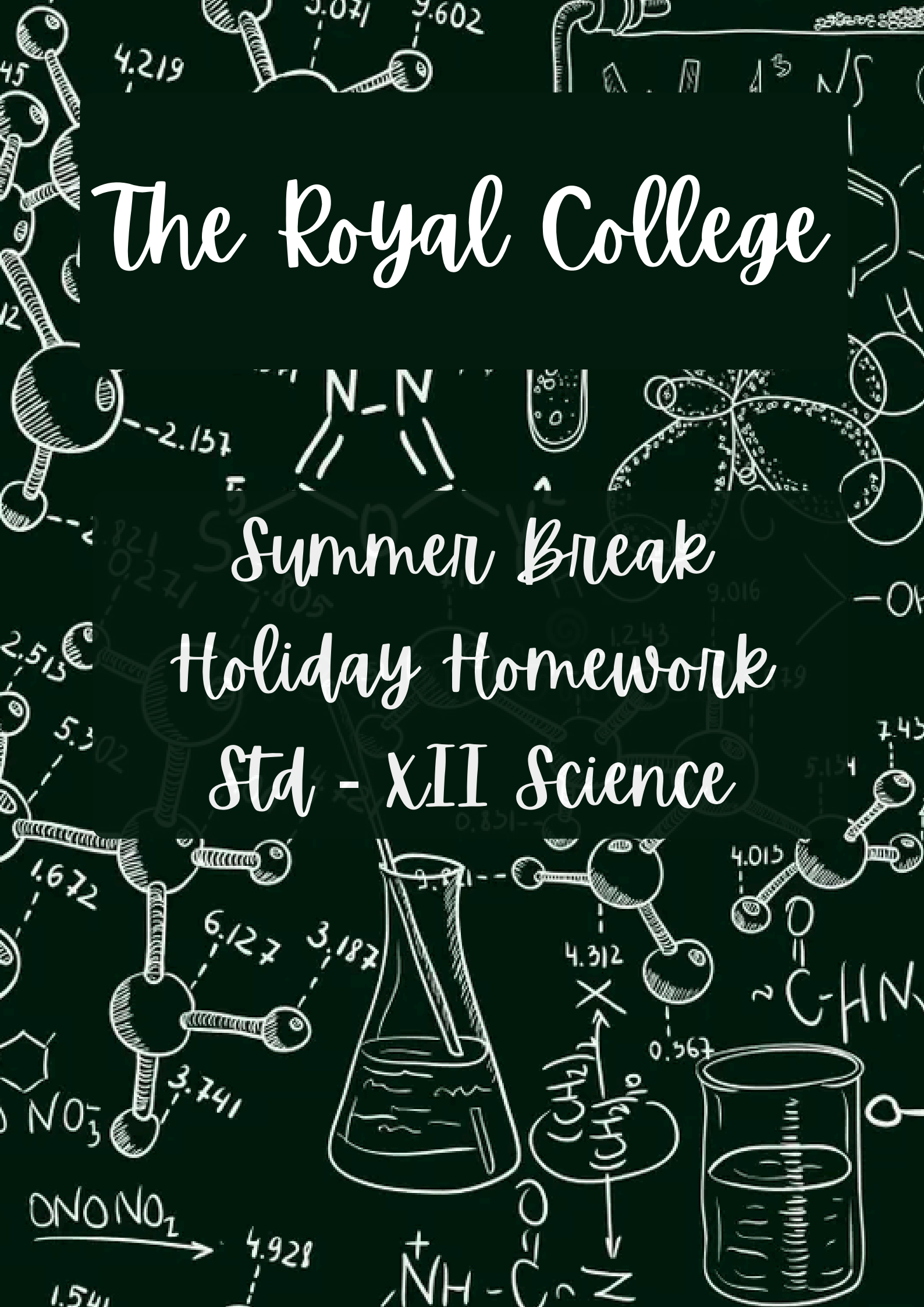
The Royal College

Summer Break Holiday Homework

Std - XII Science



Dear Explorers of Knowledge.

As you step into the sunshine of your summer break, we just wanted to say a big THANK YOU for learning with heart, thinking with spark. and making this term truly remarkable!

This holiday homework is not a checklist - it's a passport to curiosity. A canvas for your ideas and a chance to dream beyond the classroom walls. We can't wait to see your creative sparks turn into brilliant work.

Until then...

Stay inspired, stay kind, and don't forget to laugh a little louder!
Happy Holidays & Happy Creating!

GENERAL INSTRUCTIONS

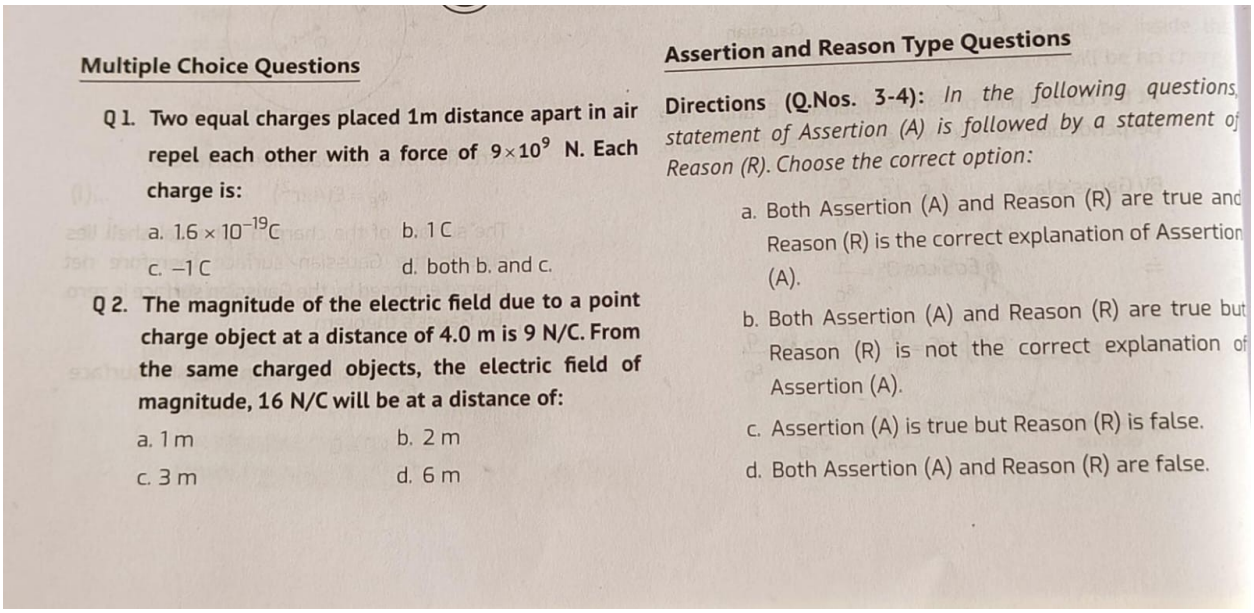
- Design your own folder using Eco-friendly material (old calendars, newspapers, old paper bags etc.). Be creative and use your imagination. Write your name and paste your own picture on the cover.
- Try not to finish the homework in a short time.
- Complete all the worksheets neatly and submit them to your class teacher after the vacation.
- There are many more ways to make vacations memorable.
- Get up early in the morning and see the rising sun. Go for a nature walk and feel the fresh air. Try to spend quality time with your elders and share your thoughts and ideas with them.
- Eat healthy food, drink lots of water and healthy drinks during summer.
- Keep two bowls out in the open- on your balcony or your lawn. Fill one with water and the other with some grains. Welcome your feathered guests and watch them flutter around your house. Click their pictures and display in the class.
- Inculcate good manners use these four magic words 'Please, Thank you, Excuse me, Sorry' and see the difference.
- Help your parents to keep the house clean. Do small household jobs like dusting, watering the plants, laying dinner table and so on.
- Request your grandparents to tell you interesting anecdotes from their life.
- Last but not the least - 'Try to converse in English with your family members and friends.'

STD. XII

PHYSICS

Read the following chapters from NCERT and solve all the exercises given at the last of the chapter and based on that solve the following sheets in a separate notebook.

CHAPTER 1 ELECTRIC CHARGES AND FIELDS



Multiple Choice Questions

Q 1. Two equal charges placed 1m distance apart in air repel each other with a force of 9×10^{9} N. Each charge is:

a. 1.6×10^{-19}C b. 1 C

c. –1 C d. both b. and c.

Q 2. The magnitude of the electric field due to a point charge object at a distance of 4.0 m is 9 N/C. From the same charged objects, the electric field of magnitude, 16 N/C will be at a distance of:

a. 1 m b. 2 m

c. 3 m d. 6 m

Assertion and Reason Type Questions

Directions (Q.Nos. 3-4): *In the following questions, statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:*

a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

c. Assertion (A) is true but Reason (R) is false.

d. Both Assertion (A) and Reason (R) are false.

Q 3. **Assertion (A):** A closed surface contains a charge q inside it and no other charge in its neighbourhood. If size of the surface area is increased so that its area is doubled, then net electric flux through the surface will also be doubled.
Reason (R): The electric flux through the surface depends upon the area of the surface.

Q 4. **Assertion (A):** Total flux through a closed surface is zero, if net charge enclosed by the surface is zero.
Reason (R): Gauss's law is true for any closed surface, no matter what its shape or size is.

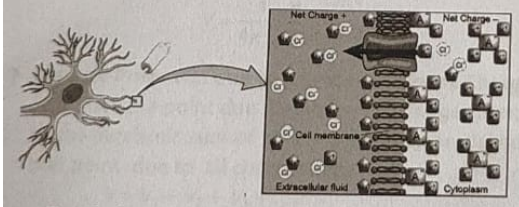
Fill in the Blanks

Q 5. The region or space around a charge in which an another charge experiences a force is called .....

Q 6. The electric field intensity due to an electric dipole at an axial point is ..... that of the intensity at an equatorial point at the same distance.

Case Study Based Question

Q 7. Neurons maintain different concentrations of certain ions across their cell membranes. Imagine the case of a boat with a small leak below the water line. In order to keep the boat afloat, the small amount of water entering through the leak has to be pumped out, which maintains a lower water level relative to the open sea. Neurons do the same thing, but they pump out positively charged sodium ions. In addition, they pump in positively charged potassium ions. Thus, there is a high concentration of sodium ions present outside the neuron and a high concentration of potassium ions inside. Thus, sodium channels allow sodium ions through the membrane while potassium channels allow potassium ions through the membrane.



Read the given passage carefully and give the answer of the following questions:

(i) When neuron pump out and pump in are the positive sodium and positive potassium ions respectively, which property of charge is to be followed?
a. Quantisation of charge
b. Additivity of charges
c. Conservation of charges
d. Associativity of charges

(ii) Coulomb's law is true for:
a. atomic distances ($= 10^{-11}$ m)
b. nuclear distances ($= 10^{-15}$ m)
c. charged as well as uncharged particles
d. All the distances

(iii) Electric lines of force about a positive sodium or potassium ions are:
a. circular anti-clockwise
b. circular clockwise
c. radial, inwards
d. radial, outwards

(iv) Electric flux produced by positive potassium ions indicates that electric lines are directed:
a. outwards b. inwards
c. Either a. or b. d. None of these

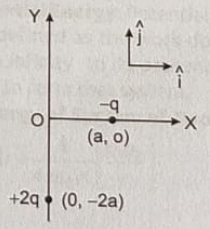
(v) Electric flux over a surface of neuron in an electric field may be:
a. positive b. negative
c. zero d. All of these

Very Short Answer Type Questions

Q 8. What is the flux coming out from a unit positive charge enclosed in air?

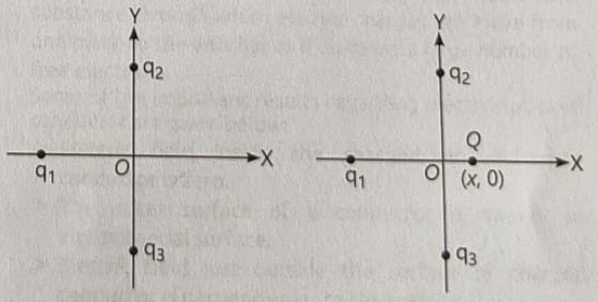
Q 9. Charges ± 20 nC are separated by 5 mm distance. What will be the magnitude of dipole moment?

Q 10. Point charges $-q$ and $+2q$ are situated at points $(a,0)$ and $(0,-2a)$ as shown in the figure. Find the electric field intensity at origin in terms of unit vectors $\hat{i}$ and $\hat{j}$.



Short Answer Type-I Questions

Q 11. In figure, two positive charges, q_2 and q_3 fixed along the Y-axis, exert a net electric force in the $+x$ direction on a charge q_1 fixed along the X-axis. If a positive charge Q is added at $(x, 0)$, what will be the force on q_1?



Q 12. The electrostatic attracting force on a small sphere of charge $0.2\mu C$ due to another small sphere of charge $-0.4\mu C$ in air is 0.4 N. What will be the distance between the two spheres?

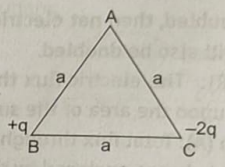
Short Answer Type-II Questions

Q 13. Two point charges placed at a certain distance r in air exert a force F on each other. Then, what will be the distance r' at which these charges will exert the same force in a medium of dielectric constant K?

Q 14. Two identical small conducting spheres have charges of $+22\mu C$ and $-8\mu C$ and are placed at a distance 3m apart in air. Find the electrostatic force between them. They are brought in momentary contact and again placed at their respective positions. How much force will they exert upon each other now? How will the nature of force change?

Long Answer Type Questions

Q 15. Two point charges $+q$ and $-2q$ are placed at the vertices 'B' and 'C' of an equilateral triangle ABC of side 'a' 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.



Q 16. (i) Use Gauss's law to obtain an expression for the electric field due to an infinitely long thin straight wire with uniform linear charge density λ.

(ii) An infinitely long positively charged straight wire has a linear charge density λ. An electron is revolving in a circle with a constant speed v such that the wire passes through the centre and is perpendicular to the plane of the circle. Find the kinetic energy of the electron in terms of magnitudes of its charge and linear charge density λ on the wire.

(iii) Draw a graph of kinetic energy as a function of linear charge density λ.

CHAPTER 2 ELETRIC POTENTIAL AND CAPACITANCE

Multiple Choice Questions

Q 1. What is not true for equipotential surface for uniform electric field?

a. Equipotential surface is flat

b. Two equipotential surfaces can cross each other

c. Electric lines are perpendicular to equipotential surface

d. Work done is zero

Q 2. A point *P* lies at a distance *x* from the mid-point of an electric dipole on its axis. The electric potential at point *P* is proportional to:

a. $\frac{1}{x^2}$ b. $\frac{1}{x^3}$

c. $\frac{1}{x}$ d. $\frac{1}{x^{1/2}}$

Assertion and Reason Type Questions

Directions (Q.Nos. 3-4): *In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:*

a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

c. Assertion (A) is true but Reason (R) is false.

d. Both Assertion (A) and Reason (R) are false.

Q 3. Assertion (A): A proton always tends to move from higher potential to lower potential.

Reason (R): Electrostatic force upon proton always acts in the direction from lower potential to higher potential.

Q 4. Assertion (A): If distance between the parallel plates of a capacitor is halved, then its capacitance is doubled.

Reason (R): The capacitance depends on the introduced dielectric.

Fill in the Blanks

Q 5. Dimension of capacitance is .....

Q 6. In a charged capacitor, the energy resides in the ..... between the plates.

Case Study Based Question

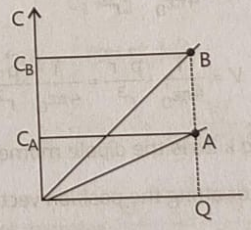
Q 7. A device that stores electrical energy in an electric field is known as to be capacitor. It is a passive electronic component with two terminals. It basically consists of two conductors separated by a non-conductive region. This non-conductive region can either be a vacuum or an electrical insulator material known as a dielectric. From Coulomb's law, a charge on one conductor will exert a force on the charge carriers within the other conductor, attracting opposite polarity charge and repelling like polarity charges, thus an opposite polarity charge will be induced on the surface of the other conductor. The conductors thus hold equal and opposite charges on their facing surfaces and the dielectric develops an electric field.

An ideal capacitor is characterised by a constant capacitance *C*. Is SI system its unit is Farad which is defined as the ratio of the positive or negative charge *Q* on each conductor to the voltage *V* between them. Parallel plate capacitor is the most commonly used capacitor.

Read the given passage carefully and give the answer of the following questions:

(i) When a dielectric is placed in an electric field, what will happen?

(ii) The graph shows the variation of capacitances in the plates of two capacitors *A* and *B versus* increase of charge *Q* stored in them. Which of the capacitors has higher potential?



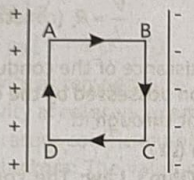
(iii) A parallel plate capacitor with plates of area $1m^2$ each, are at a separation of 0.1 m. If the electric field between the plates is 100 N/C, what will be the value of the magnitude of charge on each plate? (Take, $\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/N\text{-}m^2$)

(iv) When we consider a parallel plate air capacitor its capacitance does not depends on which parameter?

Very Short Answer Type Questions

Q 8. Two plates of a capacitor have net charges 70 pC and −70 pC when connected to a potential difference of 20 V, calculate the capacitance of the system.

Q 9. A charge q is moved along a square of side 'a' in a uniform electric field E. It starts from A and moves along AB, then BC, CD and in the end returned to A. What will be the work done against the field? And if square is replaced by a circle then?

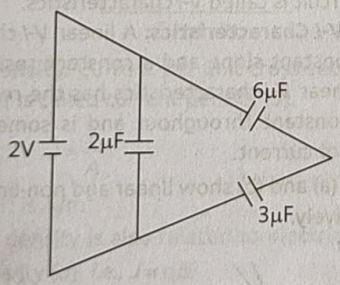


Q 10. A parallel plate capacitor is charged and battery is disconnected. Now its plates are pulled apart. How the energy stored in it will change? What is the source of this energy change?

Short Answer Type-I Questions

Q 11. A cube of side x has charge q at each of its vertices. What will be the potential due to this charge array at the centre of the cube?

Q 12. Find the total energy stored in the condenser system shown in the figure.



Short Answer Type-II Questions

Q 13. 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.

Q 14. (i) Draw the equipotential surfaces due to two identical positive charges.

(ii) In a parallel plate capacitor of capacitance C, a metal sheet is inserted between the plates, parallel to them. If the thickness of the sheet is half of the separation between the plates, what will be the value of capacitance?

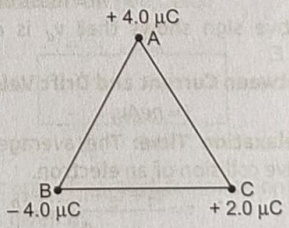
Long Answer Type Questions

Q 15. (i) Obtain the expression for the potential due to an electric dipole of dipole moment P at a point r on the axial line.

(ii) Derive the expression for the electrical capacitance of a parallel plate capacitor.

Q 16. State the significance of negative value of electrostatic potential energy of a system of charges.

Three charges are placed at the corners of an equilateral triangle ABC of side 2.0 m as shown in figure. Calculate the electric potential energy of the system of three charges.



CHAPTER 3 CURRENT ELECTRICITY

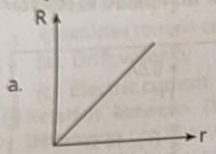
Multiple Choice Questions

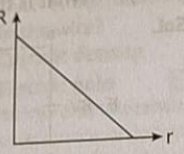
Q 1. A cell of emf E is connected across an external resistance R. When current 'I' is drawn from the cell, the potential difference across the electrodes of the cell drops to V. The internal resistance 'r' of the cell is:

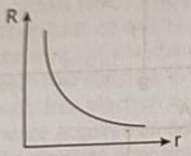
a. $\left(\frac{E-V}{E}\right)R$ b. $\left(\frac{E-V}{R}\right)$

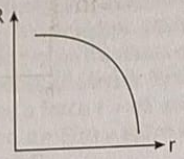
c. $\frac{(E-V)R}{I}$ d. $\left(\frac{E-V}{V}\right)R$

Q 2. The correct graph showing the variation of the resistance (R) of a cylindrical metal wire as a function of its radius (r), keeping its length and temperature constant is:

a. 

b. 

c. 

d. 

Assertion and Reason Type Questions

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c. Assertion (A) is true but Reason (R) is false.

d. Both Assertion (A) and Reason (R) are false.

Q 3. Assertion (A): Bending a wire does not effect electrical resistance.

Reason (R): Resistance of wire is proportional to resistivity of material.

Q 4. Assertion (A): The current flowing through a conductor is directly proportional to the drift velocity.

Reason (R): As the drift velocity increases, the current flowing through the conductor decreases.

Fill in the Blanks

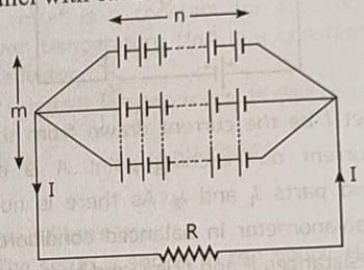
Q 5. The basic laws for analyzing an electric circuit are ..... .

Q 6. The first law or junction law due to Kirchhoff is another form of the law of conservation of ..... .

Case Study Based Question

Q 7. A single cell provides a feeble current. In order to get a higher current in a circuit, we often use a combination of cells. A combination of cells is called a battery. Cells can be joined in series, parallel or in a mixed way.

Two cells are said to be connected in series when negative terminal of one cell is connected to positive terminal of the other cell and so on. Two cells are said to be connected in parallel, if positive terminal of each cell is connected to one point and negative terminal of each cell connected to the other point. In mixed grouping of cells, a certain number of identical cells are joined in series and all such rows are then connected in parallel with each other.



Read the given passage carefully and give the answer of the following questions:

(i) To draw the maximum current from a combination of cells, how should the cells be grouped?

a. Parallel
b. Series
c. Mixed grouping
d. Depends upon the relative values of internal and external resistances

(ii) The total emf of the cells when n identical cells each of emf ε are connected in parallel is:

a. nE b. n^2E c. E d. $\frac{E}{n}$

(iii) 4 cells each of emf 2V and internal resistance of 1 Ω are connected in parallel to a load resistor of 2 Ω. Then the current through the load resistor is:

a. 2 A b. 1.5 A c. 1 A d. 0.888 A

(iv) If two cells out of n number of cells each of internal resistance 'r' are wrongly connected in series, then total resistance of the cell is:

a. $2nr$ b. $nr-4r$ c. nr d. r

(v) Two identical non-ideal batteries are connected in parallel. Consider the following statements.

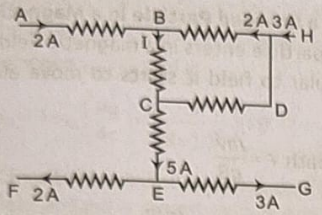
(a) The equivalent emf is smaller than either of the two emfs.

(b) The equivalent internal resistance is smaller than either of the two internal resistances.

a. Both (a) and (b) are correct
b. (a) is correct but (b) is wrong
c. (b) is correct but (a) is wrong
d. Both (a) and (b) are wrong

Very Short Answer Type Questions

Q 8. In the circuit diagram, calculate the electric current through branch *BC*.



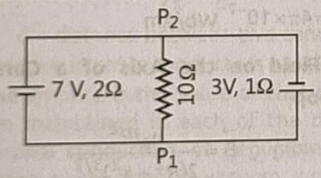
Q 9. In a Wheatstone's bridge, all the four arms have equal resistance *R*. If resistance of the galvanometer arm is also *R*, then what is the equivalent resistance of the combination?

Q 10. When a potential difference is applied across the ends of a conductor, how is the drift velocity of the electrons related to the relaxation time?

Short Answer Type-I Questions

Q 11. Four wires of the same diameter are connected, in turn, between two points maintained at a constant potential difference. Their resistivities and lengths are; ρ and *L* (wire 1), 1.2 ρ and 1.2 *L* (wire 2), 0.9ρ and 0.9 *L* (wire 3) and ρ and 1.5 *L* (wire 4). Rank the wires according to the rates at which energy is dissipated as heat, greatest first.

Q 12. A 7 V battery with internal resistance 2Ω and a 3 V battery with internal resistance 1Ω are connected to a 10Ω resistor as shown in figure. Find the current in 10 Ω resistor.



Short Answer Type-II Questions

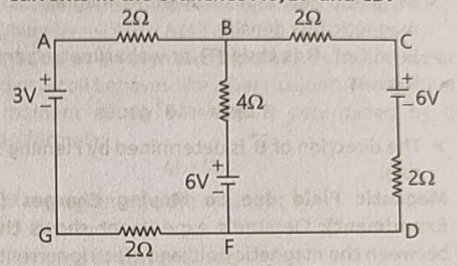
Q 13. A cylindrical rod is reformed to half of its original length keeping volume constant. If its resistance before this change were *R*, then find the resistance after reformation of rod.

Q 14. Define current density and relaxation time. Derive an expression for resistivity of a conductor in terms of number density of charge carriers in the conductor and relaxation time.

Long Answer Type Questions

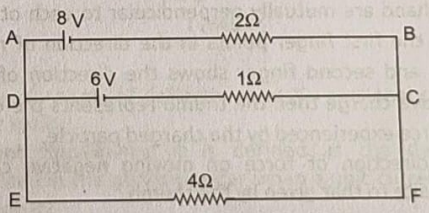
Q 15. (i) Use Kirchhoff's rules to obtain the balance condition in a Wheatstone bridge.

(ii) The figure shows a circuit with three ideal batteries. Find the magnitude and direction of currents in the branches *AG*, *BF* and *CD*.



Q 16. (i) A cell of emf *E* and internal resistance *r* is connected across a variable load resistor *R*. Draw the plots of the terminal voltage *V* versus (a) resistance *R* and (b) current *I*.
It is found that when *R* = 4 Ω, the current is 1 A and when *R* is increased to 9 Ω, the current reduces to 0.5 A. Find the values of the emf *E* and internal resistance *r*.

(ii) Calculate the potential difference across the 4 Ω resistor in the given electrical circuit, using Kirchhoff's rules.



CHEMISTRY

Read the following chapters from NCERT and solve all the exercises given at the last of the chapter and based on that solve the following sheets in a separate notebook.

Chapter Solution

SOLUTION

Multiple Choice Questions

Q 1. The value of Henry's law constant for some gases at 293 K is given below. Arrange the gases in the increasing order of their solubility:

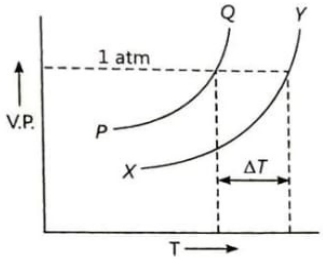
He: 144.97 kbar, H_2: 69.16 kbar,

N_2: 76.48 kbar, O_2: 34.86 kbar

a. $He < N_2 < H_2 < O_2$ b. $O_2 < H_2 < N_2 < He$

c. $H_2 < N_2 < O_2 < He$ d. $He < O_2 < N_2 < H_2$

Q 2. In the graph plotted between vapour pressure (VP) and temperature (*T*):



a. *PQ* is the curve for solvent, *XY* is the curve of solution and ΔT is depression in freezing point.

b. *PQ* is the curve for solution, *XY* is the curve for solvent and ΔT is elevation in boiling point.

c. *PQ* is the curve for solvent, *XY* is the curve for solution and ΔT is molal elevation in boiling point.

d. *PQ* is the curve for solvent, *XY* is the curve for solution and ΔT is elevation in boiling point.

Q 3. A solution containing 10.2 g glycerine per litre is isotonic with a 2% solution of glucose. What is the molecular mass of glycerine?

a. 91.8 g b. 119.8 g c. 83.9 g d. 890.3 g

Q 4. When acetone and chloroform are mixed together, hydrogen bonds are formed between them. Which of the following statements is correct about the solution made by mixing acetone and chloroform?

a. On mixing acetone and chloroform will form an ideal solution.

b. On mixing acetone and chloroform positive deviation is shown since the vapour pressure increases.

c. On mixing acetone and chloroform negative deviation is shown since there is decrease in vapour pressure.

d. At a specific composition acetone and chloroform will form minimum boiling azeotrope.

Assertion and Reason Type Questions

Directions (Q. Nos. 5-6): *Each of the following questions consists of two statements, one is Assertion (A) and the other is Reason (R). Give answer:*

a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

c. Assertion (A) is true but Reason (R) is false.

d. Assertion (A) is false but Reason (R) is true.

Q 5. Assertion (A): 1 M solution of KCl has greater osmotic pressure than 1 M solution of glucose at the same temperature.

Reason (R): In solution, KCl dissociates to produce more number of particles.

Q 6. Assertion (A): One molar aqueous solution is more concentrated than that of 1 molal aqueous solution.

Reason (R): Molarity is a function of temperature as volume depends on temperature.

Case Study Based Question

Q 7. Ideal and Non-ideal Solutions:

An ideal solution may be defined as the solution which obeys Raoult's law exactly over the entire range of concentration. The solutions for which vapour pressure is either higher or lower than that predicted by Raoult's law are called non-ideal solutions.

Non-ideal solutions can show either positive or negative deviations from Raoult's law depending on whether the *A-B* interactions in solution are stronger or weaker than *A-A* and *B-B* interactions.

Read the given passage carefully and give the answer of the following questions:

(i) For which of the following solutions ΔH_{mix} and ΔV_{mix} is negative? Can you suggest the reason for this? Acetone and aniline or ethyl alcohol and cyclohexane.

(ii) Which of the following is not true for positive deviations?

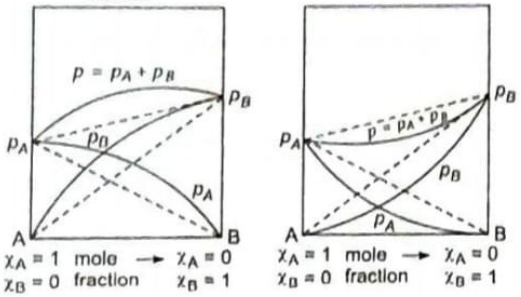
I. The *A-B* interactions in solution are weaker than the *A-A* and *B-B* interactions.

Chapter- Solutions

II. $p_A < p_A^0 \chi_A$ and $p_B < p_B^0 \chi_B$

III. Carbon tetrachloride and chloroform mixture is an example of positive deviations. What should be the correct statement?

(iii) For water and nitric acid mixture, which of the given graph is correct? Also mention the reason.



OR

What kind of deviation is shown by water—HCl mixture? Why?

Very Short Answer Type Questions

Q 8. Gas *A* is more soluble in water than Gas *B* at the same temperature. Which one of the two gases will have the higher value of K_H and why?

Q 9. Give reason why cooking is faster in pressure cooker than in cooking pan?

Short Answer Type-I Questions

Q 10. Write two differences between an ideal solution and a non-ideal solution.

Q 11. Find the freezing point of a solution containing 0.520 g glucose ($C_6H_{12}O_6$) dissolved in 80.2 g of water. (Given: K_f for water = 1.86 K kg mol^{-1})

Q 12. What is van't Hoff factor? What possible values can it have if the solute molecules undergo dissociation?

Short Answer Type-II Questions

Q 13. (i) When 2.56 g of sulphur was dissolved in 100 g of CS_2, the freezing point was lowered by 0.383 K. Calculate the formula of sulphur (S_x). [K_f for CS_2 = 3.83 K kg mol^{-1}, atomic mass of sulphur = 32 g mol^{-1}].

(ii) Blood cells are isotonic with 0.9% sodium chloride solution. What happens if we place blood cells in a solution containing:

(a) 1.2% sodium chloride solution?

(b) 0.4% sodium chloride solution?

Q 14. A solution containing 1.9 g per 100 mL of KCl (M = 74.5 g mol^{-1}) is isotonic with a solution containing 3 g per 100 ml of urea (M = 60 g mol^{-1}). Calculate the degree of dissociation of KCl solution. Assume that both the solutions have same temperature.

Q 15. On dissolving 1.822g of organic compound (molar mass = 155) in 100g benzene, the depression in freezing point is 0.60°C. Calculate the molal depression constant of benzene.

Long Answer Type Questions

Q 16. (i) Calculate the freezing point of solution when 1.9 g of $MgCl_2$ (M = 95 g mol^{-1}) was dissolved in 50g of water, assuming $MgCl_2$ undergoes complete ionisation.

(K_f for water = 1.86 K kg mol^{-1})

(ii) (a) Out of 1 M glucose and 2 M glucose, which one has a higher boiling point and why?

(b) What happens when the external pressure applied becomes more than the osmotic pressure of solution?

Q 17. (i) State Raoult's law for a solution containing volatile components. Write two characteristics of the solution which obeys Raoult's law at all concentrations.

(ii) Why a mixture of carbon disulphide and acetone shows positive deviation from Raoult's law? What type of azeotrope is formed by this mixture?

Electrochemistry

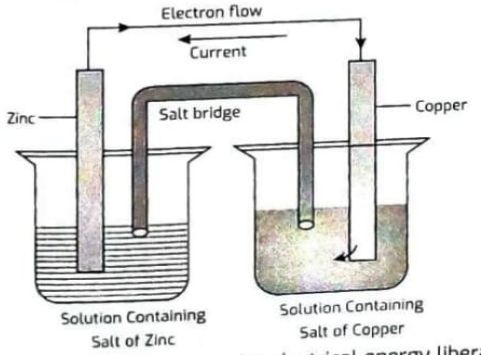
Multiple Choice Questions

Q 1. Match the Column I with Column II and mark the appropriate choice.

Column I	Column II
(A) Kohlrausch's law	(i) $\alpha = \frac{\Lambda_m}{\Lambda_m^\circ}$
(B) Molar conductivity	(ii) $K_a = \frac{c\alpha^2}{1-\alpha}$
(C) Degree of dissociation	(iii) $\Lambda_{eq}^\circ = \Lambda_c^\circ + \Lambda_a^\circ$
(D) Dissociation constant	(iv) $\Lambda_m = \frac{\kappa}{c}$

a. (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
b. (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
c. (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)
d. (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)

Q 2. Which of the following statements is correct about the given Daniell cell:



a. This cell converts the electrical energy liberated during the redox reaction to chemical energy.
b. This cell has an electrical potential greater than 1.1 V when concentration of Zn^{2+} and Cu^{2+} ions is unity (1 mol dm^{-3}).
c. In this cell, copper is acting as cathode and zinc is acting as anode.
d. Redox reaction occurring in this cell is
$$Cu(s) + Zn^{2+}(aq) \longrightarrow Cu^{2+}(aq) + Zn(s)$$

Q 3. E° values of three metals are listed below:

$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$; $E^\circ = -0.76\,V$
$Fe^{2+}(aq) + 2e^- \rightarrow 2Fe(s)$; $E^\circ = -0.44\,V$
$Sn^{2+}(aq) + 2e^- \rightarrow Sn(s)$; $E^\circ = -0.14\,V$

Which of the following statements are correct on the basis of the above information?

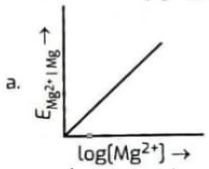
(i) Zinc will be corroded in preference to iron if zinc coating is broken on the surface.
(ii) If iron is coated with tin and the coating is broken on the surface then iron will be corroded.
(iii) Zinc is more reactive than iron but tin is less reactive than iron.

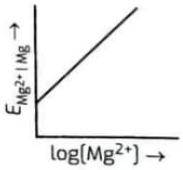
a. (i) and (ii) b. (ii) and (iii)
c. (i), (ii) and (iii) d. (i) and (iii)

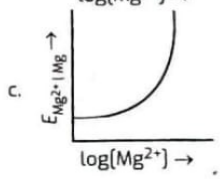
Q 4. Electrode potential for Mg electrode varies according to the equation.

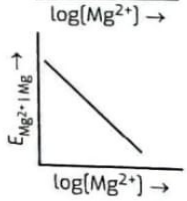
$$E_{(Mg^{2+})|Mg} = E^\circ_{(Mg^{2+})|Mg} - \frac{0.059}{2}\log\frac{1}{[Mg^{2+}]}$$

The graph of $E_{(Mg^{2+})|Mg}$ vs log $[Mg^{2+}]$ is:

a. 

b. 

c. 

d. 

Assertion and Reason Type Questions

Directions (Q. Nos. 5-6): *Each of the following questions consists of two statements, one is Assertion (A) and the other is Reason (R). Give answer:*

a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

Electrochemistry

c. Assertion (A) is true but Reason (R) is false.
d. Assertion (A) is false but Reason (R) is true.

Q 5. **Assertion (A): Current stops flowing when $E_{cell} = 0$.**
Reason (R): Equilibrium of the cell reaction is attained.

Q 6. **Assertion (A): $E_{Ag^+|Ag}$ increases with increase in concentration of Ag^+ ions.**
Reason (R): $E_{Ag^+|Ag}$ has a positive value.

Case Study Based Question

Q 7. A lead storage battery is the most important type of secondary cell having a lead anode and a grid of lead packed with PbO_2 as cathode. A 38% solution of sulphuric acid is used as electrolyte. (Density = 1.294 g mL^{-1}) The battery holds 3.5 L of the acid. During the discharge of the battery, the density of H_2SO_4 falls to 1.139 g mL^{-1}. (20% H_2SO_4 by mass).

Read the given passage carefully and give the answer of the following questions:

(i) Write the reaction taking place at the cathode when the battery is in use.

(ii) How much electricity in terms of Faraday is required to carry out the reduction of one mole of PbO_2?

(iii) What is the molarity of sulphuric acid before discharge?

OR Write the products of electrolysis when dilute sulphuric acid is electrolysed using Platinum electrodes.

Very Short Answer Type Questions

Q 8. What is the necessity to use a salt bridge in a galvanic cell?

Q 9. Write an expression for the molar conductivity of acetic acid at infinite dilution according to Kohlrausch's law.

Short Answer Type-I Questions

Q 10. (i) On the basis of standard electrode potential values stated for acid solutions, predict whether Ti^{4+} species may be used to oxidise Fe (II) to Fe (III).

$Ti^{4+} + e^- \longrightarrow Ti^{3+}$, $E^\circ = +0.01$ V

$Fe^{3+} + e^- \longrightarrow Fe^{2+}$, $E^\circ = +0.77$ V

(ii) Based on the data arrange Fe^{2+}, Mn^{2+} and Cr^{2+} in the increasing order of stability of +2 oxidation state.

$E^\circ_{Cr^{3+}|Cr^{2+}} = -0.4$ V, $E^\circ_{Mn^{3+}|Mn^{2+}} = +1.5$ V,

$E^\circ_{Fe^{3+}|Fe^{2+}} = +0.8$ V.

Q 11. What type of battery is the lead storage battery? Write the anode and the cathode reactions and the overall reaction occurring in a lead storage battery when current is drawn from it.

Q 12. Why on dilution the Λ_m of CH_3COOH increases drastically while that of CH_3COONa increases gradually?

Short Answer Type-II Questions

Q 13. A galvanic cell consists of a metallic zinc plate immersed in 0.1 M $Zn(NO_3)_2$ solution and metallic plate of lead in 0.02 M $Pb(NO_3)_2$ solution. Calculate the emf of the cell. Write the chemical equation for the electrode reactions and represent the cell.
(Given: $E^\circ_{Zn^{2+}|Zn} = -0.76$ V, $E^\circ_{Pb^{2+}|Pb} = -0.13$ V)

Q 14. When a certain conductance cell is filled with 0.1 M KCl, it has a resistance of 85 ohm at 25°C. When the same cell was filled with an aqueous solution of 0.052 M unknown electrolyte, the resistance was 96 ohms. Calculate the molar conductance of the electrolyte at this concentration. [Specific conductance of 0.1 M KCl = 1.29×10^2 ohm^{-1} cm^{-1}].

Q 15. Calculate $\Delta_r G^\circ$ and log K_c for the following cell:

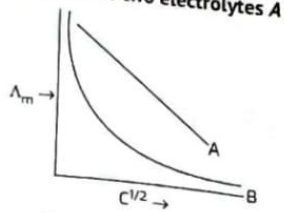
$Ni(s) + 2Ag^+(aq) \longrightarrow Ni^{2+}(aq) + 2Ag(s)$

Given that $E^\circ_{cell} = 1.05$ V, IF = 96500 C mol^{-1}.

Long Answer Type Questions

Q 16. (i) A steady current of 2 A was passed through two electrolytic cells *X* and *Y* connected in series containing electrolytes $FeSO_4$ and $ZnSO_4$ until 2.8 g of Fe deposited at the cathode of cell *X*. How long did the current flow? Calculate the mass of Zn deposited at the cathode of cell *Y*. (molar mass: Fe = 56 g mol^{-1}, Zn = 65.3 g mol^{-1}, 1 F = 96500 C mol^{-1})

(ii) In the plot of molar conductivity (Λ_m) vs square root of concentration ($C^{1/2}$), following curves are obtained for two electrolytes *A* and *B*.



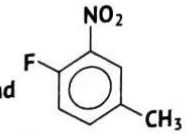
Answer the following:
(a) Predict the nature of electrolytes *A* and *B*.
(b) What happens on extrapolation of Λ_m to concentration approaching zero for electrolytes *A* and *B*?

Q 17. (i) What is limiting molar conductivity? Why is there steep rise in the molar conductivity of weak electrolyte on dilution?

(ii) Calculate the emf of the following cell at 298 K:
$Mg(s) | Mg^{2+}$ (0.1 M) $|| Cu^{2+}$ (1.0×10^{-3} M) $| Cu(s)$
(Given, $E^\circ_{cell} = 2.71$ V)

Haloalkane and Haloarenes

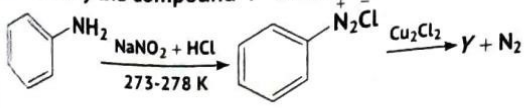
Multiple Choice Questions

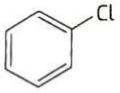
Q1. The IUPAC name of the compound 

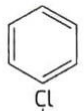
is:

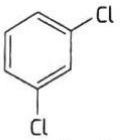
a. 1-fluoro-4-methyl-2-nitrobenzene
b. 4-fluoro-1-methyl-3-nitrobenzene
c. 4-methyl-1-fluoro-2-nitrobenzene
d. 2-fluoro-5-methyl-1-nitrobenene

Q2. Identify the compound '*Y*' in the following reaction.



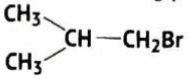
a. 

b. 

c. 

d. 

Q 3. Arrange the following compounds in increasing order of their boiling points.

(i) 

Haloalkane and Haloarenes

(ii) $CH_3CH_2CH_2CH_2Br$

(iii) $H_3C-\underset{\displaystyle Br}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_3$

a. (ii) < (i) < (iii) b. (i) < (ii) < (iii)

c. (iii) < (i) < (ii) d. (iii) < (ii) < (i)

Q 4. Match the column I with column II and mark the appropriate choice.

Column I	Column II
(A) $CH_3-\underset{\displaystyle Br}{\overset{|}{CH}}-\underset{\displaystyle CH_3}{\overset{|}{CH}}-CH_3 + C_2H_5ONa \longrightarrow CH_3CH_2-\underset{\displaystyle CH_3}{\overset{\displaystyle OC_2H_5}{\overset{|}{\underset{|}{C}}}}-CH_3$	(i) β-elimination
(B) $CH_3CH_2Br \xrightarrow{AgOH} CH_3CH_2OH$	(ii) S_N1 nucleophilic substitution
(C) $CH_3CH=CH_2 + HBr \xrightarrow{Peroxide} CH_3CH_2CH_2Br$	(iii) S_N2 nucleophilic substitution
(D) $CH_3-CH_2Br + alc.KOH \rightarrow CH_2=CH_2$	(iv) Kharasch effect

a. (A)→(iv), (B)→ (i), (C)→ (ii), (D)→(iii)

b. (A)→ (ii), (B)→(iii), (C)→ (iv), (D)→(i)

c. (A)→ (i), (B)→ (ii), (C)→ (iv), (D)→(iii)

d. (A)→(iii), (B)→ (i), (C)→ (ii), (D)→(iv)

Assertion and Reason Type Questions

Directions (Q. Nos. 5-6): *Each of the following questions consists of two statements, one is Assertion (A) and the other is Reason (R). Give answer*

a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A)

c. Assertion (A) is true but Reason (R) is false.

d. Assertion (A) is false but Reason (R) is true.

Q 5. Assertion (A): Hydrolysis of (−)-2-bromo octane proceeds with inversion of configuration.
Reason (R): This reaction proceeds through the formation of a carbocation.

Q 6. Assertion (A): Nitration of chlorobenzene leads to the formation of *m*-nitrochlorobenzene.
Reason (R) : $-NO_2$ group is a *m*-directing group.

Case Study Based Question

Q 7. Nucleophilic substitution reaction of haloalkan can be conducted according to both S_N1 and S_N mechanisms. However, which mechanism it is based on is related to such factors as the structure of haloalkane, and properties of leaving group, nucleophilic reagent and solvent.

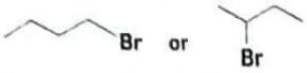
Influences of Halogen: No matter which mechanism the nucleophilic substitution reaction is based on, the leaving group always leave the central carbon atom with electron pair. This is just the opposite of the situation that nucleophilic reagent attacks the central carbon atom with electron pair. Therefore, the weaker the alkalinity of leaving group is, the more stable the anion formed is and it will be more easier to be substituted. The alkalinity order of halogen ion is $I^- < Br^- < Cl^- < F^-$ and the order of their leaving tendency should be $I^- > Br^- > Cl^- > F^-$. Therefore, in four halides with the same alkyl and different halogens, the order of substitution reaction rate is RI > RBr > RCl > RF. In addition, if the leaving group is very easy to leave, many carbocation intermediates are generated in the reaction and the reaction is based on S_N1 mechanism. If the leaving group is not easy to leave, the reaction is based on S_N2 mechanism.

Influences of Solvent Polarity: In S_N1 reaction, the polarity of the system increases from the reactant to the transition state, because polar solvent has a greater stabilizing effect on the transition state than the reactant, thereby reduce activation energy and accelerate the reaction. In S_N2 reaction, the polarity of the system generally does not change from the reactant to the transition state and only charge dispersion occurs. At this time, polar solvent has a great stabilising effect on Nu than the transition state, thereby increasing activation energy and slow down the reaction rate. For example, the decomposition rate (S_N1) of tertiary chlorobutane in 25°C water (dielectric constant 79) is 300000 times faster than in ethanol (dielectric constant 24). The reaction rate (S_N2) of 2-bromopropane and NaOH in ethanol containing 40% water is twice slower than in absolute ethanol. In a word, the level of solvent polarity has influence on both S_N1 and S_N2 reactions, but with different results. Generally speaking, weak polar solvent is favourable for S_N2 reaction, while strong polar solvent is favourable for S_N1 reaction, because only under the action of polar solvent can halogenated hydrocarbon dissociate into carbocation, and halogen ion and solvents with a strong polarity is favourable for solvation of carbocation increasing its stability. Generally speaking, the substitution reaction of tertiary haloalkane is based on S_N1 mechanism in solvents with a strong polarity (for example, ethanol containing water).

Haloarenes And Haloarenes

Read the given passage carefully and give the answer of the following questions:

(i) Which alkyl halide from the following pair is chiral and undergoes faster S_N2 reaction?



(ii) Give reason why ethyl iodide undergoes S_N2 reaction.

(iii) Why are S_N1 reactions accompanied by racemisation in optically active alkyl halides?

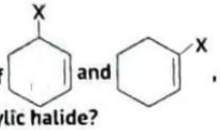
OR

Why do the C—Cl bond length in chlorobenzene is shorter than in CH_3Cl? Also, arrange the following halides in the order of increasing S_N2 reactivity:

CH_3Cl, CH_3Br, CH_3CH_2Cl, $(CH_3)_2CHCl$

Very Short Answer Type Questions

Q 8. Write the structure of an isomer of compound C_4H_9Br which is most reactive towards S_N1 reaction.

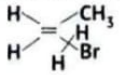
Q 9. Out of  and , which is an example of allylic halide?

Short Answer Type-I Questions

Q 10. (i) In the following pair of halogen compounds, which compound undergoes S_N1 reaction faster and why?

(ii) Arrange the following compounds in increasing order of their reactivity towards S_N2 displacement: 2-Bromo-2-methylbutane, 1-Bromopentane, 2-Bromopentane.

Q 11. (i) Write the IUPAC name of the following:



(ii) Among the isomers of pentane (C_5H_{12}), write the one which on photochemical chlorination yields a single monochloride.

Q 12. Draw the structures of the following organic halogen compounds:

(i) 4-tert-butyl-3-iodoheptane

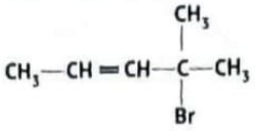
(ii) 4-bromo-3-methylpent-2-ene

Short Answer Type-II Questions

Q 13. (i) Write equation for preparation of 1-iodobutane from 1-chlorobutane.

(ii) Out of 2-bromopentane, 2-bromo-2 methylbutane and 1-bromopentane, which compound is most reactive towards elimination reaction and why?

(iii) Give IUPAC name of



Q 14. Give reasons for the following:

(i) The presence of $-NO_2$ group at *ortho* or *para* position increases the reactivity of haloarenes towards nucleophilic substitution reactions.

(ii) *p*-dichlorobenzene has higher melting point than that of *ortho* or *meta* isomer.

(iii) Thionyl chloride method is preferred for preparing alkyl chloride from alcohols.

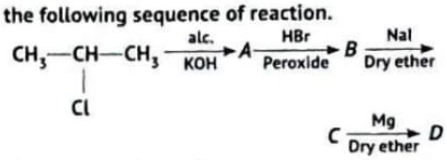
Q 15. (i) Out of $(CH_3)_3C-Br$ and $(CH_3)_3C-I$, which one is more reactive towards S_N1 and why?

(ii) Write the product formed when *p*-nitrochlorobenzene is heated with aqueous NaOH at 443 K followed by acidification.

(iii) Why *dextro* and laevo-rotatory isomers of butan-2-ol are difficult to separate by fractional distillation?

Long Answer Type Questions

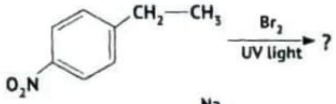
Q 16. (i) Write the structural formula of *A*, *B*, *C* and *D* in the following sequence of reaction.



(ii) Illustrate Sandmeyer's reaction with the help of a suitable example.

(iii) A compound is formed by the substitution of two chlorine atoms for two hydrogen atoms in propane. Write the structures of the possible isomers. Give the IUPAC name of the isomer which can exhibit enantiomerism.

Q 17. (i) Write the major product (s) in the following:

(a) 

(b) $2CH_3-\underset{\underset{Cl}{|}}{CH}-CH_3 \xrightarrow[\text{dry ether}]{Na} ?$

(c) $CH_3-CH_2-Br \xrightarrow{AgCN} ?$

(ii) Account for the following:

(a) The C—Cl bond length in chlorobenzene is shorter than that in CH_3-Cl.

(b) Chloroform is stored in closed dark brown bottles.

MATHEMATICS

Do the following questions from the RD SHARMA book of Mathematics in a separate notebook

Chapter: Matrices

- **Algebra of Matrices:**

Exercise – 4.1, Questions: 5, 8, 10, 13, 16 (Page No. 4.15, Example 13)

Exercise – 4.2, Questions: 9, 12, 15, 16, 19, 21, 22

Exercise – 4.3, Questions: 27, 28, 29, 31, 71, 72, 74

Exercise – 4.5, Questions: 1, 2, 4, 5, 7

- **Chapter: Determinants**

Exercise – 5.1, Questions: 2, 10, 12

Exercise – 5.3, Questions: 1, 2, 6, 9

Exercise – 5.4, Questions: 2, 8, 16

Exercise – 6.1, Questions: 12, 16, 20, 27, 40, 26

Exercise – 6.2, Questions: 3, 14, 16, 17, 18, 11

Page No. 7.4, Example: 1, 2, 3

Chapter: Continuity and Differentiability

- **Do these questions from NCERT book**

Exercise – 5.3, Questions: 6, 10, 12, Example 27, 30

Exercise – 5.5, Questions: 1, 5, 6, 10, 17

Exercise – 5.6, Questions: 1, 5, 7, 8, 11

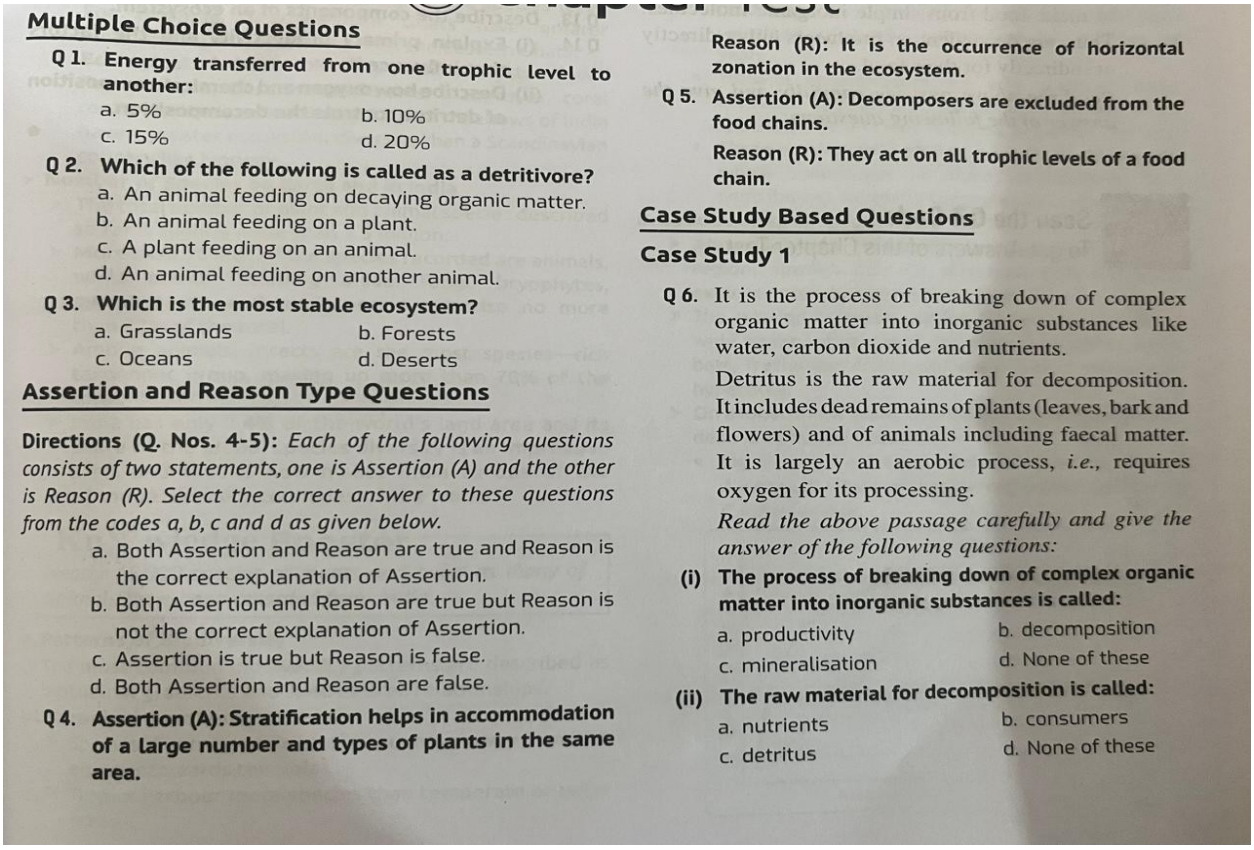
Exercise – 5.7, Questions: 5, 7, 11, 14, 17

- **Write All the Trigonometric Functions identity formulas.**
- **Write All the Differentiation & Integration Formulas.**

BIOLOGY

Read the following chapters from NCERT and solve all the exercises given at the last of the chapter and based on that solve the following sheets in a separate notebook.

Chapter: Ecosystem



Multiple Choice Questions

Q 1. Energy transferred from one trophic level to another:

a. 5% b. 10%
c. 15% d. 20%

Q 2. Which of the following is called as a detritivore?

a. An animal feeding on decaying organic matter.
b. An animal feeding on a plant.
c. A plant feeding on an animal.
d. An animal feeding on another animal.

Q 3. Which is the most stable ecosystem?

a. Grasslands b. Forests
c. Oceans d. Deserts

Assertion and Reason Type Questions

Directions (Q. Nos. 4-5): *Each of the following questions consists of two statements, one is Assertion (A) and the other is Reason (R). Select the correct answer to these questions from the codes a, b, c and d as given below.*

a. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
b. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
c. Assertion is true but Reason is false.
d. Both Assertion and Reason are false.

Q 4. Assertion (A): Stratification helps in accommodation of a large number and types of plants in the same area.

Reason (R): It is the occurrence of horizontal zonation in the ecosystem.

Q 5. Assertion (A): Decomposers are excluded from the food chains.

Reason (R): They act on all trophic levels of a food chain.

Case Study Based Questions

Case Study 1

Q 6. It is the process of breaking down of complex organic matter into inorganic substances like water, carbon dioxide and nutrients.

Detritus is the raw material for decomposition. It includes dead remains of plants (leaves, bark and flowers) and of animals including faecal matter. It is largely an aerobic process, *i.e.*, requires oxygen for its processing.

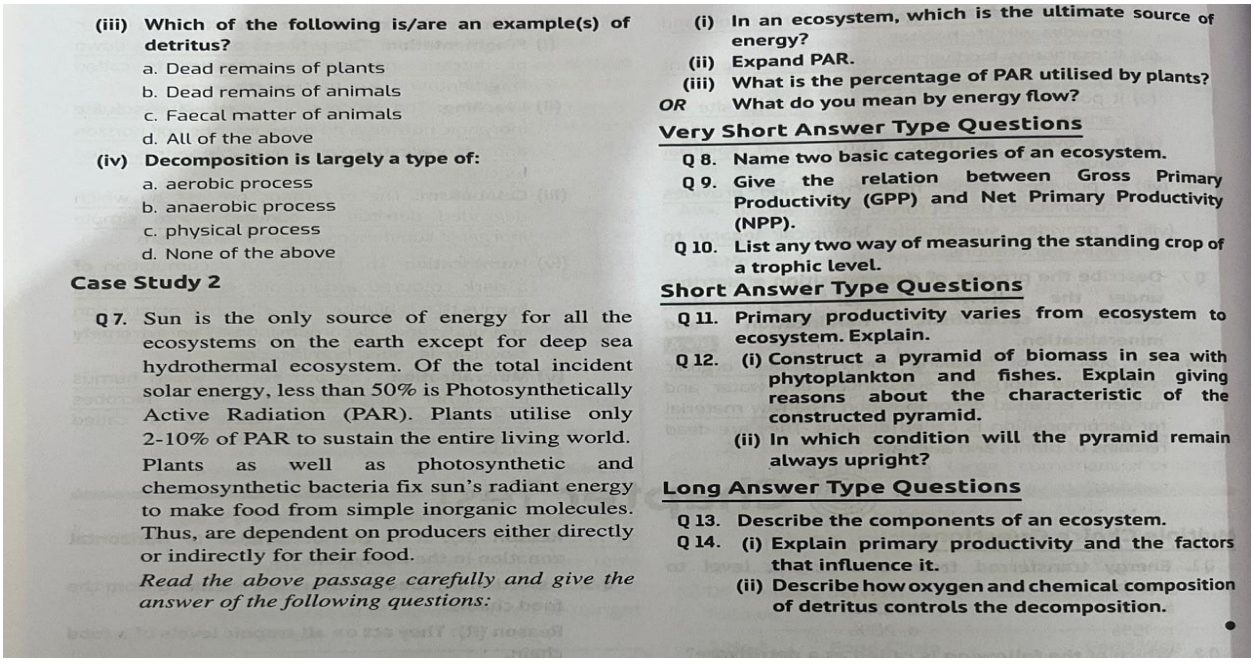
Read the above passage carefully and give the answer of the following questions:

(i) The process of breaking down of complex organic matter into inorganic substances is called:

a. productivity b. decomposition
c. mineralisation d. None of these

(ii) The raw material for decomposition is called:

a. nutrients b. consumers
c. detritus d. None of these



(iii) Which of the following is/are an example(s) of detritus?

a. Dead remains of plants
b. Dead remains of animals
c. Faecal matter of animals
d. All of the above

(iv) Decomposition is largely a type of:

a. aerobic process
b. anaerobic process
c. physical process
d. None of the above

Case Study 2

Q 7. Sun is the only source of energy for all the ecosystems on the earth except for deep sea hydrothermal ecosystem. Of the total incident solar energy, less than 50% is Photosynthetically Active Radiation (PAR). Plants utilise only 2-10% of PAR to sustain the entire living world. Plants as well as photosynthetic and chemosynthetic bacteria fix sun's radiant energy to make food from simple inorganic molecules. Thus, are dependent on producers either directly or indirectly for their food.

Read the above passage carefully and give the answer of the following questions:

(i) In an ecosystem, which is the ultimate source of energy?
(ii) Expand PAR.
(iii) What is the percentage of PAR utilised by plants?
OR **What do you mean by energy flow?**

Very Short Answer Type Questions

Q 8. Name two basic categories of an ecosystem.
Q 9. Give the relation between Gross Primary Productivity (GPP) and Net Primary Productivity (NPP).
Q 10. List any two way of measuring the standing crop of a trophic level.

Short Answer Type Questions

Q 11. Primary productivity varies from ecosystem to ecosystem. Explain.
Q 12. (i) Construct a pyramid of biomass in sea with phytoplankton and fishes. Explain giving reasons about the characteristic of the constructed pyramid.
(ii) In which condition will the pyramid remain always upright?

Long Answer Type Questions

Q 13. Describe the components of an ecosystem.
Q 14. (i) Explain primary productivity and the factors that influence it.
(ii) Describe how oxygen and chemical composition of detritus controls the decomposition.

Chapter: Human health and Disease

Multiple Choice Questions

Q 1. AIDS is caused by HIV. Among the following, which one is not a mode of transmission of HIV?

a. Transfusion of contaminated blood.
b. Sharing the infected needles.
c. Shaking hands with infected persons.
d. Sexual contact with infected persons.

Q 2. ..... is a CNS stimulant as it interferes with the transport of the neuro-transmitter .....

a. Cocaine; acetylcoline
b. Barbiturate; glutamate
c. Cocaine; dopamine
d. Barbiturate; glycine

Q 3. Which of the following plants possess hallucinogenic properties?

a. *Erythroxylum coca* b. *Atropa belladona*
c. *Datura stramonium* d. All of these

Assertion and Reason Type Questions

Directions (Q.Nos. 4-5): *Each of the following questions consists of two statements, one is Assertion (A) and the other is Reason (R). Select the correct answer to these questions from the codes a, b, c and d as given below.*

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d. Both Assertion and Reason are false.

Q 4. Assertion (A): Subsequent encounter with the same pathogen elicits a highly intensified anamnestic response.

Reason (R): This is based on the fact that our body appears to have memory of the first encounter.

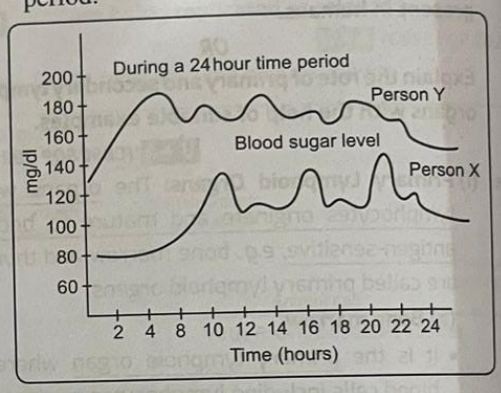
Q 5. Assertion (A): Proto-oncogenes are cellular genes required for normal growth.

Reason (R): Under normal conditions they could lead to the oncogenic transformation of the cell.

Case Study Based Questions

Case Study 1

Q 6. The given graph shows fluctuations in blood sugar of person X and Y during a 24 hour time period.



(i) Which of the following holds true for person X?

a. Person X is suffering from type I diabetes.
b. Person X shows severe insulin deficiency and beta cell depletion.
c. Person X is normal and shows good control of blood sugar level.
d. Person X is subjected to excessive urination and abnormal thrust.

(ii) The given graph indicates that person Y is suffering from:

a. diabetes
b. hypertension
c. atherosclerosis
d. rheumatic heart disease

(iii) **Which of the following conditions are common in person Y?**

a. Excretion of glucose in urine and excessive urination.
b. Polydipsia and mild beta cell depletion.
c. Progressive erosion of articular cartilage at synovial joint.
d. Both a. and b.

(iv) **A person suffering from diabetes mellitus becomes weak because:**

a. the cells are unable to utilise glucose and other carbohydrates for energy production.
b. degradation of fat increases production of toxic ketone bodies.
c. cells utilise proteins for obtaining energy.
d. All of the above

Case Study 2

Q 7. Antibodies are immunoglobulins (IgS) which are produced in response to antigenic stimulation and each antibody is a protein molecule. Antibodies are produced by B-lymphocytes. T-lymphocytes do not produce antibodies themselves but help B cells to produce them.

Each antibody molecule has four peptide chains, two small light chains and two longer heavy chains. Hence, the antibody is represented as H_2L_2. Different types of antibodies such as IgA, IgM, IgD, IgE, IgG are produced in our body. IgG is the only antibody to cross placenta.

Read the above passage carefully and give the answer of the following questions:

(i) **What are antibodies?**
(ii) **Antibodies are produced by which lymphocytes?**
(iii) **How many peptide chains are there in each antibody?**

OR

Name any three antibodies which are produced by our body.

Very Short Answer Type Questions

Q 8. **Why sharing of injection needles between two individuals are not recommended?**

Q 9. **Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible?**

Q 10. **Mention the useful as well as the harmful drug obtained from the latex of poppy plant.**

Short Answer Type Questions

Q 11. **What would happen to immune system, if thymus gland is removed from the body of a person?**

Q 12. **What is colostrum? Why is it important to be given to the newborn infants?**

Long Answer Type Questions

Q 13. **Answer the following questions:**

(i) Name a drug used:
(a) As an effective sedative and pain killer.
(b) For helping patients to cope with mental illnesses like depression, but often misused.
(ii) How does the moderate and high dosage of cocaine affect the human body?

Q 14. **Describe the life-cycle of HIV from the time of its entry into the human body till full blown AIDS sets in.**

Chapter: Microbes in human welfare

Multiple Choice Questions

Q 1. Which of the following is widely used as a successful biofertiliser in Indian rice field?

a. *Rhizobium* b. *Acacia arabica*
c. *Acalypha indica* d. *Azolla pinnata*

Q 2. Which of the following options includes biofertilisers?

a. Cow dung manure and farmyard waste.
b. A quick growing crop ploughed back into the field.
c. *Nostoc, Oscillatoria*
d. All of the above

Q 3. *Mycorrhiza* does not help the host plant in:

a. enhancing its phosphorus uptake capacity.
b. increasing its tolerance to drought.
c. enhancing its resistance to root pathogens.
d. increasing its resistance to insects.

Assertion and Reason Type Questions

Directions (Q.Nos. 4-5): *Each of the following questions consists of two statements, one is Assertion (A) and the other is Reason (R). Select the correct answer to these questions from the codes a, b, c and d as given below:*

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b. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
c. Assertion is true but Reason is false.
d. Both Assertion and Reason are false.

Q 4. Assertion (A): An organism which acts as herbicide is called bioherbicide.

Reason (R): *Phytophthora palmivora* is a mycoherbicide.

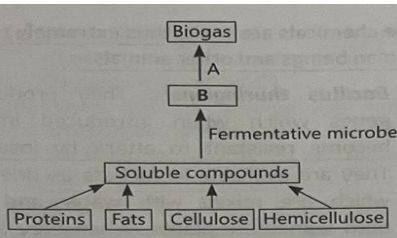
Q 5. Assertion (A): *Azotobacter* fixes nitrogen in symbiotic form.

Reason (R): *Azotobacter* form root nodules in the roots of Leguminous plants.

Case Study Based Questions

Case Study 1

Q 6. Villagers in a place near Chambur started planning to make power supply for agricultural purposes from cow dung. They have started a biogas plant for the purpose. Study the flowchart for biogas production given ahead and answer the ahead questions.



Read the given passage carefully and give the answer of the following questions:

(i) Biogas is composed of majorly:

a. Methane, CO_2 and O_2 b. Methane, CO_2
c. CO_2, H_2S and H d. H_2S, H and O_2

(ii) In the given flowchart, 'A' denotes:

a. Aerobic bacteria
b. Methanogen bacteria
c. Cellulose degrading bacteria
d. Yeast and Protozoa

(iii) What is represented by 'B' in the flowchart?

a. Carbohydrates b. Protein polymers
c. Organic acids d. Fat globules

(iv) 'C' in the given flowchart causes:

a. aerobic breakdown of complex organic compounds.
b. anaerobic digestion of complex organic compounds.
c. fermentation of organic compounds.
d. fermentation of monomers.

Case Study 2

Q 7. Biogas is a methane rich fuel produced by the degradation of biological matter by the bacterial action under anaerobic conditions. It is an ideal gas made up of 50-70% methane (CH_4), 30-40% CO_2, 1-5% H_2, traces of O_2, N_2 and H, S. Microbes produce different types of gaseous end-products based upon the microbes and the organic substrates they utilise during growth and metabolism. Certain bacteria, collectively called **methanogens** which grow anaerobically on cellulosic material, produce large amount of methane along with CO_2 and H_2, *e.g., Methanobacterium, Methanococcus.*

Read the above passage carefully and give the answer of the following questions:

(i) What is biogas?

(ii) Give the composition of biogas.

(iii) What are methanogens?

OR

Name any two methanogens.

Very Short Answer Type Questions

Q 8. Give the significance of biofertilisers.

Q 9. What are *Nucleopolyhedroviruses* being used for now-a-days?

Q 10. Name the pests that ladybird, beetle and dragonflies help to get rid of.

Short Answer Type Questions

Q 11. List the events that reduce the Biological Oxygen Demand (BOD) of a primary effluent during sewage treatment.

Q 12. Why is *Rhizobium* categorised as a 'symbiotic bacterium'? How does it act as a biofertiliser?

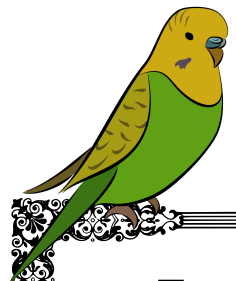
Long Answer Type Questions

Q 13. What are antibiotics? Name the classes of organisms that produce antibiotics.

Q 14. Explain how are microbes important for humans.

MOST IMPORTANT:

- Do a good social activity per week, click pictures. Paste and write about it in the scrapbook.
- Plant a sapling on “World Environment Day” (5 June). Click a picture with it and write a paragraph on world environment day. Paste it in the scrapbook.
- 90% of the homework is offline. Please don’t use mobile phones.



For any query, please connect Mr. Devansh Kohli between 11:00 am to 12:00 noon on 7906097284.