

PYQSide

AIPMT 2010 (MAINS) — QUESTION PAPER

Max. Marks: 448

Questions: 112

Section A (MCQ)

- Q.1** A student measures the distance traversed in free fall of a body, initially at rest, in a given time. He uses this data to estimate g , the acceleration due to gravity. If the maximum percentage errors in measurement of the distance and the time are e_1 and e_2 respectively, the percentage error in the estimation of g is [AIPMT 2010 (Mains)]

(1) $e_2 - e_1$ (2) $e_1 + 2e_2$ (3) $e_1 + e_2$ (4) $e_1 - 2e_2$

Scan or tap for the full solution 

- Q.2** The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is [AIPMT 2010 (Mains)]

(1) 60° (2) 15° (3) 30° (4) 45°

Scan or tap for the full solution 

- Q.3** A particle moves in x - y plane according to rule $x = a \sin \omega t$ and $y = a \cos \omega t$. The particle follows [AIPMT 2010 (Mains)]

(1) an elliptical path
(2) a circular path
(3) a parabolic path
(4) a straight line path inclined equally to x and y -axes

Scan or tap for the full solution 

- Q.4** A particle of mass M , starting from rest, undergoes uniform acceleration. If the speed acquired in time T is V , the power delivered to the particle is [AIPMT 2010 (Mains)]

(1) $\frac{MV^2}{T}$ (2) $\frac{1}{2} \frac{MV^2}{T^2}$ (3) $\frac{MV^2}{T^2}$ (4) $\frac{1}{2} \frac{MV^2}{T}$

Scan or tap for the full solution 

- Q.5** From a circular disc of radius R and mass $9M$, a small disc of mass M and radius $\frac{R}{3}$ is removed concentrically. The moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through its centre is [AIPMT 2010 (Mains)]

(1) $\frac{40}{9}MR^2$ (2) MR^2
(3) $4MR^2$ (4) $\frac{4}{9}MR^2$

Scan or tap for the full solution 

- Q.6** A solid cylinder and a hollow cylinder, both of the same mass and same external diameter are released from the same height at the same time on an inclined plane. Both roll down without slipping. Which one will reach the bottom first? [AIPMT 2010 (Mains)]

(1) Both together only when angle of inclination of plane is 45°
(2) Both together
(3) Hollow cylinder
(4) Solid cylinder

Scan or tap for the full solution 

- Q.7** A thin circular ring of mass M and radius r is rotating about its axis with constant angular velocity ω . Two objects each of mass m are attached gently to the opposite ends of a diameter of the ring. The ring now rotates with angular velocity given by [AIPMT 2010 (Mains)]

(1) $\frac{(M+2m)\omega}{2m}$ (2) $\frac{2M\omega}{M+2m}$
(3) $\frac{(M+2m)\omega}{M}$ (4) $\frac{M\omega}{M+2m}$

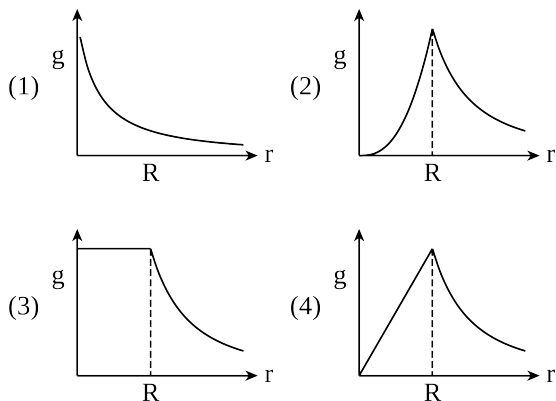
Scan or tap for the full solution 

- Q.8** The additional kinetic energy to be provided to a satellite of mass m revolving around a planet of mass M , to transfer it from a circular orbit of radius R_1 to another of radius R_2 ($R_2 > R_1$) is [AIPMT 2010 (Mains)]

(1) $GmM \left(\frac{1}{R_1^2} - \frac{1}{R_2^2} \right)$ (2) $GmM \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$
(3) $2GmM \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$ (4) $\frac{1}{2} GmM \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$

Scan or tap for the full solution 

- Q.9** The dependence of acceleration due to gravity g on the distance r from the centre of the earth, assumed to be a sphere of radius R of uniform density is as shown in figures below



The correct figure is

[AIPMT 2010 (Mains)]

- (1) (4) (2) (1) (3) (2) (4) (3)

Scan or tap for the full solution



Q.10 Which one of the following pairs of statements is correct ?

- Centre of gravity (C.G.) of a body is the point at which the weight of the body acts
- Centre of mass coincides with the centre of gravity if the earth is assumed to have infinitely large radius.
- To evaluate the gravitational field intensity due to any body at an external point, the entire mass of the body can be considered to be concentrated at its C.G.
- The radius of gyration of any body rotating about an axis is the length of the perpendicular dropped from the C.G. of the body to the axis.

[AIPMT 2010 (Mains)]

- (1) D and A only (2) A and B only
(3) B and C only (4) C and D only

Scan or tap for the full solution



Q.11 If c_p and c_v denote the specific heats (per unit mass) of an ideal gas of molecular weight M , then

[AIPMT 2010 (Mains)]

- (1) $c_p - c_v = \frac{R}{M^2}$ (2) $c_p - c_v = R$
(3) $c_p - c_v = \frac{R}{M}$ (4) $c_p - c_v = MR$

Scan or tap for the full solution



Q.12 A monatomic gas at pressure P_1 and volume V_1 is compressed adiabatically to $\frac{1}{8}$ of its original volume. What is the final pressure of the gas?

[AIPMT 2010 (Mains)]

- (1) $64P_1$ (2) P_1 (3) $16P_1$ (4) $32P_1$

Scan or tap for the full solution



Q.13 Two parallel metal plates having charges $+Q$ and $-Q$ face each other at a certain distance between them. If the plates are now dipped in kerosene oil tank, the electric field between the plates will

[AIPMT 2010 (Mains)]

- (1) become zero (2) increase
(3) decrease (4) remain same

Scan or tap for the full solution



Q.14 The electric field at a distance $\frac{3R}{2}$ from the centre of a charged conducting spherical shell of radius R is E . The electric field at a distance $\frac{R}{2}$ from the centre of the sphere is

[AIPMT 2010 (Mains)]

- (1) zero (2) E (3) $\frac{E}{2}$ (4) $\frac{E}{3}$

Scan or tap for the full solution



Q.15 A current loop consists of two identical semicircular parts each of radius R , one lying in the x - y plane and the other in x - z plane. If the current in the loop is i . The resultant magnetic field due to the two semicircular parts at their common centre is

[AIPMT 2010 (Mains)]

- (1) $\frac{\mu_0 i}{2\sqrt{2}R}$ (2) $\frac{\mu_0 i}{2R}$ (3) $\frac{\mu_0 i}{4R}$ (4) $\frac{\mu_0 i}{\sqrt{2}R}$

Scan or tap for the full solution



Q.16 A closely wound solenoid of 2000 turns and area of cross-section $1.5 \times 10^{-4} \text{ m}^2$ carries a current of 2.0 A. It is suspended through its centre and perpendicular to its length, allowing it to turn in a horizontal plane in a uniform magnetic field 5×10^{-2} tesla making an angle of 30° with the axis of the solenoid. The torque on the solenoid will be

[AIPMT 2010 (Mains)]

- (1) $3 \times 10^{-3} \text{ N m}$ (2) $1.5 \times 10^{-3} \text{ N m}$
(3) $1.5 \times 10^{-2} \text{ N m}$ (4) $3 \times 10^{-2} \text{ N m}$

Scan or tap for the full solution



Q.17 A particle having a mass of 10^{-2} kg carries a charge of $5 \times 10^{-8} \text{ C}$. The particle is given an initial horizontal velocity of 10^5 m s^{-1} in the presence of electric field $\vec{E}$ and magnetic field $\vec{B}$. To keep the particle moving in a horizontal direction, it is necessary that

Which one of the following pairs of statements is possible ?

- A. $\vec{B}$ should be perpendicular to the direction of velocity and $\vec{E}$ should be along the direction of velocity

- B. Both $\vec{B}$ and $\vec{E}$ should be along the direction of velocity
 C. Both $\vec{B}$ and $\vec{E}$ are mutually perpendicular and perpendicular to the direction of velocity.
 D. $\vec{B}$ should be along the direction of velocity and $\vec{E}$ should be perpendicular to the direction of velocity

[AIPMT 2010 (Mains)]

- (1) A and C only (2) C and D only
 (3) B and C only (4) B and D only

Scan or tap for the full solution



Q.18 The magnetic moment of a diamagnetic atom is

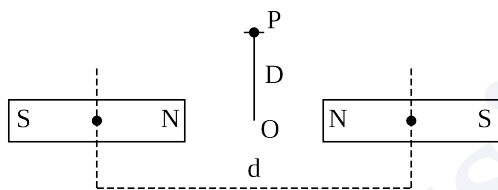
[AIPMT 2010 (Mains)]

- (1) much greater than one
 (2) 1
 (3) between zero and one
 (4) equal to zero

Scan or tap for the full solution



Q.19 Two identical bar magnets are fixed with their centers at a distance d apart. A stationary charge Q is placed at P in between the gap of the two magnets at a distance D from the centre O as shown in the figure



The force on the charge Q is [AIPMT 2010 (Mains)]

- (1) zero
 (2) directed along OP
 (3) directed along PO
 (4) directed perpendicular to the plane of paper

Scan or tap for the full solution



Q.20 A condenser of capacity C is charged to a potential difference of V_1 . The plates of the condenser are then connected to an ideal inductor of inductance L . The current through the inductor when the potential difference across the condenser reduces to V_2 is

[AIPMT 2010 (Mains)]

- (1) $\left(\frac{C(V_1 - V_2)^2}{L}\right)^{\frac{1}{2}}$ (2) $\frac{C(V_1^2 - V_2^2)}{L}$
 (3) $\frac{C(V_1^2 + V_2^2)}{L}$ (4) $\left(\frac{C(V_1^2 - V_2^2)}{L}\right)^{\frac{1}{2}}$

Scan or tap for the full solution



Q.21 The electric field of an electromagnetic wave in free space is given by $\vec{E} = 10\cos(10^7t + kx)\hat{j}$ V/m, where t and x are in seconds and metres respectively. It can be inferred that

Which one of the following pairs of statements is correct ?

- A. the wavelength λ is 188.4 m.
 B. the wave number k is 0.33 rad/m.
 C. the wave amplitude is 10 V/m.
 D. the wave is propagating along $+x$ direction.

[AIPMT 2010 (Mains)]

- (1) C and D only (2) A and B only
 (3) B and C only (4) A and C only

Scan or tap for the full solution



Q.22 The speed of light in media M_1 and M_2 are 1.5×10^8 m/s and 2.0×10^8 m/s respectively. A ray of light enters from medium M_1 to M_2 at an incidence angle i . If the ray suffers total internal reflection, the value of i is [AIPMT 2010 (Mains)]

- (1) Equal to $\sin^{-1}\left(\frac{2}{3}\right)$
 (2) Equal to or less than $\sin^{-1}\left(\frac{3}{5}\right)$
 (3) Equal to or greater than $\sin^{-1}\left(\frac{3}{4}\right)$
 (4) Less than $\sin^{-1}\left(\frac{2}{3}\right)$

Scan or tap for the full solution



Q.23 A ray of light is incident on a 60° prism at the minimum deviation position. The angle of refraction at the first face (i.e., incident face) of the prism is

[AIPMT 2010 (Mains)]

- (1) zero (2) 30° (3) 45° (4) 60°

Scan or tap for the full solution



Q.24 When monochromatic radiation of intensity I falls on a metal surface, the number of photoelectrons and their maximum kinetic energy are N and T respectively. If the intensity of radiation is $2I$, the number of emitted electrons and their maximum kinetic energy are respectively [AIPMT 2010 (Mains)]

- (1) N and $2T$ (2) $2N$ and T
 (3) $2N$ and $2T$ (4) N and T

Scan or tap for the full solution



- Q.25** The electron in the hydrogen atom jumps from excited state ($n = 3$) to its ground state ($n = 1$) and the photons thus emitted irradiate a photosensitive material. If the work function of the material is 5.1 eV, the stopping potential is estimated to be (the energy of the electron in n^{th} state $E_n = -\frac{13.6}{n^2}$ eV)

[AIPMT 2010 (Mains)]

- (1) 5.1 V (2) 12.1 V (3) 17.2 V (4) 7 V

Scan or tap for the full solution



- Q.26** The binding energy per nucleon in deuterium and helium nuclei are 1.1 MeV and 7.0 MeV, respectively. When two deuterium nuclei fuse to form a helium nucleus the energy released in the fusion is

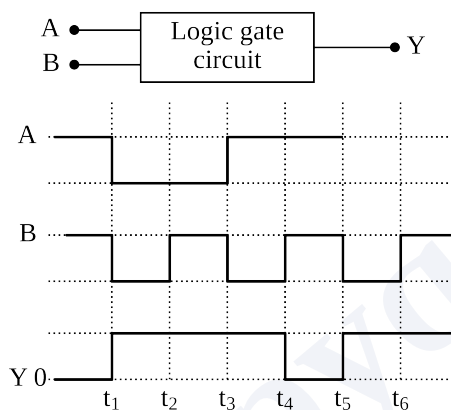
[AIPMT 2010 (Mains)]

- (1) 23.6 MeV (2) 2.2 MeV
(3) 28.0 MeV (4) 30.2 MeV

Scan or tap for the full solution



- Q.27** The following figure shows a logic gate circuit with two inputs A and B and the output Y. The voltage waveforms of A, B and Y are as given.



The logic gate is [AIPMT 2010 (Mains)]

- (1) NOR gate (2) OR gate
(3) AND gate (4) NAND gate

Scan or tap for the full solution



- Q.28** The decay constant of a radioisotope is λ . If A_1 and A_2 are its activities at times t_1 and t_2 respectively, the number of nuclei which have decayed during the time ($t_1 - t_2$)

[AIPMT 2010 (Mains)]

- (1) $A_1 t_1 - A_2 t_2$ (2) $A_1 - A_2$
(3) $(A_1 - A_2)/\lambda$ (4) $\lambda(A_1 - A_2)$

Scan or tap for the full solution



- Q.29** For transistor action Which one of the following pairs of statements is correct?

- A. Base, emitter and collector regions should have similar size and doping concentrations.

- B. The base region must be very thin and lightly doped.
C. The emitter-base junction is forward biased and base-collector junction is reverse biased.
D. Both the emitter-base junction as well as the base-collector junction are forward biased.

[AIPMT 2010 (Mains)]

- (1) D and A (2) A and B (3) B and C (4) C and D

Scan or tap for the full solution



- Q.30** A 0.66 kg ball is moving with a speed of 100 m/s. The associated wavelength will be

($h = 6.6 \times 10^{-34}$ J s) [AIPMT 2010 (Mains)]

- (1) 6.6×10^{-32} m (2) 6.6×10^{-34} m
(3) 1.0×10^{-35} m (4) 1.0×10^{-32} m

Scan or tap for the full solution



- Q.31** Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is

[AIPMT 2010 (Mains)]

- (1) $\text{Mg} < \text{Ca} < \text{Cl} < \text{P}$ (2) $\text{Cl} < \text{P} < \text{Mg} < \text{Ca}$
(3) $\text{P} < \text{Cl} < \text{Ca} < \text{Mg}$ (4) $\text{Ca} < \text{Mg} < \text{P} < \text{Cl}$

Scan or tap for the full solution



- Q.32** Among the following which one has the highest cation to anion size ratio?

[AIPMT 2010 (Mains)]

- (1) CsI (2) CsF (3) LiF (4) NaF

Scan or tap for the full solution



- Q.33** In which of the following molecules the central atom does not have sp^3 hybridization?

[AIPMT 2010 (Mains)]

- (1) CH_4 (2) SF_4 (3) BF_4^- (4) NH_4^+

Scan or tap for the full solution



- Q.34** Some of the properties of the two species, NO_3^- and H_3O^+ are described below. Which one of them is correct?

[AIPMT 2010 (Mains)]

- (1) Dissimilar in hybridization for the central atom with different structures.
(2) Isostructural with same hybridization for the central atom.
(3) Isostructural with different hybridization for the central atom.
(4) Similar in hybridization for the central atom with different structures.

Scan or tap for the full solution



- Q.35** Match **List I** (Equations) with **List II** (Type of processes) and select the correct option.

[AIPMT 2010 (Mains)]

List I Equations		List II Type of processes	
A.	$K_p > Q$	i.	Non-spontaneous
B.	$\Delta G^\circ > -RT \ln Q$	ii.	Equilibrium
C.	$K_p = Q$	iii.	Spontaneous and endothermic
D.	$T > \frac{\Delta H}{\Delta S}$	iv.	Spontaneous

(1) A - (i), B - (ii), C - (iii), D - (iv)

(2) A - (iii), B - (iv), C - (ii), D - (i)

(3) A - (iv), B - (i), C - (ii), D - (iii)

(4) A - (ii), B - (i), C - (iv), D - (iii)

Scan or tap for the full solution



Q.36 Three moles of an ideal gas expanded spontaneously into vacuum. The work done will be

[AIPMT 2010 (Mains)]

(1) infinite (2) 3 Joules (3) 9 Joules (4) zero

Scan or tap for the full solution



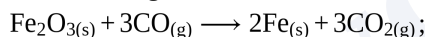
Q.37 For vaporization of water at 1 atmospheric pressure, the values of ΔH and ΔS are $40.63 \text{ kJ mol}^{-1}$ and $108.8 \text{ J K}^{-1} \text{ mol}^{-1}$, respectively. The temperature when Gibbs energy change (ΔG) for this transformation will be zero, is [AIPMT 2010 (Mains)]

(1) 273.4 K (2) 393.4 K (3) 373.4 K (4) 293.4 K

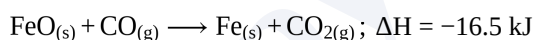
Scan or tap for the full solution



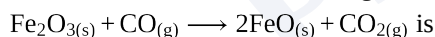
Q.38 The following two reactions are known



$$\Delta H = -26.8 \text{ kJ}$$



The value of ΔH for the following reaction



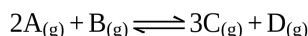
[AIPMT 2010 (Mains)]

(1) +10.3 kJ (2) -43.3 kJ (3) -10.3 kJ (4) +6.2 kJ

Scan or tap for the full solution



Q.39 The reaction,



is begun with the concentrations of A and B both at an initial value of 1.00 M. When equilibrium is reached, the concentration of D is measured and found to be 0.25 M. The value for the equilibrium constant for this reaction is given by the expression

[AIPMT 2010 (Mains)]

$$(1) [(0.75)^3(0.25)] \div [(1.00)^2(1.00)]$$

$$(2) [(0.75)^3(0.25)] \div [(0.50)^2(0.75)]$$

$$(3) [(0.75)^3(0.25)] \div [(0.50)^2(0.25)]$$

$$(4) [(0.75)^3(0.25)] \div [(0.75)^2(0.25)]$$

Scan or tap for the full solution



Q.40 Which of the following species is not electrophilic in nature? [AIPMT 2010 (Mains)]

(1) $\text{Cl}^\oplus$ (2) BH_3 (3) $\text{H}_3\text{O}^\oplus$ (4) $\text{NO}_2^\oplus$

Scan or tap for the full solution



Q.41 The IUPAC name of the compound



[AIPMT 2010 (Mains)]

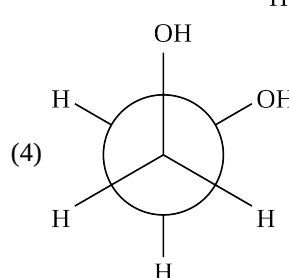
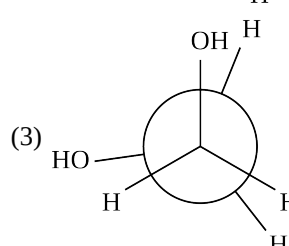
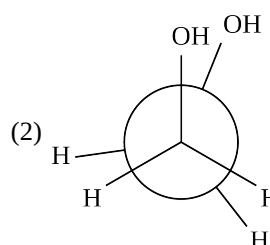
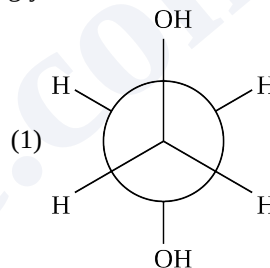
(1) pent-4-yn-2-ene (2) pent-3-en-1-yne

(3) pent-2-en-4-yne (4) pent-1-yn-3-ene

Scan or tap for the full solution



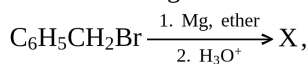
Q.42 Which of the following conformers for ethylene glycol is most stable? [AIPMT 2010 (Mains)]



Scan or tap for the full solution



Q.43 In the following reaction



the product 'X' is

[AIPMT 2010 (Mains)]

- (1) $\text{C}_6\text{H}_5\text{CH}_2\text{OCH}_2\text{C}_6\text{H}_5$ (2) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
 (3) $\text{C}_6\text{H}_5\text{CH}_3$ (4) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{C}_6\text{H}_5$

Scan or tap for the full solution



Q.44 When glycerol is treated with excess of HI, it produces

[AIPMT 2010 (Mains)]

- (1) 2-iodopropane (2) allyl iodide
 (3) propene (4) glycerol triiodide

Scan or tap for the full solution



Q.45 Following compounds are given

- (i) $\text{CH}_3\text{CH}_2\text{OH}$ (ii) CH_3COCH_3
 (iii) $\text{CH}_3-\underset{\text{CH}_3}{\underset{|}{\text{CHOH}}}$ (iv) CH_3OH

Which of the above compound(s), on being warmed with iodine solution and NaOH, will give iodoform?

[AIPMT 2010 (Mains)]

- (1) (i), (iii) and (iv) (2) Only (ii)
 (3) (i), (ii) and (iii) (4) (i) and (ii)

Scan or tap for the full solution



Q.46 Match the compounds given in **List-I** with their characteristic reactions given in **List-II**.

List-I (Compounds)		List-II (Reactions)	
A.	$\text{CH}_3(\text{CH}_2)_3\text{NH}_2$	i.	Alkaline hydrolysis
B.	$\text{CH}_3\text{C}\equiv\text{CH}$	ii.	With KOH (alcohol) and CHCl_3 produces bad smell
C.	$\text{CH}_3\text{CH}_2\text{COOCH}_3$	iii.	Gives white ppt. with ammoniacal AgNO_3
D.	$\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$	iv.	With Lucas reagent cloudiness appears after 5 minutes

Select the correct option.

[AIPMT 2010 (Mains)]

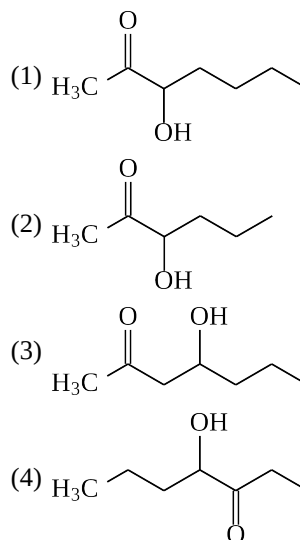
- (1) A-(ii), B-(i), C-(iv), D-(iii)
 (2) A-(iii), B-(ii), C-(i), D-(iv)
 (3) A-(ii), B-(iii), C-(i), D-(iv)
 (4) A-(iv), B-(ii), C-(iii), D-(i)

Scan or tap for the full solution



Q.47 Which one of the following compounds will be most readily dehydrated?

[AIPMT 2010 (Mains)]



Scan or tap for the full solution



Q.48 Fructose reduces Tollens' reagent due to

[AIPMT 2010 (Mains)]

- (1) asymmetric carbons
 (2) primary alcoholic group
 (3) secondary alcoholic group
 (4) enolisation of fructose followed by conversion to aldehyde by base

Scan or tap for the full solution



Q.49 Which of the following expressions correctly represents the equivalent conductance at infinite dilution of $\text{Al}_2(\text{SO}_4)_3$. Given that $\Lambda^\circ_{\text{Al}^{3+}}$ and $\Lambda^\circ_{\text{SO}_4^{2-}}$ are the equivalent conductances at infinite dilution of the respective ions?

[AIPMT 2010 (Mains)]

- (1) $2\Lambda^\circ_{\text{Al}^{3+}} + 3\Lambda^\circ_{\text{SO}_4^{2-}}$
 (2) $\Lambda^\circ_{\text{Al}^{3+}} + \Lambda^\circ_{\text{SO}_4^{2-}}$
 (3) $(\Lambda^\circ_{\text{Al}^{3+}} + \Lambda^\circ_{\text{SO}_4^{2-}}) \times 6$
 (4) $\frac{1}{3}\Lambda^\circ_{\text{Al}^{3+}} + \frac{1}{2}\Lambda^\circ_{\text{SO}_4^{2-}}$

Scan or tap for the full solution



Q.50 Consider the following relations for emf of an electrochemical cell

- (i) $\text{EMF of cell} = (\text{Oxidation potential of anode}) - (\text{Reduction potential of cathode})$
 (ii) $\text{EMF of cell} = (\text{Oxidation potential of anode}) + (\text{Reduction potential of cathode})$
 (iii) $\text{EMF of cell} = (\text{Reduction potential of anode}) + (\text{Reduction potential of cathode})$
 (iv) $\text{EMF of cell} = (\text{Oxidation potential of anode}) - (\text{Oxidation potential of cathode})$

Which of the above relations are correct?

[AIPMT 2010 (Mains)]

- (1) (iii) and (i) (2) (i) and (ii)
 (3) (iii) and (iv) (4) (ii) and (iv)

Scan or tap for the
full solution



Q.51 The rate of the reaction, $2\text{NO} + \text{Cl}_2 \longrightarrow 2\text{NOCl}$ is given by the rate equation $\text{rate} = k[\text{NO}]^2[\text{Cl}_2]$. The value of the rate constant can be increased by

[AIPMT 2010 (Mains)]

- (1) increasing the temperature
 (2) increasing the concentration of NO
 (3) increasing the concentration of the Cl_2
 (4) doing all of these.

Scan or tap for the
full solution



Q.52 How many bridging oxygen atoms are present in P_4O_{10} ? [AIPMT 2010 (Mains)]

- (1) 6 (2) 4 (3) 2 (4) 5

Scan or tap for the
full solution



Q.53 Match **List-I** (substances) with **List-II** (processes) employed in the manufacture of the substances and select the correct option. [AIPMT 2010 (Mains)]

List-I (Substances)		List-II (Processes)	
A.	Sulphuric acid	i.	Haber's process
B.	Steel	ii.	Bessemer's process
C.	Sodium hydroxide	iii.	Leblanc process
D.	Ammonia	iv.	Contact process

- (1) (A) $\longrightarrow$ (i); (B) $\longrightarrow$ (iv); (C) $\longrightarrow$ (ii); (D) $\longrightarrow$ (iii)
 (2) (A) $\longrightarrow$ (i); (B) $\longrightarrow$ (ii); (C) $\longrightarrow$ (iii); (D) $\longrightarrow$ (iv)
 (3) (A) $\longrightarrow$ (iv); (B) $\longrightarrow$ (iii); (C) $\longrightarrow$ (ii); (D) $\longrightarrow$ (i)
 (4) (A) $\longrightarrow$ (iv); (B) $\longrightarrow$ (ii); (C) $\longrightarrow$ (iii); (D) $\longrightarrow$ (i)

Scan or tap for the
full solution



Q.54 Which of the following oxidation states is the most common among the lanthanoids?

[AIPMT 2010 (Mains)]

- (1) 4 (2) 2 (3) 5 (4) 3

Scan or tap for the
full solution



Q.55 The pressure exerted by 6.0 g of methane gas in a 0.03 m^3 vessel at 129°C is (Atomic masses : C = 12.01, H = 1.01 and $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)

[AIPMT 2010 (Mains)]

- (1) 215216 Pa (2) 13409 Pa
 (3) 41648 Pa (4) 31684 Pa

Scan or tap for the
full solution



Q.56 Some statements about heavy water are given below:

Which of the above statements are correct?

- (i) Heavy water is used as a moderator in nuclear reactors.
 (ii) Heavy water is more associated than ordinary water.
 (iii) Heavy water is more effective solvent than ordinary water.

[AIPMT 2010 (Mains)]

- (1) (i) and (ii) (2) (i), (ii) and (iii)
 (3) (ii) and (iii) (4) (i) and (iii)

Scan or tap for the
full solution



Q.57 The compound A on heating gives a colourless gas and a residue that is dissolved in water to obtain B. Excess of CO_2 is bubbled through aqueous solution of B, C is formed which is recovered in the solid form. Solid C on gentle heating gives back A. The compound is [AIPMT 2010 (Mains)]

- (1) CaCO_3 (2) Na_2CO_3
 (3) K_2CO_3 (4) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

Scan or tap for the
full solution



Q.58 Select the correct combination of the statements (i – iv) regarding the characteristics of certain organisms.

- (i) Methanogens are archaeobacteria which produce methane in marshy areas.
 (ii) *Nostoc* is a filamentous blue-green alga which fixes atmospheric nitrogen.
 (iii) Chemosynthetic autotrophic bacteria synthesise cellulose from glucose.
 (iv) *Mycoplasma* lack a cell wall and can survive without oxygen.

The correct statements are [AIPMT 2010 (Mains)]

- (1) (ii) and (iii) (2) (i), (ii) and (iii)
 (3) (ii), (iii) and (iv) (4) (i), (ii) and (iv)

Scan or tap for the
full solution



Q.59 Black (stem) rust of wheat is caused by

[AIPMT 2010 (Mains)]

- (1) *Alternaria solani* (2) *Ustilago nuda*
 (3) *Puccinia graminis* (4) *Xanthomonas oryzae*

Scan or tap for the
full solution



Q.60 Which one of the following is monoecious?

[AIPMT 2010 (Mains)]

- (1) *Marchantia* (2) *Cycas*
(3) *Pinus* (4) Date palm

Scan or tap for the full solution



Q.61 Which one of the following is a xerophytic plant in which the stem is modified into the flat green and succulent structure?

[AIPMT 2010 (Mains)]

- (1) *Opuntia* (2) *Casuarina*
(3) *Hydrilla* (4) *Acacia*

Scan or tap for the full solution



Q.62 The correct floral formula of soyabean is

[AIPMT 2010 (Mains)]

- (1) $\% \text{ } \begin{array}{c} \nearrow \\ \text{♀} \end{array} K_{(5)} C_{1+(2)+2} A_{(9)+1} \underline{G}_1$
(2) $\% \text{ } \begin{array}{c} \nearrow \\ \text{♀} \end{array} K_5 C_{1+(2)+2} A_{(9)+1} \underline{G}_1$
(3) $\% \text{ } \begin{array}{c} \nearrow \\ \text{♀} \end{array} K_{(5)} C_{1+2+(2)} A_{(9)+1} \underline{G}_1$
(4) $\% \text{ } \begin{array}{c} \nearrow \\ \text{♀} \end{array} K_{(5)} C_{1+2+(2)} A_{1+(9)} \underline{G}_1$

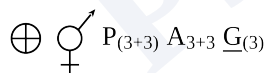
Scan or tap for the full solution



Q.63 Consider the following four statements (i), (ii), (iii) and (iv) and select the right option for two correct statements.

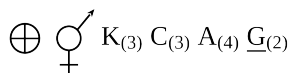
Statements :

- (i) In vexillary aestivation, the large posterior petal is called standard, two lateral ones are wings and two small anterior petals are termed keel.
(ii) The floral formula for Liliaceae is



(iii) In pea flower the stamens are monadelphous.

(iv) The floral formula for Solanaceae is



The correct statements are [AIPMT 2010 (Mains)]

- (1) (i) and (iii) (2) (i) and (ii)
(3) (ii) and (iii) (4) (iii) and (iv)

Scan or tap for the full solution



Q.64 Three of the following statements about enzymes are correct and one is wrong. Which one is wrong?

[AIPMT 2010 (Mains)]

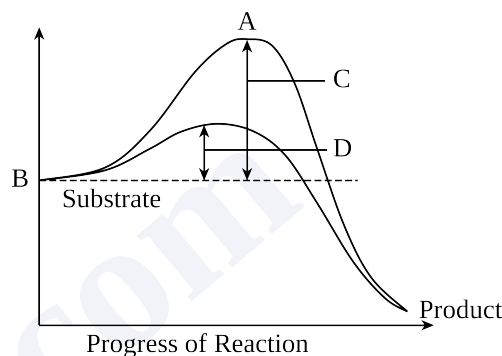
- (1) Enzymes require optimum pH for maximal activity.
(2) Enzymes are denatured at high temperature but in certain exceptional organisms they are effective even at temperatures 80°–90°C.
(3) Enzymes are highly specific.
(4) Most enzymes are proteins but some are lipids.

Scan or tap for the full solution



Q.65 The figure given below shows the conversion of a substrate into product by an enzyme. In which one of the four options (1 – 4) the components of reaction labelled as A, B, C and D are identified correctly?

[AIPMT 2010 (Mains)]



(1)	A Potential energy	B Transition state	C Activation energy
(2)	A Transition state	B Potential energy	C Activation energy w
(3)	A Potential energy	B Transition state	C Activation energy w
(4)	A Activation energy with enzyme	B Transition state	C Activ

Scan or tap for the full solution



Q.66 Read the following four statements, (i), (ii), (iii) and (iv) and select the right option having both correct statements.

Statements :

[AIPMT 2010 (Mains)]

- (i) Z scheme of light reaction takes place in presence of PS I only.
(ii) Only PS I is functional in cyclic photophosphorylation.
(iii) Cyclic photophosphorylation results into synthesis of ATP and NADPH₂.
(iv) Stroma lamellae lack PS II as well as NADP reductase.

- (1) (ii) and (iv) (2) (i) and (ii)
(3) (ii) and (iii) (4) (iii) and (iv)

Scan or tap for the full solution



Q.67 Kranz anatomy is one of the characteristics of the leaves of [AIPMT 2010 (Mains)]

- (1) potato (2) wheat
(3) sugarcane (4) mustard

Scan or tap for the full solution



Q.68 One of the commonly used plant growth hormones in tea plantations is [AIPMT 2010 (Mains)]

- (1) ethylene (2) abscisic acid
(3) zeatin (4) indole-3-acetic acid

Scan or tap for the full solution



Q.69 Root development is promoted by [AIPMT 2010 (Mains)]

- (1) abscisic acid (2) auxin
(3) gibberellin (4) ethylene

Scan or tap for the full solution



Q.70 Vegetative propagation in *Pistia* occurs by [AIPMT 2010 (Mains)]

- (1) stolon (2) offset (3) runner (4) sucker

Scan or tap for the full solution



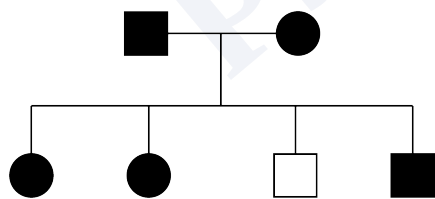
Q.71 ABO blood grouping is controlled by gene I which has three alleles and shows co-dominance. There are six genotypes. How many phenotypes in all are possible - [AIPMT 2010 (Mains)]

- (1) five (2) four (3) three (4) six

Scan or tap for the full solution



Q.72 Study the pedigree chart of a certain family given below and select the correct conclusion which can be drawn for the character - [AIPMT 2010 (Mains)]



- (1) The trait under study could not be colourblindness
(2) The female parent is heterozygous
(3) The parents could not have had a normal daughter for this character
(4) The male parent is homozygous dominant

Scan or tap for the full solution



Q.73 A cross in which an organism showing a dominant phenotype is crossed with the recessive parent in order to know its genotype is called - [AIPMT 2010 (Mains)]

- (1) Dihybrid cross (2) Back cross
(3) Monohybrid cross (4) Test cross

Scan or tap for the full solution



Q.74 In *Antirrhinum* two plants with pink flowers were hybridized. The F_1 plants produced red, pink and white flowers in the proportion of 1 red, 2 pink and 1 white. What could be the genotype of the two plants used for hybridization? Red flower colour is determined by RR, and White by rr genes - [AIPMT 2010 (Mains)]

- (1) rrrr (2) rr (3) Rr (4) RR

Scan or tap for the full solution



Q.75 The 3'-5' phosphodiester linkages inside a polynucleotide chain serve to join - [AIPMT 2010 (Mains)]

- (1) One nucleotide with another nucleotide
(2) One nitrogenous base with pentose sugar
(3) One nucleoside with another nucleoside
(4) One DNA strand with the other DNA strand

Scan or tap for the full solution



Q.76 The lac operon consists of - [AIPMT 2010 (Mains)]

- (1) Three regulatory genes and three structural genes
(2) Four regulatory genes only
(3) Two regulatory genes and two structural genes
(4) One regulatory gene and three structural genes

Scan or tap for the full solution



Q.77 In eukaryotic cell transcription, RNA splicing and RNA capping take place inside the - [AIPMT 2010 (Mains)]

- (1) Dictyosomes (2) Ribosomes
(3) Nucleus (4) ER

Scan or tap for the full solution



Q.78 Which one of the following statements about the particular entity is true? [AIPMT 2010 (Mains)]

- (1) Nucleosome is formed of nucleotides
(2) Centromere is found in animal cells, which produces aster during cell division
(3) The gene for producing insulin is present in every body cell
(4) DNA consists of a core of eight histones

Scan or tap for the full solution



Q.79 An example of endomycorrhiza is -

[AIPMT 2010 (Mains)]

- (1) *Nostoc* (2) *Rhizobium*
(3) *Glomus* (4) *Agaricus*

Scan or tap for the full solution



Q.80 Which one of the following is most appropriately defined?

[AIPMT 2010 (Mains)]

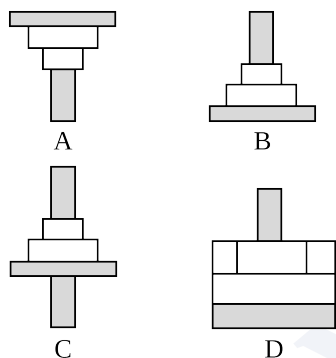
- (1) Parasite is an organism which always lives inside the body of other organism and may kill it.
(2) Host is an organism which provides food to another organism.
(3) Amensalism is a relationship in which one species is benefited whereas the other is unaffected
(4) Predator is an organism that catches and kills other organism for food.

Scan or tap for the full solution



Q.81 Which of the following representations shows the pyramid of numbers in a forest ecosystem?

[AIPMT 2010 (Mains)]



- (1) B (2) A (3) D (4) C

Scan or tap for the full solution



Q.82 The Indian Rhinoceros is a natural inhabitant of which one of the Indian states?

[AIPMT 2010 (Mains)]

- (1) Uttarakhand (2) Assam
(3) Uttar Pradesh (4) Himachal Pradesh

Scan or tap for the full solution



Q.83 Transport of food material in higher plants takes place through -

[AIPMT 2010 (Mains)]

- (1) Sieve elements (2) Transfusion tissue
(3) Companion cells (4) Tracheids

Scan or tap for the full solution



Q.84 An elaborate network of filamentous proteinaceous structures present in the cytoplasm which helps in the maintenance of cell shape is called -

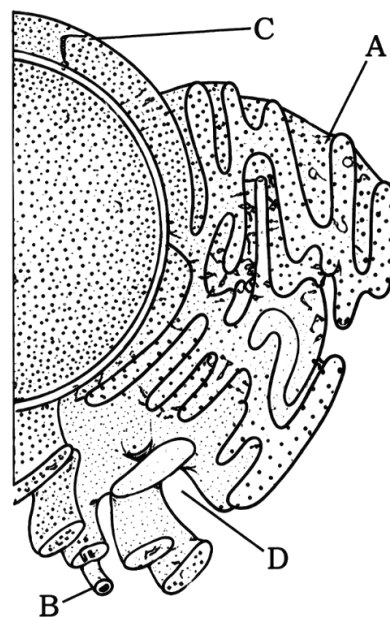
[AIPMT 2010 (Mains)]

- (1) Cytoskeleton
(2) Endoplasmic Reticulum
(3) Thylakoid
(4) Plasmalemma

Scan or tap for the full solution



Q.85 Identify the components labelled A, B, C and D in the diagram below from the list (i) to (viii) given along with -



Components :

- (i) Cristae of mitochondria
(ii) Inner membrane of mitochondria
(iii) Cytoplasm
(iv) Smooth endoplasmic reticulum
(v) Rough endoplasmic reticulum
(vi) Mitochondrial matrix
(vii) Cell vacuole
(viii) Nucleus

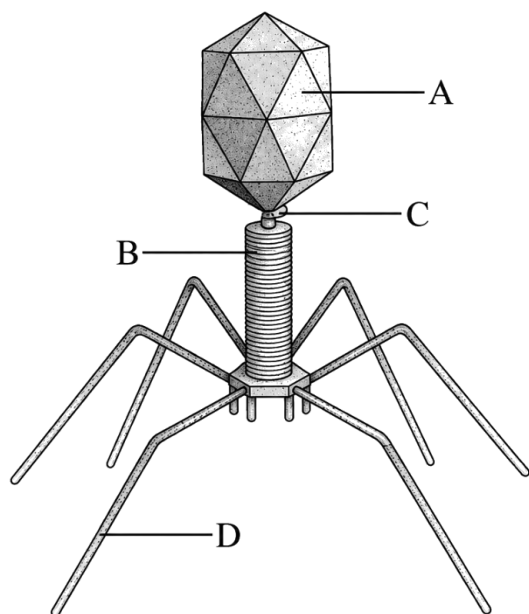
The correct components are : [AIPMT 2010 (Mains)]

- (1) (A) → (v), (B) → (iv), (C) → (viii), (D) → (iii)
(2) (A) → (i), (B) → (iv), (C) → (viii), (D) → (vi)
(3) (A) → (v), (B) → (i), (C) → (iii), (D) → (ii)
(4) (A) → (vi), (B) → (v), (C) → (iv), (D) → (vii)

Scan or tap for the full solution



- Q.86** Given below is the diagram of a bacteriophage. In which one of the options all the four parts A, B, C and D are correct? [AIPMT 2010 (Mains)]

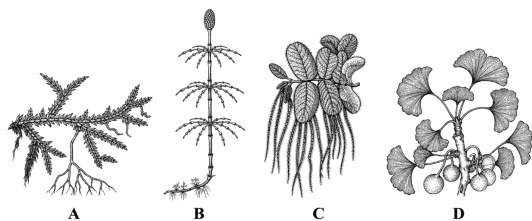


- (1) A → Collar, B → Tail fibres, C → Head, D → Sheath
- (2) A → Tail fibres, B → Head, C → Sheath, D → Collar
- (3) A → Head, B → Sheath, C → Collar, D → Tail fibres
- (4) A → Sheath, B → Collar, C → Head, D → Tail fibres

Scan or tap for the full solution



- Q.87** Examine the figures A, B, C and D. In which one of the four options all the items A, B, C and D are correct? [AIPMT 2010 (Mains)]

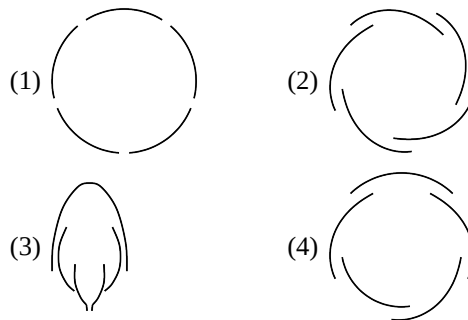


- (1) (A) → *Funaria*, (B) → *Adiantum*, (C) → *Salvinia*, (D) → *Riccia*
- (2) (A) → *Equisetum*, (B) → *Ginkgo*, (C) → *Selaginella*, (D) → *Lycopodium*
- (3) (A) → *Chara*, (B) → *Marchantia*, (C) → *Fucus*, (D) → *Pinus*
- (4) (A) → *Selaginella*, (B) → *Equisetum*, (C) → *Salvinia*, (D) → *Ginkgo*

Scan or tap for the full solution



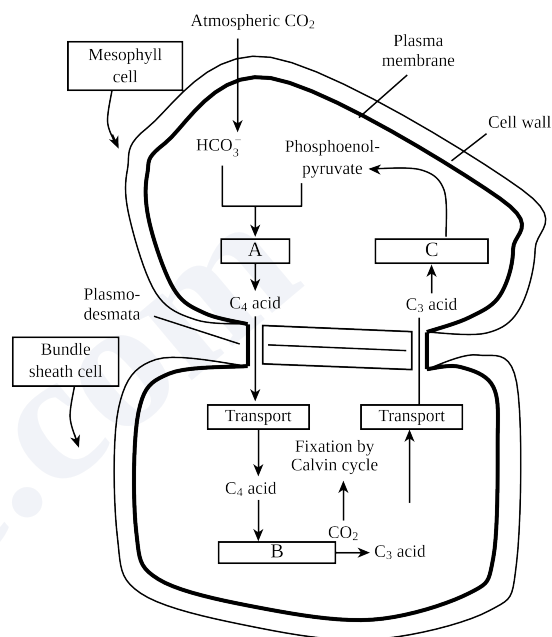
- Q.88** Aestivation of petals in the flower of cotton is correctly shown in [AIPMT 2010 (Mains)]



Scan or tap for the full solution



- Q.89** Study the pathway given below:



In which of the following options correct words for all the three blanks A, B and C are indicated?

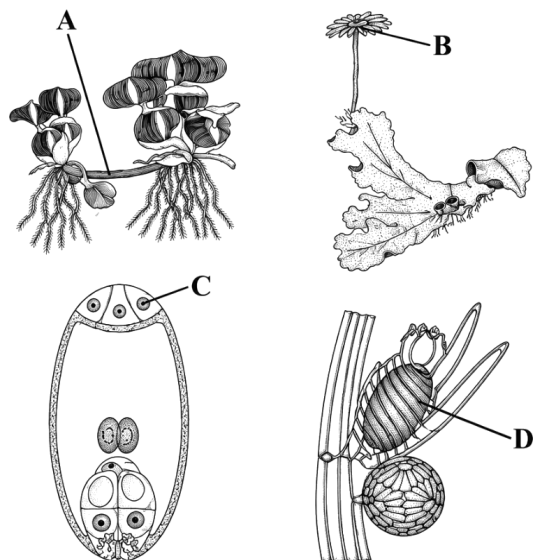
[AIPMT 2010 (Mains)]

- (1) A → Fixation, B → Transamination, C → Regeneration
- (2) A → Decarboxylation, B → Reduction, C → Regeneration
- (3) A → Carboxylation, B → Decarboxylation, C → Reduction
- (4) A → Fixation, B → Decarboxylation, C → Regeneration

Scan or tap for the full solution



- Q.90** Examine the figures (A–D) given below and select the right option, in which all the four structures A, B, C and D are identified correctly. [AIPMT 2010 (Mains)]



- (1) A → Offset, B → Antheridiophore, C → Antipodals, D → Oogonium
 (2) A → Rhizome, B → Sporangophore, C → Polar cell, D → Globule
 (3) A → Sucker, B → Seta, C → Megaspore mother cell, D → Gemma cup
 (4) A → Runner, B → Archegoniophore, C → Synergid, D → Antheridium

Scan or tap for the full solution



Q.91 Leguminous plants are able to fix atmospheric nitrogen through the process of symbiotic nitrogen fixation. Which one of the following statements is not correct during this process of nitrogen fixation?

[AIPMT 2010 (Mains)]

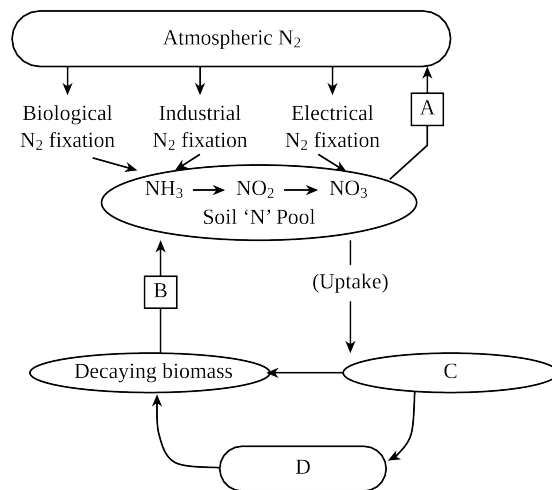
- (1) Leghaemoglobin scavenges oxygen and is pinkish in colour.
 (2) Nodules act as sites for nitrogen fixation.
 (3) The enzyme nitrogenase catalyses the conversion of atmospheric N_2 to NH_3 .
 (4) Nitrogenase is insensitive to oxygen.

Scan or tap for the full solution



Q.92 Study the cycle shown below and select the option which gives correct words for all the four blanks A, B, C and D.

[AIPMT 2010 (Mains)]



(1)	A	B	C	D
	Nitrification	Ammonification	Animals	Plants
(2)	A	B	C	D
	Denitrification	Ammonification	Plants	Animals
(3)	A	B	C	D
	Nitrification	Denitrification	Animals	Plants
(4)	A	B	C	D
	Denitrification	Nitrification	Plants	Animals

Scan or tap for the full solution



Q.93 When domestic sewage mixes with river water

[AIPMT 2010 (Mains)]

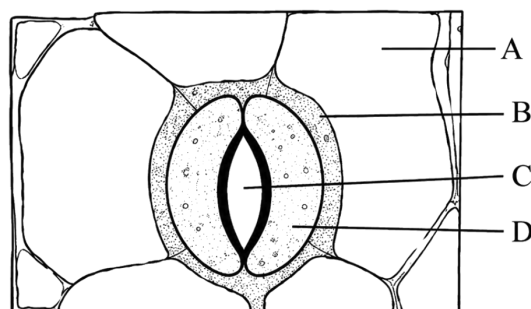
- (1) The river water is still suitable for drinking as impurities are only about 0.1%
 (2) Small animals like rats will die after drinking river water
 (3) The increased microbial activity releases micro-nutrients such as iron
 (4) The increased microbial activity uses up dissolved oxygen

Scan or tap for the full solution



Q.94 Given below is the diagram of a stomatal apparatus. In which of the following all the four parts labelled as A, B, C and D are correctly identified?

[AIPMT 2010 (Mains)]



- (1) A → Epidermal cell, B → Subsidiary cell,
C → Stomatal aperture, D → Guard cell
- (2) A → Subsidiary cell, B → Epidermal cell,
C → Guard cell, D → Stomatal aperture
- (3) A → Guard cell, B → Stomatal aperture,
C → Subsidiary cell, D → Epidermal cell
- (4) A → Epidermal cell, B → Guard cell, C
→ Stomatal aperture, D → Subsidiary cell

Scan or tap for the
full solution



Q.95 In which one of the following organisms its excretory organs are correctly stated?

[AIPMT 2010 (Mains)]

- (1) Humans :- Kidneys, sebaceous glands and tear glands
- (2) Earthworm :- Pharyngeal, integumentary and septal nephridia
- (3) Cockroach :- Malpighian tubules and enteric caeca
- (4) Frog :- Kidneys, skin and buccal epithelium

Scan or tap for the
full solution



Q.96 Crocodile and penguin are similar to whale and dogfish in which one of the following features?

[AIPMT 2010 (Mains)]

- (1) Possess a solid single stranded central nervous system
- (2) Lay eggs and guard them till they hatch
- (3) Possess bony skeleton
- (4) Have gill slits at some stage

Scan or tap for the
full solution



Q.97 Fastest distribution of some injectable material/medicine and with no risk of any kind can be achieved by injecting it into the

[AIPMT 2010 (Mains)]

- (1) muscles (2) arteries
- (3) veins (4) lymph vessels

Scan or tap for the
full solution



Q.98 Given below are four statements (i – iv) regarding human blood circulatory system.

- (i) Arteries are thick-walled and have narrow lumen as compared to veins.
- (ii) Angina is acute chest pain when the blood circulation to the brain is reduced.
- (iii) Persons with blood group AB can donate blood to any person with any blood group under ABO system.
- (iv) Calcium ions play a very important role in blood clotting.

Which two of the above statements are correct?

[AIPMT 2010 (Mains)]

- (1) (i) and (iv) (2) (i) and (ii)
- (3) (ii) and (iii) (4) (iii) and (iv)

Scan or tap for the
full solution



Q.99 The haemoglobin content per 100 mL of blood of a normal healthy human adult is [AIPMT 2010 (Mains)]

- (1) 5–11 g (2) 25–30 g (3) 17–20 g (4) 12–16 g

Scan or tap for the
full solution



Q.100 Select the answer with correct matching of the structure, its location and function.

[AIPMT 2010 (Mains)]

	Structure	Location	Function
(1)	Eustachian tube	Anterior part of internal ear	Equalises
	Structure	Location	Function
(2)	Cerebellum	Midbrain	Controls respiration and gastric
	Structure	Location	Function
(3)	Hypothalamus	Forebrain	Controls body temperature,
	Structure	Location	
(4)	Blind spot	Near the place where optic nerve leaves the e	

Scan or tap for the
full solution



Q.101 Signals from fully developed foetus and placenta ultimately lead to parturition which requires the release of [AIPMT 2010 (Mains)]

- (1) Oxytocin from maternal pituitary
- (2) Oxytocin from foetal pituitary
- (3) Relaxin from placenta
- (4) Estrogen from placenta

Scan or tap for the
full solution



Q.102 In human female the blastocyst

[AIPMT 2010 (Mains)]

- (1) gets implanted into uterus 3 days after ovulation
- (2) gets nutrition from uterine endometrial secretion only after implantation
- (3) gets implanted in endometrium by the trophoblast cells
- (4) forms placenta even before implantation

Scan or tap for the
full solution



Q.103 Jaundice is a disorder of [AIPMT 2010 (Mains)]

- (1) excretory system (2) skin and eyes
- (3) digestive system (4) circulatory system

Scan or tap for the
full solution



Q.104 Secretions from which one of the following are rich in fructose, calcium and some enzymes?

[AIPMT 2010 (Mains)]

- (1) Liver (2) Pancreas
(3) Salivary glands (4) Male accessory glands

Scan or tap for the full solution



Q.105 Given below are four statements (A-D) each with one or two blanks. Select the option which correctly fills up the blanks in two statements.

- (i) Wings of butterfly and birds look alike and are the results of (i) _____ evolution
(ii) Miller showed that CH_4 , H_2 , NH_3 and (i) _____, when exposed to electric discharge in a flask resulted in formation of (ii) _____.
(iii) Vermiform appendix is a (i) _____ organ and an (ii) _____ evidence of evolution.
(iv) According to Darwin evolution took place due to (i) _____ and (ii) _____ of the fittest.

[AIPMT 2010 (Mains)]

- (1) C - (i) vestigial, (ii) anatomical, D - (i) mutations, (ii) multiplication
(2) D - (i) small variations, (ii) survival, A - (i) convergent
(3) A - (i) convergent, B - (i) oxygen, (ii) nucleosides
(4) B - (i) water vapour, (ii) amino acids, C - (i) rudimentary, (ii) anatomical

Scan or tap for the full solution



Q.106 The most apparent changes during the evolutionary history of *Homo sapiens* are traced in

[AIPMT 2010 (Mains)]

- (1) Remarkable increase in the brain size
(2) Walking upright
(3) Loss of body hair
(4) Shortening of the jaws

Scan or tap for the full solution



Q.107 Which one of the following techniques is safest for the detection of cancers?

[AIPMT 2010 (Mains)]

- (1) Computed tomography (CT)
(2) Magnetic resonance imaging (MRI)
(3) Histopathological studies
(4) Radiography (X-ray)

Scan or tap for the full solution



Q.108 A person suffering from a disease caused by *Plasmodium*, experiences recurring chill and fever at the time when

[AIPMT 2010 (Mains)]

- (1) the parasite after its rapid multiplication inside RBCs ruptures them, releasing the stage to enter fresh RBCs.
(2) the trophozoites reach maximum growth and give out certain toxins
(3) the sporozoites released from RBCs are being rapidly killed and broken down inside spleen
(4) the microgametocytes and megagametocytes are being destroyed by the WBCs.

Scan or tap for the full solution



Q.109 In genetic engineering, a DNA segment (gene) of interest, is transferred to the host cell through a vector. Consider the following four agents (A-D) in this regard and select the correct option about which one or more of these can be used as a vector / vectors –

- A. a bacterium B. plasmid
C. *Plasmodium* D. bacteriophage

[AIPMT 2010 (Mains)]

- (1) B and D only (2) A and C only
(3) A, B and D only (4) A only

Scan or tap for the full solution



Q.110 Which one of the following is now being commercially produced by biotechnological procedures?

[AIPMT 2010 (Mains)]

- (1) Insulin (2) Morphine
(3) Nicotine (4) Quinine

Scan or tap for the full solution



Q.111 Which one of the following pairs of structures is correctly matched with their correct description?

[AIPMT 2010 (Mains)]

- (1) Structure → Tibia and fibula, Description → Both form parts of knee joint
(2) Structure → Shoulder joint and elbow joint, Description → Ball and socket type of joint
(3) Structure → Cartilage and cornea, Description → No blood supply but do require oxygen for respiratory need
(4) Structure → Premolars and molars, Description → 20 in all and 3-rooted

Scan or tap for the full solution



Q.112 If for some reason the parietal cells of the gut epithelium become partially non-functional, what is likely to happen?

[AIPMT 2010 (Mains)]

- (1) The pancreatic enzymes and specially the trypsin and lipase will not work efficiently.
- (2) The pH of stomach will fall abruptly.
- (3) Steapsin will be more effective.
- (4) Proteins will not be adequately hydrolysed by pepsin into proteoses and peptones.

Scan or tap for the
full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7
Ans.	2	1	2	4	1	4	4
Ques.	8	9	10	11	12	13	14
Ans.	4	1	1	3	4	3	1
Ques.	15	16	17	18	19	20	21
Ans.	1	3	3	4	1	4	4
Ques.	22	23	24	25	26	27	28
Ans.	3	2	2	4	1	4	3
Ques.	29	30	31	32	33	34	35
Ans.	3	3	2	2	2	1	3
Ques.	36	37	38	39	40	41	42
Ans.	4	3	4	2	3	2	4
Ques.	43	44	45	46	47	48	49
Ans.	3	1	3	3	3	4	2
Ques.	50	51	52	53	54	55	56
Ans.	4	1	1	4	4	3	1
Ques.	57	58	59	60	61	62	63
Ans.	1	4	3	3	1	3	2
Ques.	64	65	66	67	68	69	70
Ans.	4	2	1	3	4	4	2
Ques.	71	72	73	74	75	76	77
Ans.	2	2	4	3	1	4	3
Ques.	78	79	80	81	82	83	84
Ans.	3	3	4	1	2	1	1
Ques.	85	86	87	88	89	90	91
Ans.	1	3	4	2	4	1	4
Ques.	92	93	94	95	96	97	98
Ans.	2	4	1	2	4	3	1
Ques.	99	100	101	102	103	104	105
Ans.	4	3	1	3	3	4	2
Ques.	106	107	108	109	110	111	112
Ans.	1	2	1	1	1	3	4