CBSE - All India Pre-Medical/ Pre-Dental Ent. Exam. 2012 (Prelim.)

Answers by
Aakash Institute

CODE				
Q.N.	A	B	C	D
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003	4	1	3	1
004	4	2	**	4
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CODE				
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199	3	1	1	2
200	2	4	**	1

**** Options are incorrect.**

Though every care has been taken to provide the answers correctly but the Institute shall not be responsible for any typographical error, if any.

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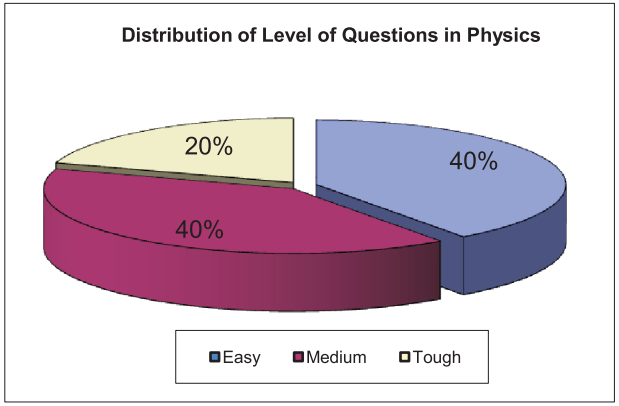
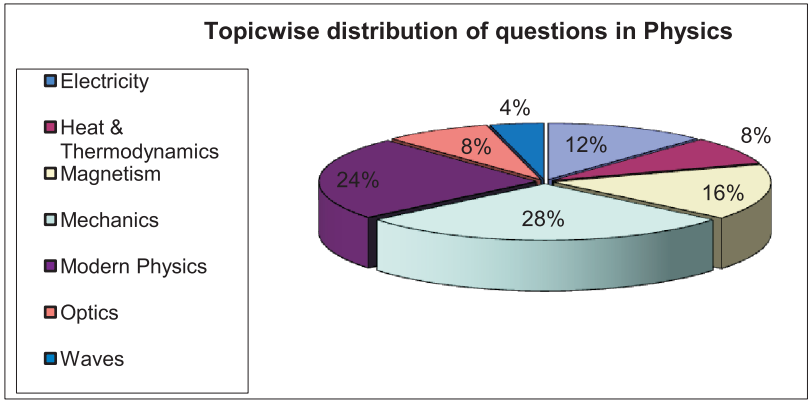
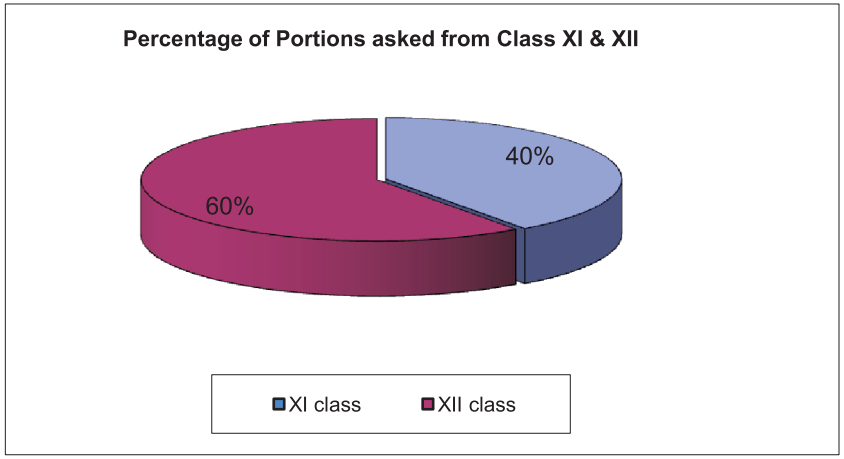
ANALYSIS OF PHYSICS PORTION OF AIPMT PRELIM 2012

	XII	XI	XII	XI	XII	XII	XI	
	Electricity	Heat & Thermodynamics	Magnetism	Mechanics	Modern Physics	Optics	Waves	*Total*
Easy	4	1	2	5	5	3		*20*
Medium	2	2	4	6	5		1	*20*
Tough		1	2	3	2	1	1	*10*
Total	*6*	*4*	*8*	*14*	*12*	*4*	*2*	***50***

XI class	20	XII class	30







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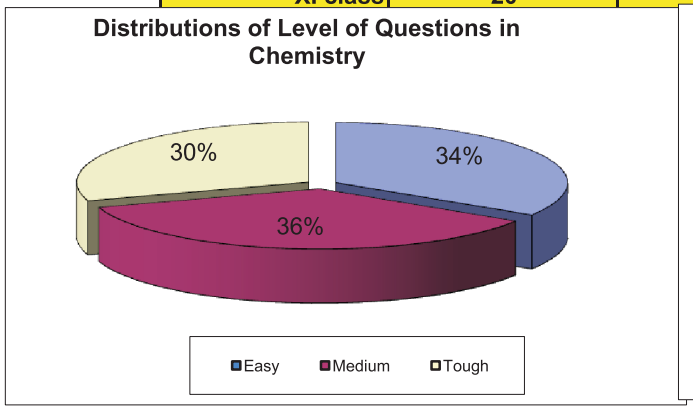
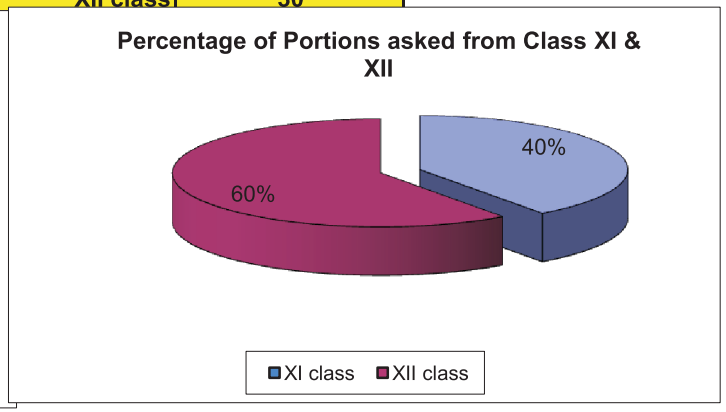
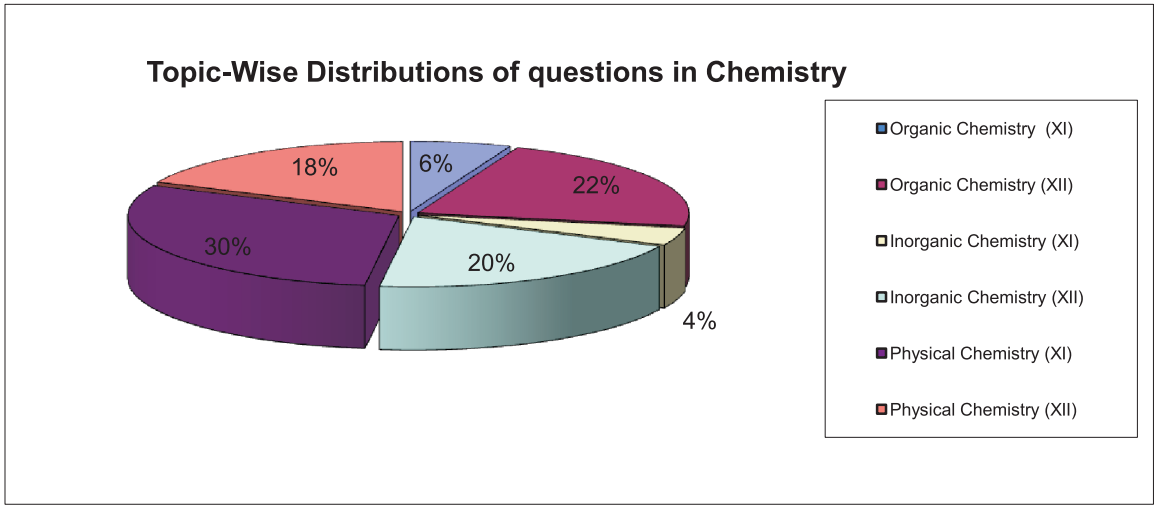
ANALYSIS OF CHEMISTRY PORTION OF AIPMT PRELIM 2012

	XI	XII	XI	XII	XI	XII	
	Organic Chemistry (XI)	Organic Chemistry (XII)	Inorganic Chemistry (XI)	Inorganic Chemistry (XII)	Physical Chemistry (XI)	Physical Chemistry (XII)	Total
Easy		3	1	2	5	6	*17*
Medium	2	2	1	3	8	2	*18*
Tough	1	6		5	2	1	*15*
Total	*3*	*11*	*2*	*10*	*15*	*9*	*50*

XI class	20	XII class	30







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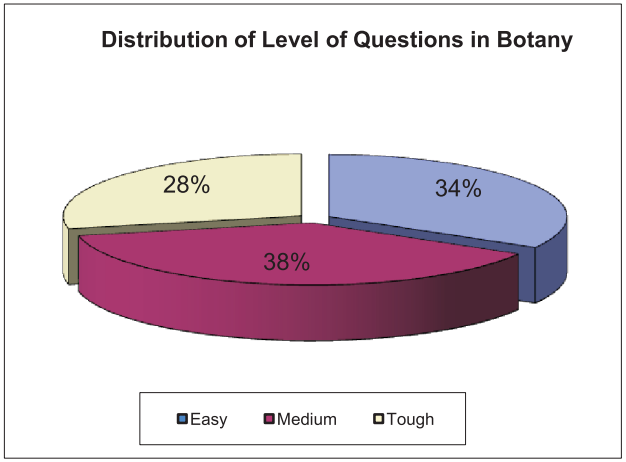
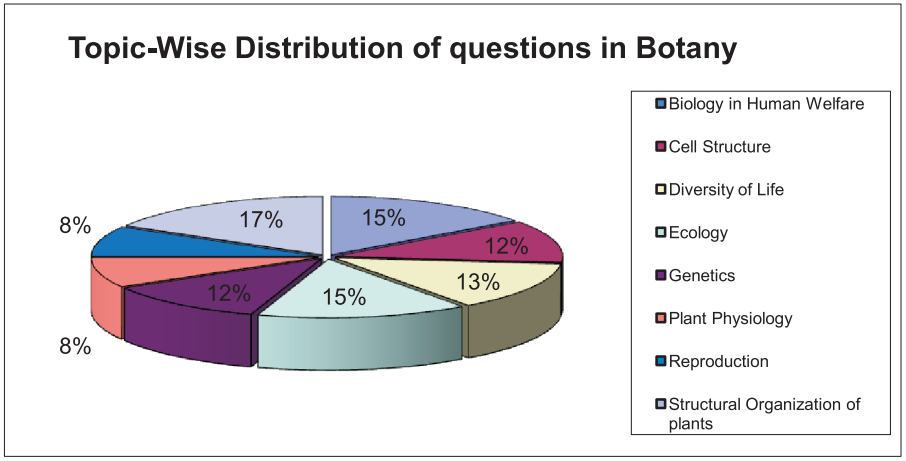
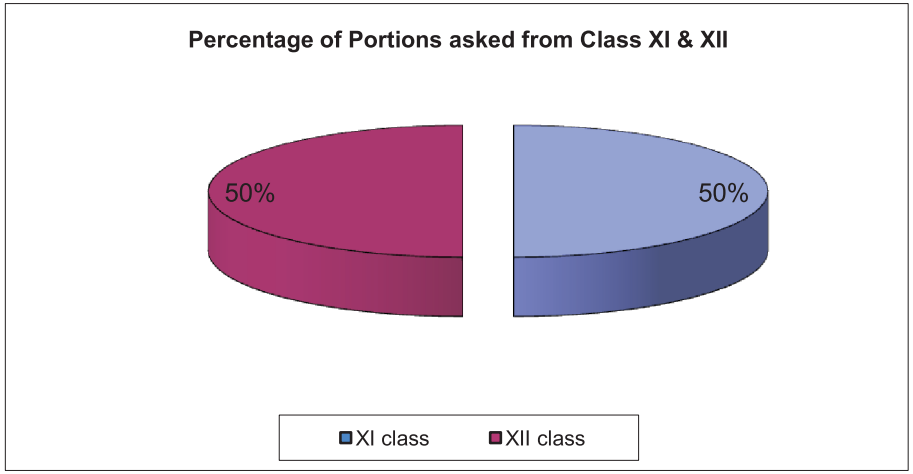
ANALYSIS OF BOTANY PORTION OF AIPMT PRELIM 2012

	XII Biology in Human Welfare	XI Cell Structure	XI Diversity of Life	XII Ecology	XII Genetics	XI Plant Physiology	XII Reproduction	XI Structural Organization of plants	Total
Easy	4	2	2	3	3	1	2	3	*20*
Medium	4	4	3	3	2	1	3	3	*23*
Tough	1	1	3	3	2	3	0	4	*17*
Total	*9*	*7*	*8*	*9*	*7*	*5*	*5*	*10*	***60***

XI class	**30**	**XII class**	**30**







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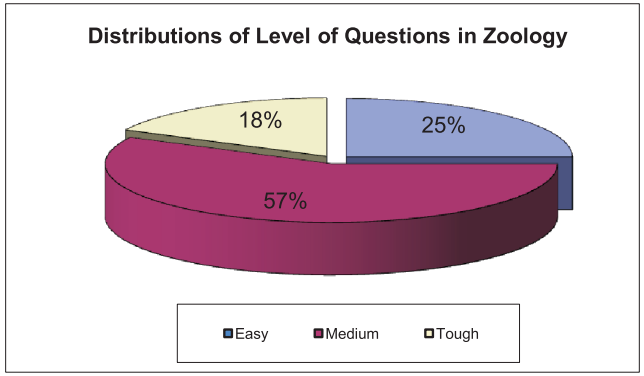
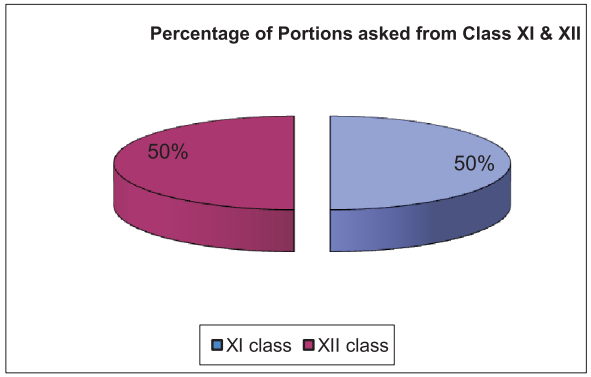
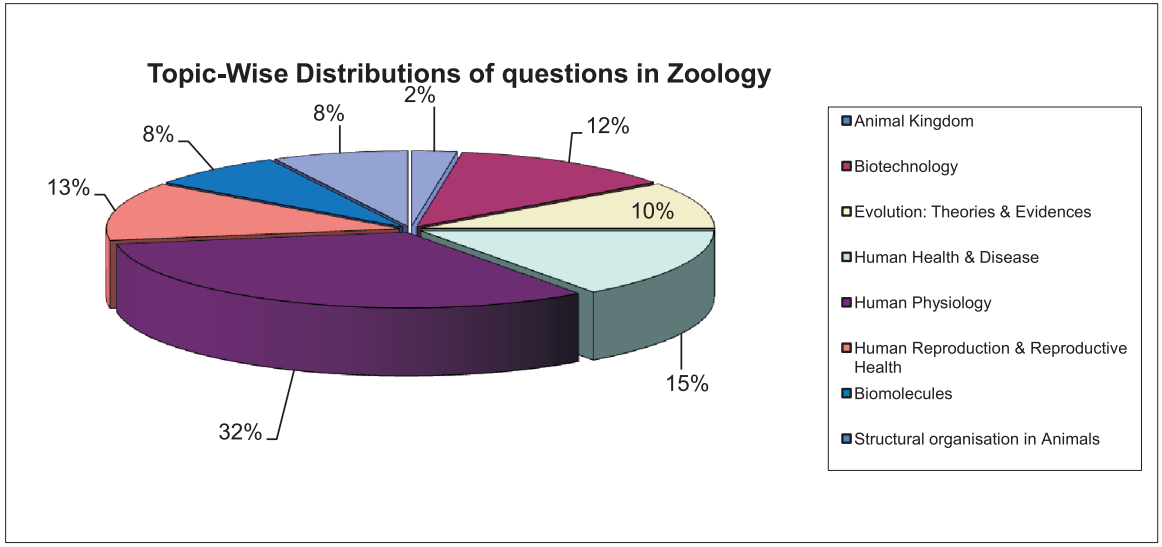
ANALYSIS OF ZOOLOGY PORTION OF AIPMT PRELIM 2012

	XI	XII	XII	XII	XI	XII	XI	XI	
	Animal Kingdom	Biotechnology	Evolution: Theories & Evidences	Human Health & Disease	Human Physiology	Human Reproduction & Reproductive Health	Biomolecules	Structural organisation in Animals	Total
Easy		2		3	2	1	1	1	*10*
Medium	1	3	4	2	7	2	2	2	*23*
Tough				1	4	2			*7*
Total	*1*	*5*	*4*	*6*	*13*	*5*	*3*	*3*	*40*

XI class	20	XII class	20







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Code - **A**

HINTS & SOLUTIONS
for
CBSE Preliminary 2012

by Aakash Institute

1. The damping force on an oscillator is directly proportional to the velocity. The units of the constant of proportionality are

(1) kgs^{-1} (2) kgs

(3) $kgms^{-1}$ (4) $kgms^{-2}$

Sol. Answer (1)

$F = KV$

$$\therefore\ K = \frac{F}{V} = \frac{\text{kg ms}^{-2}}{\text{ms}^{-1}} = [\text{kgs}^{-1}]$$

2. The motion of a particle along a straight line is described by equation

$x = 8 + 12t - t^3$

where x is in metre and t in second. The retardation of the particle when its velocity becomes zero, is

(1) 6 ms^{-2} (2) 12 ms^{-2}

(3) 24 ms^{-2} (4) Zero

Sol. Answer (2)

$x = 8 + 12t - t^3$

$v = 12 - 3t^2 = 0$ $\quad\therefore\ t = 2$ s

$a = -6t = -12$

$\therefore$ Retardation 12 m/s^2

3. The horizontal range and the maximum height of a projectile are equal. The angle of projection of the projectile is

(1) $\theta = \tan^{-1}(2)$ (2) $\theta = 45^\circ$

(3) $\theta = \tan^{-1}\left(\frac{1}{4}\right)$ (4) $\theta = \tan^{-1}(4)$

Sol. Answer (4)

$H_{max} = R$

$$\frac{u^2 \sin^2\theta}{2g} = \frac{2u^2 \sin\theta\cos\theta}{g}$$

$\therefore\ \tan\theta = 4$

$\therefore\ \theta = \tan^{-1}(4)$

4. A particle has initial velocity $\left(2\vec{i}+3\vec{j}\right)$ and acceleration $\left(0.3\vec{i}+0.2\vec{j}\right)$. The magnitude of velocity after 10 seconds will be

(1) 5 units (2) 9 units

(3) $9\sqrt{2}$ units (4) $5\sqrt{2}$ units

Sol. Answer (4)

$$\vec{v}=\vec{u}+\vec{a}t=\left(2\hat{i}+3\hat{j}\right)+\left(0.3\hat{i}+0.2\hat{j}\right)10=5\hat{i}+5\hat{j}$$

$\therefore$ $v=\sqrt{5^2+5^2}=5\sqrt{2}$ units

5. A car of mass 1000 kg negotiates a banked curve of radius 90 m on a fictionless road. If the banking angle is 45°, the speed of the car is

(1) 5 ms^{-1} (2) 10 ms^{-1}

(3) 20 ms^{-1} (4) 30 ms^{-1}

Sol. Answer (4)

$$\tan\theta=\frac{v^2}{Rg}$$

$\therefore$ $v=\sqrt{Rg\tan\theta}=\sqrt{90\times10\times\tan45^\circ}$ = 30 m/s

6. A solid cylinder of mass 3 kg is rolling on a horizontal surface with velocity 4 ms^{-1}. It collides with a horizontal spring of force constant 200 Nm^{-1}. The maximum compression produced in the spring will be

(1) 0.7 m (2) 0.2 m

(3) 0.5 m (4) 0.6 m

Sol. Answer (4)

$$\frac{1}{2}mv^2+\frac{1}{2}I\omega^2=\frac{1}{2}kx^2$$

$\therefore$ $\frac{3}{4}mv^2=\frac{1}{2}kx^2$

$\therefore$ x = 0.6 m

7. The potential energy of a particle in a force field is $U=\frac{A}{r^2}-\frac{B}{r}$, where A and B are positive constants and r is the distance of particle from the centre of the field. For stable equilibrium, the distance of the particle is

(1) $\frac{A}{B}$ (2) $\frac{B}{A}$

(3) $\frac{B}{2A}$ (4) $\frac{2A}{B}$

Sol. Answer (4)

$$-\frac{dU}{dr}=0 \Rightarrow r=\frac{2A}{B}$$

8. Two spheres A and B of masses m_1 and m_2 respectively collide. A is at rest initially and B is moving with velocity v along x-axis. After collision B has a velocity $\frac{v}{2}$ in a direction perpendicular to the original direction. The mass A moves after collision in the direction

(1) $\theta = \tan^{-1}\left(\frac{1}{2}\right)$ to the x-axis (2) $\theta = \tan^{-1}\left(-\frac{1}{2}\right)$ to the x-axis

(3) Same as that of B (4) Opposite to that of B

Sol. Answer (1)

Conservation of linear momentum

$\tan\theta = \frac{v/2}{v}$ $\therefore\ \theta = \tan^{-1}\left(\frac{1}{2}\right)$

9. Two persons of masses 55 kg and 65 kg respectively, are at the opposite ends of a boat. The length of the boat is 3.0 m and weighs 100 kg. The 55 kg man walks up to the 65 kg man and sits with him. If the boat is in still water the center of mass of the system shifts by

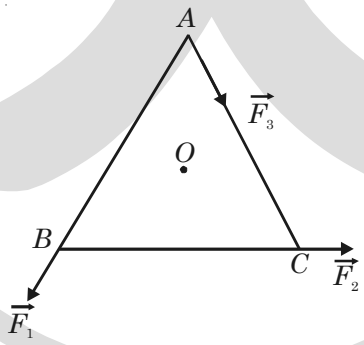
(1) Zero (2) 0.75 m

(3) 3.0 m (4) 2.3 m

Sol. Answer (1)

Since $F_{ext} = 0$ $\therefore$ CM will not shift

10. ABC is an equilateral triangle with O as its centre. $\vec{F}_1, \vec{F}_2$ 77nd $\vec{F}_3$ represent three forces acting along the sides AB, BC and AC respectively. If the total torque about O is zero then the magnitude of $\vec{F}_3$ is



(1) $\frac{F_1 + F_2}{2}$ (2) $2(F_1 + F_2)$

(3) $F_1 + F_2$ (4) $F_1 - F_2$

Sol. Answer (3)

Net torque = 0

$\therefore\ (F_1 + F_2 - F_3)R = 0$

$\therefore\ F_3 = F_1 + F_2$

11. When a mass is rotating in a plane about a fixed point, its angular momentum is directed along

(1) The radius

(2) The tangent to the orbit

(3) A line perpendicular to the plane of rotation

(4) The line making an angle of 45° to the plane of rotation

Sol. Answer (3)

Right hand thumb rule.

12. A spherical planet has a mass M_p and diameter D_p. A particle of mass m falling freely near the surface of this planet will experience an acceleration due to gravity, equal to

(1) GM_p / D_p^2 (2) $4\ GM_p m / D_p^2$

(3) $4\ GM_p / D_p^2$ (4) $GM_p m / D_p^2$

Sol. Answer (3)

$$g = \frac{GM}{R^2} = \frac{GM_p}{\left(\frac{D_p}{2}\right)^2}$$

13. A geostationary satellite is orbiting the earth at a height of $5R$ above that surface of the earth, R being the radius of the earth. The time period of another satellite in hours at a height of $2R$ from the surface of the earth is

(1) $6\sqrt{2}$ (2) $\frac{6}{\sqrt{2}}$

(3) 5 (4) 10

Sol. Answer (1)

$$\frac{T_2}{T_1} = \left(\frac{R_2}{R_1}\right)^{3/2}$$

$$\frac{T_2}{24} = \left(\frac{3R}{6R}\right)^{3/2} \qquad \therefore\ T_2 = 6\sqrt{2} \text{ hour}$$

14. The height at which the weight of a body becomes $\frac{1}{16}^{th}$, its weight on the surface of earth (radius R), is

(1) $3\ R$ (2) $4\ R$

(3) $5\ R$ (4) $15\ R$

Sol. Answer (1)

$$g' \propto \frac{1}{(R+H)^2}$$

15. Two sources of sound placed close to each other, are emitting progressive waves given by $y_1 = 4\sin 600\pi t$ and $y_2 = 5\sin 608\pi t$. An observer located near these two sources of sound will hear

(1) 8 beats per second with intensity ratio 81 : 1 between waxing and waning

(2) 4 beats per second with intensity ratio 81 : 1 between waxing and waning

(3) 4 beats per second with intensity ratio 25 : 16 between waxing and waning

(4) 8 beats per second with intensity ratio 25 : 16 between waxing and waning

Sol. Answer (2)

Number of beats = $\frac{608\pi - 600\pi}{2\pi}$ = 4 beats per second

$$\frac{I_{max}}{I_{min}} = \left(\frac{5+4}{5-4}\right)^2 = \frac{81}{1}$$

16. When a string is divided into three segments of length l_1, l_2 and l_3, the fundamental frequencies of these three segments are ν_1, ν_2 and ν_3 respectively. The original fundamental frequency (υ) of the string is

(1) $\frac{1}{\nu} = \frac{1}{\nu_1} + \frac{1}{\nu_2} + \frac{1}{\nu_3}$

(2) $\frac{1}{\sqrt{\nu}} = \frac{1}{\sqrt{\nu_1}} + \frac{1}{\sqrt{\nu_2}} + \frac{1}{\sqrt{\nu_3}}$

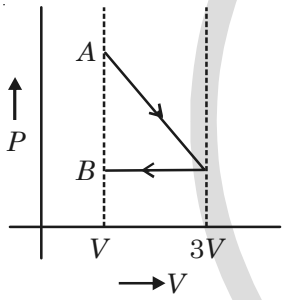
(3) $\sqrt{\nu} = \sqrt{\nu_1} + \sqrt{\nu_2} + \sqrt{\nu_3}$

(4) $\nu = \nu_1 + \nu_2 + \nu_3$

Sol. Answer (1)

$$f \propto \frac{1}{\text{length}}$$

17. One mole of an ideal gas goes from an initial state A to final state B via two processes: It first undergoes isothermal expansion from volume V to $3V$ and then its volume is reduced from $3V$ to V at constant pressure. The correct P-V diagram representing the two processes is

(1)


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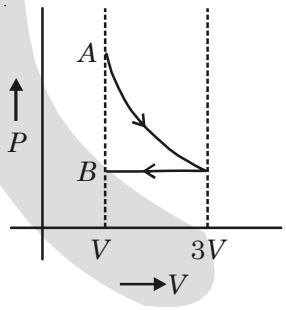
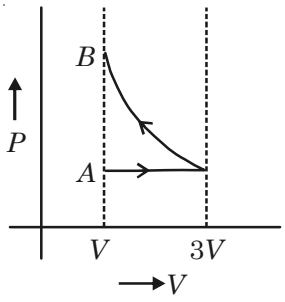


(3)


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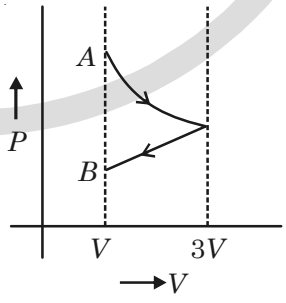
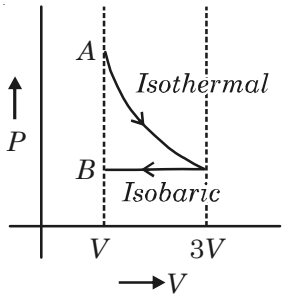
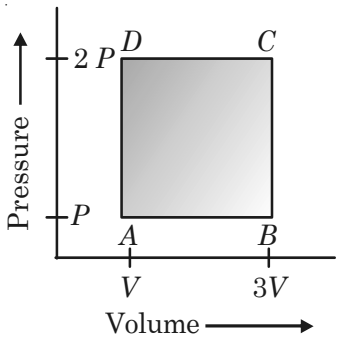


Sol. Answer (2)



18. A thermodynamic system is taken through the cycle *ABCD* as shown in figure. Heat rejected by the gas during the cycle is



(1) $\frac{1}{2}PV$ (2) PV

(3) $2\ PV$ (4) $4\ PV$

Sol. Answer (3)

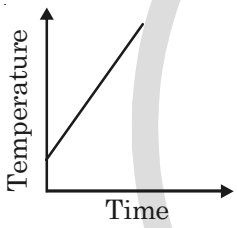
In cyclic process

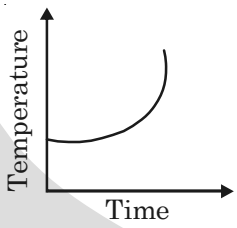
$\Delta Q = \Delta W$ = area under the cycle

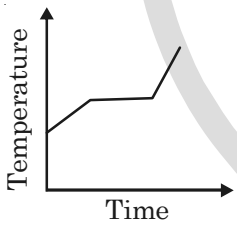
$= -2\ PV$

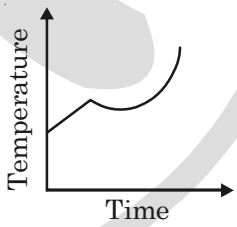
$\therefore$ Heat rejected $= 2\ PV$

19. Liquid oxygen at 50 K is heated to 300 K at constant pressure of 1 atm. The rate of heating is constant. Which one of the following graphs represents the variation of temperature with time?

(1) 

(2) 

(3) 

(4) 

Sol. Answer (3)

Boiling point of oxygen is 50.5 K. First liquid oxygen will be heated then it will be converted into gas at its boiling point then the temperature of gas will increase upto 300 K.

20. If the radius of a star is R and it acts as a black body, what would be the temperature of the star, in which the rate of energy production is Q?

(1) $\left(\frac{4\pi R^2 Q}{\sigma}\right)^{1/4}$ (2) $\left(\frac{Q}{4\pi R^2 \sigma}\right)^{1/4}$

(3) $\frac{Q}{4\pi R^2 \sigma}$ (4) $\left(\frac{Q}{4\pi R^2 \sigma}\right)^{-1/2}$

(σ stands for Stefan's constant.)

Sol. Answer (2)

Stefan's law $Q = \sigma A T^4$

$\therefore \quad T = \left(\frac{Q}{\sigma A}\right)^{1/4} = \left[\frac{Q}{4\pi R^2 \sigma}\right]^{1/4}$

21. A coil of resistance 400 Ω is placed in a magnetic field. If the magnetic flux ϕ (wb) linked with the coil varies with time t (sec) as

$\phi = 50t^2 + 4$

The current in the coil at t = 2 sec is:

(1) 2 A (2) 1 A

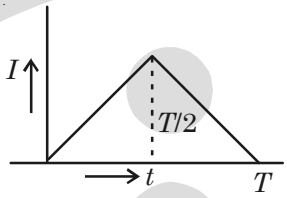
(3) 0.5 A (4) 0.1 A

Sol. Answer (3)

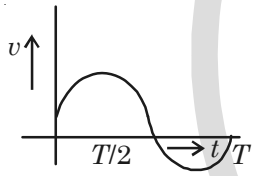
$$\varepsilon = \frac{-d\phi}{dt} = -100t = -200 \text{ volt}$$

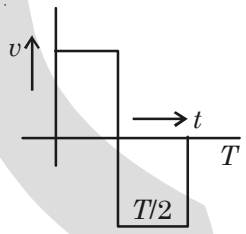
$$\therefore \quad I = \frac{|\varepsilon|}{R} = \frac{200}{400} = 0.5 \text{ A}$$

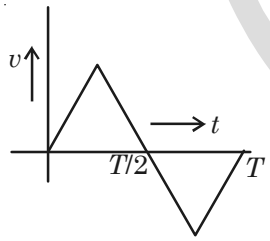
22. The current (I) in the inductance is varying with time according to the plot shown in figure.

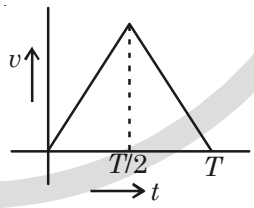


Which one of the following is the correct variation of voltage with time in the coil?

(1)


(2)


(3)


(4)


Sol. Answer (2)

$$\text{emf} = -\frac{LdI}{dt}$$

$\therefore$ emf $\propto$ slope of I–t graph.

23. In an electrical circuit R, L, C and an $a.c.$ voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and the current in the circuit is $\frac{\pi}{3}$. If instead, C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$. The power factor of the circuit is:

(1) 1 (2) $\frac{\sqrt{3}}{2}$

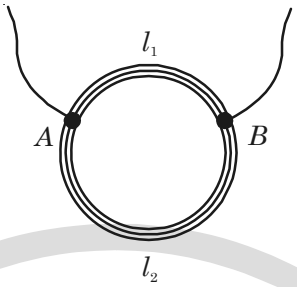
(3) $\frac{1}{2}$ (4) $\frac{1}{\sqrt{2}}$

Sol. Answer (1)

Here $X_C = X_L$ ($\because$ $\phi_1 = \phi_2$ given)

$\therefore$ $\cos\phi = 1$

24. A ring is made of a wire having a resistance $R_0 = 12\ \Omega$. Find the points A and B, as shown in the figure, at which a current carrying conductor should be connected so that the resistance R of the sub circuit between these points is equal to $\frac{8}{3}\Omega$.



(1) $\frac{l_1}{l_2} = \frac{3}{8}$ (2) $\frac{l_1}{l_2} = \frac{1}{2}$

(3) $\frac{l_1}{l_2} = \frac{5}{8}$ (4) $\frac{l_1}{l_2} = \frac{1}{3}$

Sol. Answer (2)

$\frac{x(12-x)}{12} = \frac{8}{3}$ $\therefore$ $x = 4\ \Omega$

$\therefore$ $\frac{4}{12-4} = \frac{1}{2} = \frac{l_1}{l_2}$

25. If voltage across a bulb rated 220 volt - 100 watt drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is

(1) 5% (2) 10%

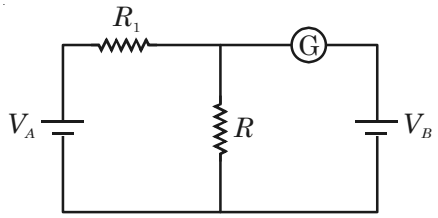
(3) 20% (4) 2.5%

Sol. Answer (1)

$P \propto V^2$

$\therefore$ $\frac{\Delta P}{P} = \frac{2\Delta V}{V} = 5\%$

26. In the circuit shown the cells A and B have negligible resistances. For $V_A = 12$ V, $R_1 = 500\ \Omega$ and $R = 100\ \Omega$ the galvanometer (G) shows no deflection. The value of V_B is



(1) 12 V (2) 6 V

(3) 4 V (4) 2 V

Sol. Answer (4)

Potential drop across $R = 100\ \Omega$ is 2 V.

27. The electric field associated with an e.m. wave in vacuum is given by $\vec{E} = \hat{i}\, 40\cos(kz - 6\times10^8 t)$, where E, z and t are in volt/m, metre and seconds respectively. The value of wave vector k is

(1) 6 m^{-1} (2) 3 m^{-1}

(3) 2 m^{-1} (4) 0.5 m^{-1}

Sol. Answer (3)

$$c = \frac{\omega}{k}$$

$$\therefore \quad k = \frac{\omega}{c} = \frac{6\times10^8}{3\times10^8} = 2 \text{ m}^{-1}$$

28. What is the flux through a cube of side a if a point charge of q is at one of its corner?

(1) $\frac{q}{\varepsilon_0}$ (2) $\frac{q}{2\varepsilon_0}6a^2$

(3) $\frac{2q}{\varepsilon_0}$ (4) $\frac{q}{8\varepsilon_0}$

Sol. Answer (4)

Eight such cubes will completely encapsulate the charge symmetrically.

$$\therefore \quad \phi = \frac{q}{8\varepsilon_0}$$

29. An electric dipole of moment p is placed in an electric field of intensity E. The dipole acquires a position such that the axis of the dipole makes an angle θ with the direction of the field. Assuming that the potential energy of the dipole to be zero when θ = 90°, the torque and the potential energy of the dipole will respectively be

(1) $pE\sin\theta$, $2pE\cos\theta$ (2) $pE\cos\theta$, $-pE\sin\theta$

(3) $pE\sin\theta$, $-pE\cos\theta$ (4) $pE\sin\theta$, $-2pE\cos\theta$

Sol. Answer (3)

By definition.

30. Four points charges $-Q$, $-q$, $2q$ and $2Q$ are placed, one at each corner of the square. The relation between Q and q for which the potential at the centre of the square is zero is

(1) $Q = q$ (2) $Q = \frac{1}{q}$

(3) $Q = -q$ (4) $Q = -\frac{1}{q}$

Sol. Answer (3)

$$\frac{(-Q - q + 2q + 2Q)}{4\pi\varepsilon_0 R} = 0$$

$$\therefore \quad Q = -q$$

31. A compass needle which is allowed to move in a horizontal plane is taken to a geomagnetic pole. It

(1) Will stay in north-south direction only (2) Will stay in east-west direction only

(3) Will become rigid showing no movement (4) Will stay in any position

Sol. Answer (4)

Horizontal component of earth's field is absent there.

32. A milli voltmeter of 25 milli volt range is to be converted into an ammeter of 25 ampere range. The value (in ohm) of necessary shunt will be

(1) 1 (2) 0.05

(3) 0.001 (4) 0.01

Sol. Answer (3)

$$S = \frac{V_g}{I - I_g}$$

Neglect I_g

$$\therefore \quad S = \frac{V_g}{I} = 0.001\ \Omega$$

33. Two similar coils of radius R are lying concentrically with their planes at right angles to each other. The currents flowing in them are I and $2I$, respectively. The resultant magnetic field induction at the centre will be

(1) $\frac{\mu_0 I}{2R}$ (2) $\frac{\mu_0 I}{R}$

(3) $\frac{\sqrt{5}\,\mu_0 I}{2R}$ (4) $\frac{3\,\mu_0 I}{2R}$

Sol. Answer (3)

$$\frac{\mu_0}{2R}\sqrt{I^2 + (2I)^2} = \frac{\sqrt{5}\mu_0 I}{2R}$$

34. An alternating electric field, of frequency ν, is applied across the dees (radius = R) of a cyclotron that is being used to accelerate protons (mass = m). The operating magnetic field (B) used in the cyclotron and the kinetic energy (K) of the proton beam, produced by it, are given by

(1) $B = \frac{2\pi m\nu}{e}$ and $K = 2m\pi^2\nu^2R^2$ (2) $B = \frac{m\nu}{e}$ and $K = m^2\pi\nu R^2$

(3) $B = \frac{m\nu}{e}$ and $K = 2m\pi^2\nu^2R^2$ (4) $B = \frac{2\pi m\nu}{e}$ and $K = m^2\pi\nu R^2$

Sol. Answer (1)

$$\nu = \frac{eB}{2\pi m} \Rightarrow B = \frac{2\pi m\nu}{e}$$

and $K = \frac{q^2B^2R^2}{2m} \Rightarrow 2m\pi^2\nu^2R^2$

35. The magnifying power of a telescope is 9. When it is adjusted for parallel rays the distance between the objective and eyepiece is 20 cm. The focal length of lenses are

(1) 18 cm, 2 cm (2) 11 cm, 9 cm

(3) 10 cm, 10 cm (4) 15 cm, 5 cm

Sol. Answer (1)

$$m = \frac{f_o}{f_e} = 9$$

and $L = f_o + f_e = 20$

Solving simultaneously gives

$f_o = 18$ cm

$f_e = 2$ cm

36. A ray of light is incident at an angle of incidence, i, on one face of a prism of angle A (assumed to be small) and emerges normally from the opposite face. If the refractive index of the prism is μ, the angle of incidence i, is nearly equal to

(1) $\frac{A}{\mu}$ (2) $\frac{A}{2\mu}$

(3) μA (4) $\frac{\mu A}{2}$

Sol. Answer (3)

$$\frac{\sin i}{\sin A} = \mu \text{ or } \frac{i}{A} = \mu$$

$$\therefore \quad i = \mu A$$

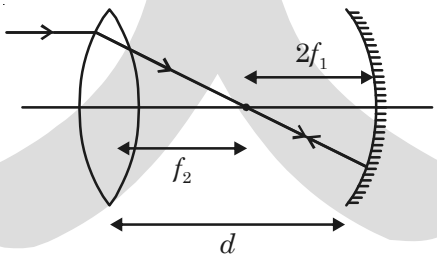
37. A concave mirror of focal length 'f_1' is placed at a distance of 'd' from a convex lens of focal length 'f_2'. A beam of light coming from infinity and falling on this convex lens - concave mirror combination returns to infinity. The distance d must equal

(1) $2f_1 + f_2$ (2) $-2f_1 + f_2$

(3) $f_1 + f_2$ (4) $-f_1 + f_2$

Sol. Answer (1)

$$\therefore \quad d = 2f_1 + f_2$$



38. When a biconvex lens of glass having refractive index 1.47 is dipped in a liquid, it acts as a plane sheet of glass. This implies that the liquid must have refractive index.

(1) Greater than that of glass (2) Less than that of glass

(3) Equal to that of glass (4) Less than one

Sol. Answer (3)

When refractive index will be same, the rays will not deviate and the combination will behave as glass sheet.

39. An α-particle moves in a circular path of radius 0.83 cm in the presence of a magnetic field of 0.25 Wb/m^2. The de Broglie wavelength associated with the particle will be

(1) 10 Å (2) 0.01 Å

(3) 1 Å (4) 0.1 Å

Sol. Answer (2)

$$\lambda = \frac{h}{mv} \text{ and } R = \frac{mv}{qB}$$

$$\therefore \quad \lambda = \frac{h}{qBR} = 0.01 \text{ Å}$$

40. Monochromatic radiation emitted when electron on hydrogen atom jumps from first excited to the ground state irradiates a photosensitive material. The stopping potential is measured do be 3.57 V. The threshold frequency of the material is

(1) 1.6×10^{15} Hz (2) 2.5×10^{15} Hz

(3) 4×10^{15} Hz (4) 5×10^{15} Hz

Sol. Answer (1)

$(10.2 \text{ eV} - 3.57 \text{ eV}) = hf$

$\therefore \quad f = 1.6 \times 10^{15}$ Hz

41. A 200 W sodium street lamp emits yellow light of wavelength 0.6 μm. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is

(1) 62×10^{20} (2) 3×10^{19}

(3) 1.5×10^{20} (4) 6×10^{18}

Sol. Answer (3)

$$200 \times 25\% = n\frac{hc}{\lambda}$$

$\therefore \quad n = 1.5 \times 10^{20}$ per second

42. Electron in hydrogen atom first jumps from third excited state to second excited state and then from second excited to the first excited state. The ratio of the wavelengths $\lambda_1 : \lambda_2$ emitted in the two cases is

(1) $\frac{27}{5}$ (2) $\frac{20}{7}$

(3) $\frac{7}{5}$ (4) $\frac{27}{20}$

Sol. Answer (2)

$$\frac{\lambda_2}{\lambda_1} = \frac{\frac{1}{9} - \frac{1}{16}}{\frac{1}{4} - \frac{1}{9}}$$

$$\therefore \quad \frac{\lambda_1}{\lambda_2} = \frac{20}{7}$$

43. An electron of a stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom acquired as a result of photon emission will be

(1) $\frac{25 \text{ m}}{24 \text{ hR}}$ (2) $\frac{24 \text{ m}}{25 \text{ hR}}$

(3) $\frac{24 \text{ hR}}{25 \text{ m}}$ (4) $\frac{25 \text{ hR}}{24 \text{ m}}$

Sol. Answer (3)

As per conservation of momentum

Momentum of photon = Momentum of atom

$$\therefore \quad \frac{h}{\lambda} = m\text{v}$$

$$\therefore \quad \text{v} = \frac{h}{\lambda m} = \frac{h}{m} RZ^2 \left[\frac{1}{1^2} - \frac{1}{5^2}\right]$$

$$\therefore \quad \text{v} = \frac{\text{hR } 24}{25 \text{ m}}$$

44. If the nuclear radius of ^{27}Al is 3.6 Fermi, the approximate nuclear radius of ^{64}Cu is Fermi is

(1) 4.8 (2) 3.6

(3) 2.4 (4) 1.2

Sol. Answer (1)

$R \propto A^{1/3}$

45. A mixture consists of two radioactive materials A_1 and A_2 with half lives of 20 s and 10 s respectively. Initially the mixture has 40 g of A_1 and 160 g of A_2. The amount of the two in the mixture will become equal after

(1) 20 s (2) 40 s

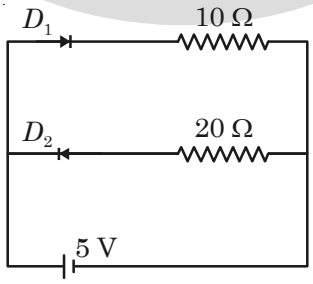
(3) 60 s (4) 80 s

Sol. Answer (2)

By arithmetic calculation using

$$A = \frac{A_0}{2^n} \quad (n = \text{number of half lives})$$

46. Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is



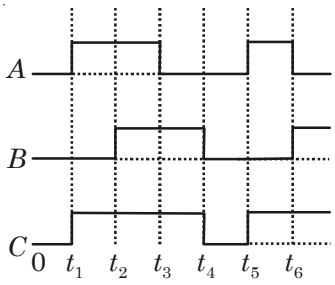
(1) 0.25 A (2) 0.5 A

(3) 0.75 A (4) Zero

Sol. Answer (2)

$I = \frac{5}{10} = 0.5$ A (D_2 is reverse biased)

47. The figure shows a logic circuit with two inputs A and B and the output C. The voltage wave forms across A, B and C are as given. The logic circuit gate is



(1) AND gate (2) NAND gate

(3) OR gate (4) NOR gate

Sol. Answer (3)

Using the truth table.

48. In a CE transistor amplifier, the audio signal voltage across the collector resistance of 2 kΩ is 2 V. If the base resistance is 1 kΩ and the current amplification of the transistor is 100, the input signal voltage is

(1) 1 mV (2) 10 mV

(3) 0.1 V (4) 1.0 V

Sol. Answer (2)

$$\frac{V_{out}}{V_{in}} = \beta \frac{R_{out}}{R_{in}}$$

$\therefore \quad V_{in} = 10$ mV

49. C and Si both have same lattice structure, having 4 bonding electrons in each. However, C is insulator whereas Si is intrinsic semiconductor. This is because

(1) The four bonding electrons in the case of C lie in the second orbit, whereas in the case of Si they lie in the third.

(2) The four bonding electrons in the case of C lie in the third orbit, whereas for Si they lie in the fourth orbit.

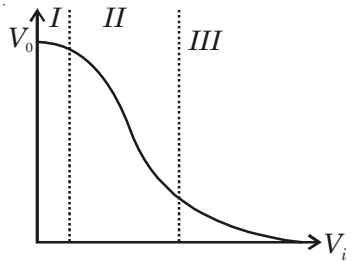
(3) In case of C the valance band is not completely filled at absolute zero temperature.

(4) In case of C the conduction band is partly filled even at absolute zero temperature.

Sol. Answer (1)

Fact.

50. Transfer characteristics [output voltage (V_0) vs input voltage (V_i)] for a base biased transistor in CE configuration is as shown in the figure. For using transistor as a switch, it is used



(1) In region II (2) In region I

(3) In region III (4) Both in region (I) and (III)

Sol. Answer (4)

Fact. (NCERT)

51. In a zero-order reaction for every 10° rise of temperature, the rate is doubled. If the temperature is increased from 10°C to 100°C, the rate of the reaction will become

(1) 64 times (2) 128 times

(3) 256 times (4) 512 times

Sol. Answer (4)

Rate = $(2)^9$ = 512 times.

52. Which **one** of the following pairs is isostructural (i.e. having the same shape and hybridization)?

(1) [NF_3 and BF_3] (2) [BF_4^- and NH_4^+]

(3) [BCl_3 and $BrCl_3$] (4) [NH_3 and NO_3^-]

Sol. Answer (2)

Both are sp^3 and tetrahedral.

53. In which of the following reactions, standard reaction entropy change ($\Delta S°$) is positive and standard Gibb's energy change ($\Delta G°$) decreases sharply with increasing temperature?

(1) $Mg(s) + \frac{1}{2}O_2(g) \longrightarrow MgO(s)$ (2) $\frac{1}{2}C\ \text{graphite} + \frac{1}{2}O_2(g) \longrightarrow \frac{1}{2}CO_2(g)$

(3) $C\ \text{graphite} + \frac{1}{2}O_2(g) \longrightarrow CO(g)$ (4) $CO(g) + \frac{1}{2}O_2(g) \longrightarrow CO_2(g)$

Sol. Answer (3)

$C(s) + \frac{1}{2}O_2(g) \rightarrow CO(g)$, as Δn_g increases, ΔS positive

54. In a reaction, $A + B \longrightarrow$ Product, rate is doubled when the concentration of B is doubled, and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled, rate law for the reaction can be written as

(1) Rate = k[A] [B] (2) Rate = $k[A]^2[B]$

(3) Rate = $k[A][B]^2$ (4) Rate = $k[A]^2[B]^2$

Sol. Answer (2)

Rate = $k[A]^2[B]^1$

55. Limiting molar conductivity of NH_4OH $\left(i.e.\ \mathring{\Lambda}_m(NH_4OH)\right)$ is equal to

(1) $\mathring{\Lambda}_m(NH_4OH) + \mathring{\Lambda}_m(NH_4Cl) - \mathring{\Lambda}_m(HCl)$ (2) $\mathring{\Lambda}_m(NH_4Cl) + \mathring{\Lambda}_m(NaOH) - \mathring{\Lambda}_m(NaCl)$

(3) $\mathring{\Lambda}_m(NH_4Cl) + \mathring{\Lambda}_m(NaCl) - \mathring{\Lambda}_m(NaOH)$ (4) $\mathring{\Lambda}_m(NaOH) + \mathring{\Lambda}_m(NaCl) - \mathring{\Lambda}_m(NH_4Cl)$

Sol. Answer (2)

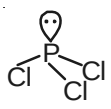
$\mathring{\Lambda}_m(NH_4Cl) + \mathring{\Lambda}_m(NaOH) - \mathring{\Lambda}_m(NaCl)$

56. Which of the following species contains three bond pairs and one lone pair around the central atom?

(1) NH_2^- (2) PCl_3

(3) H_2O (4) BF_3

Sol. Answer (2)



57. Buffer solutions have constant acidity and alkalinity because

(1) They have large excess of H^+ or OH^- ions

(2) They have fixed value of pH

(3) These give unionised acid or base on reaction with added acid or alkali

(4) Acids and alkalies in these solutions are shielded from attack by other ions

Sol. Answer (3)

They give unionised acid or base on reaction with added acid or alkali.

58. In Freundlich Adsorption isotherm, the value of $1/n$ is

(1) 1 in case of physical adsorption (2) 1 in case of chemisorption

(3) Between 0 and 1 in all cases (4) Between 2 and 4 in all cases

Sol. Answer (3)

Freundlich Adsorption isotherm, applicable at moderate pressure

$$\frac{1}{n} = 0 \text{ to } 1$$

59. pH of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product (K_{sp}) of $Ba(OH)_2$ is

(1) 4.0×10^{-6} (2) 5.0×10^{-6}

(3) 3.3×10^{-7} (4) 5.0×10^{-7}

Sol. Answer (4)

pH = 12, pOH = 2, $[OH^-] = 10^{-2}$

$K_{sp} = [Ba^{+2}]\,[OH^-]^2$

$$= \left[\frac{10^{-2}}{2}\right]\left[10^{-2}\right]^2$$

$$= 5 \times 10^{-7}$$

60. When Cl_2 gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from

(1) Zero to – 1 and zero to +3 (2) Zero to + 1 and zero to –3

(3) Zero to + 1 and zero to –5 (4) Zero to – 1 and zero to +5

Sol. Answer (4)

$$Cl_2 + \underset{\text{(Hot \& conc)}}{NaOH} \longrightarrow NaCl + NaClO_3 + H_2O$$

61. Which one of the following statement is **incorrect** about enzyme catalysis?

(1) Enzymes are denaturated by ultraviolet rays and at high temperature

(2) Enzymes are least reactive at optimum temperature

(3) Enzymes are mostly proteinous in nature

(4) Enzyme action is specific

Sol. Answer (2)

Enzymes are most reactive at optimum temperature.

62. p_A and p_B are the vapour pressure of pure liquid components, A and B, respectively of an ideal binary solution. If x_A represents the mole fraction of component A, the total pressure of the solution will be

(1) $p_B + x_A (p_B - p_A)$ (2) $p_B + x_A (p_A - p_B)$

(3) $p_A + x_A (p_B - p_A)$ (4) $p_A + x_A (p_A - p_B)$

Sol. Answer (2)

$p_T = x_A p_A + x_B p_B$

$= x_A p_A + p_B(1-x_A)$

$= p_A x_A + p_B - p_B - p_B x_A$

$p_T = (p_A - p_B)x_A + p_B$

63. The protecting power of lyophilic colloidal sol is expressed in terms of

(1) Critical miscelle concentration (2) Oxidation number

(3) Coagulation value (4) Gold number

Sol. Answer (4)

Fact.

64. Maximum number of electrons in a subshell with $l = 3$ and $n = 4$ is

(1) 10 (2) 12

(3) 14 (4) 16

Sol. Answer (3)

$l = 3$, $n = 4 \Rightarrow \therefore$ 4*f* sub-shell orbital $\longrightarrow 14e^-$.

65. 50 mL of each gas A and of gas B takes 150 and 200 seconds respectively for effusing through a pin hole under the similar conditions. If molecular mass of gas B is 36, the molecular mass of gas A will be

(1) 32 (2) 64

(3) 96 (4) 128

Sol. [No answer is correct, however the correct answer should be 20.25]

$$\frac{r_1}{r_2} = \frac{v_1/t_1}{v_2/t_2} = \frac{t_2}{t_1} = \frac{200}{150} = \frac{4}{3}, \quad \frac{r_1}{r_2} = \sqrt{\frac{m_2}{m_1}}, \frac{4}{3} = \sqrt{\frac{36}{x}}$$

$x = 20.25$

66. Standard enthalpy of vapourisation $\Delta_{vap}H^{\ominus}$ for water at 100° C is 40.66 $kJmol^{-1}$. The internal energy of vapourisation of water at 100°C (in $kJmol^{-1}$) is

(1) +43.76 (2) +40.66

(3) +37.56 (4) –43.76

(Assume water vapour to behave like an ideal gas)

Sol. Answer (3)

$\Delta H = \Delta E + \Delta n_g RT$

$\Delta n_g = 1$

$40660 = \Delta E + 1 \times 8.314 \times 373$

$\Delta E = 37.56$ kJ/mol

67. The number of octahedral void(s) per atom present in a cubic close-packed structure is

(1) 2 (2) 4

(3) 1 (4) 3

Sol. Answer (3)

Number of atom per unit cell in cubic close-packed = 4

Number of octahedral voids in cubic close-packed = 4

68. The correct set of four quantum numbers for the valence electron of rubidium atom (Z = 37) is

(1) $5,0,0, +\frac{1}{2}$ (2) $5,1,0, +\frac{1}{2}$

(3) $5,1,1, +\frac{1}{2}$ (4) $6,0,0, +\frac{1}{2}$

Sol. Answer (1)

Rb = $[Kr]5s^1$

$\therefore \quad n = 5,\ l = 0,\ m = 0,\ s = \frac{1}{2}$

69. A metal crystallizes with a face-centered cubic lattice. The edge of the unit cell is 408 pm. The diameter of the metal atom is

(1) 144 pm (2) 204 pm

(3) 288 pm (4) 408 pm

Sol. Answer (3)

fcc structure = $\sqrt{2}a = 2d$

$$d = \frac{1.414 \times 408}{2} = 288 \text{ pm}$$

70. The enthalpy of fusion of water is 1.435 kcal/mol. The molar entropy change for the melting of ice at 0°C is

(1) 5.260 cal/(mol K) (2) 0.526 cal/(mol K)

(3) 10.52 cal/(mol K) (4) 21.04 cal/(mol K)

Sol. Answer (1)

$$\Delta S = \frac{\Delta H}{T}$$

$$= \frac{1.435 \times 1000}{273} = 5.260 \text{ cal/(mol K)}$$

71. In which of the following compounds, nitrogen exhibits highest oxidation state?

(1) N_3H (2) NH_2OH

(3) N_2H_4 (4) NH_3

Sol. Answer (1)

$\underline{N}_3H = -\frac{1}{3}$

$\underline{N}H_2OH = -1$

$\underline{N}_2H_4 = -2$

$\underline{N}H_3 = -3$

72. Aluminium is extracted from alumina (Al_2O_3) by electrolysis of a molten mixture of

(1) $Al_2O_3 + Na_3AlF_6 + CaF_2$ (2) $Al_2O_3 + KF + Na_3AlF_6$

(3) $Al_2O_3 + HF + NaAlF_4$ (4) $Al_2O_3 + CaF_2 + NaAlF_4$

Sol. Answer (1)

$Al_2O_3 + Na_3AlF_6 + CaF_2$

73. Which of the statements is **not** true?

(1) $K_2Cr_2O_7$ solution in acidic medium is orange

(2) $K_2Cr_2O_7$ solution becomes yellow on increasing the pH beyond 7

(3) On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky colour is observed

(4) $Na_2Cr_2O_7$ is preferred over $K_2Cr_2O_7$ in volumetric analysis

Sol. Answer (4)

$K_2Cr_2O_7$ is preferred over $Na_2Cr_2O_7$ is volumetric analysis because $Na_2Cr_2O_7$ is deliquescent

74. A mixture of potassium chlorate, oxalic acid and sulphuric acid is heated. During the reaction which element undergoes maximum change in the oxidation number?

(1) Cl (2) C

(3) S (4) H

Sol. Answer (1)

$KClO_3 + H_2C_2O_4 + H_2SO_4 \longrightarrow CO_2 + ClO_2 + HClO_4 + KHSO_4 + H_2O$

75. Which one of the following is an outer orbital complex and exhibits paramagnetic behaviour?

(1) $[Cr(NH_3)_6]^{3+}$ (2) $[Co(NH_3)_6]^{3+}$

(3) $[Ni(NH_3)_6]^{2+}$ (4) $[Zn(NH_3)_6]^{2+}$

Sol. Answer (3)

$[Ni(NH_3)_6]^{+2} = sp^3d^2$

It has two unpaired electron.

76. The ease of adsorption of the hydrates alkali metal ions on an ion-exchange resins follows the order

(1) $K^+ < Na^+ < Rb^+ < Li^+$ (2) $Na^+ < Li^+ < K^+ < Rb^+$

(3) $Li^+ < K^+ < Na^+ < Rb^+$ (4) $Rb^+ < K^+ < Na^+ < Li^+$

Sol. Answer (3)

$Li^+ < K^+ < Na^+ < Rb^+$

77. Equimolar solutions of the following substances were prepared separately. Which one of these will record the highest pH value?

(1) LiCl (2) $BeCl_2$

(3) $BaCl_2$ (4) $AlCl_3$

Sol. Answer (3)

$BaCl_2$ is made up of $Ba(OH)_2$ + HCl.

$Ba(OH)_2$ is strongest base among the given option.

78. Sulphur trioxide can be obtained by which of the following reaction

(1) $S + H_2SO_4 \xrightarrow{\Delta}$ (2) $H_2SO_4 + PCl_5 \xrightarrow{\Delta}$

(3) $CaSO_4 + C \xrightarrow{\Delta}$ (4) $Fe_2(SO_4)_3 \xrightarrow{\Delta}$

Sol. Answer (4)

$Fe_2(SO_4)_3 \xrightarrow{\Delta} Fe_2O_3 + SO_3$

79. In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide with

(1) Iron sulphide (FeS) (2) Carbon monoxide (CO)

(3) Copper (I) sulphide (Cu_2S) (4) Sulphur dioxide (SO_2)

Sol. Answer (3)

Auto-reduction.

80. Identify the **wrong** statement in the following

(1) Atomic radius of the elements increases as one moves down the first group of the periodic table

(2) Atomic radius of the elements decreases as one moves across from left to right in the 2nd period of the periodic table

(3) Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius

(4) Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius

Sol. Answer (3)

Amongst isoelectronic species, smaller the positive charge on cation, larger is the ionic radius.

81. Which of the following statements is **not** valid for oxoacids of phosphorus?

(1) All oxoacids contain tetrahedral four coordinated phosphorus

(2) All oxoacids contain atleast one P = O unit and one P – OH group

(3) Orthophosphoric acid is used in the manufacture of triple superphosphate

(4) Hypophosphorous acid is a diprotic acid

Sol. Answer (4)

Hypophosphorus acid, H_3PO_2 is monoprotic acid.

82. Identify the alloy containing a non-metal as a constituent in it

(1) Bell metal (2) Bronze

(3) Invar (4) Steel

Sol. Answer (4)

Steel contains carbon which is non-metal.

83. The pair of species with the same bond order is

(1) NO, CO (2) N_2, O_2

(3) O_2^{2-}, B_2 (4) O_2^+, NO^+

Sol. Answer (3)

Both O_2^{2-}, B_2 have bond order 1.

84. Bond order of 1.5 is shown by

(1) O_2^{2-} (2) O_2

(3) O_2^+ (4) O_2^-

Sol. Answer (4)

Electric configuration of O_2^- : $\sigma 1s^2\ \sigma^*1s^2\ \sigma 2s^2\ \sigma^*2s^2$

$\sigma 2p_z^2,\ \pi 2p_x^2 = \pi 2p_y^2,\ \pi^*2p_x^2 = \pi^*2p_y^1$

Bond order of $O_2^- = \dfrac{N_b - N_a}{2} = \dfrac{10-7}{2} = 1.5$

85. Which one of the following is a mineral of iron?

(1) Pyrolusite (2) Magnetite

(3) Malachite (4) Cassiterite

Sol. Answer (2)

Magnetite $\rightarrow Fe_3O_4$

86. Which one of the alkali metals, forms only, the normal oxide, M_2O on heating in air?

(1) Li (2) Na

(3) Rb (4) K

Sol. Answer (1)

Lithium being small in size forms only normal oxide.

87. The correct order of decreasing acid strength of trichloroacetic acid (A), trifluoroacetic acid (B), acetic acid (C) and formic acid (D) is

(1) A > B > C > D (2) A > C > B > D

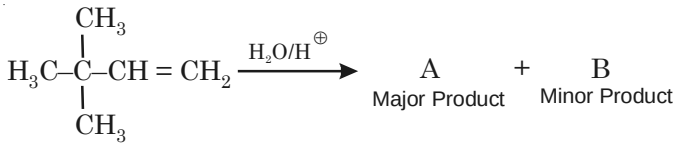
(3) B > A > D > C (4) B > D > C > A

Sol. Answer (3)

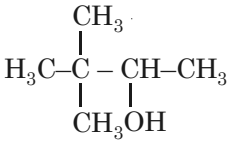
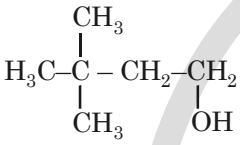
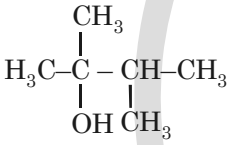
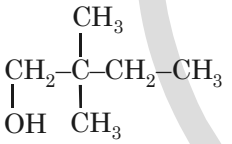
Electron withdrawing group increases the acidic character.

$CF_3COOH > CCl_3COOH > HCOOH > CH_3COOH$

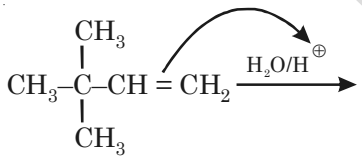
88. In the following reaction :



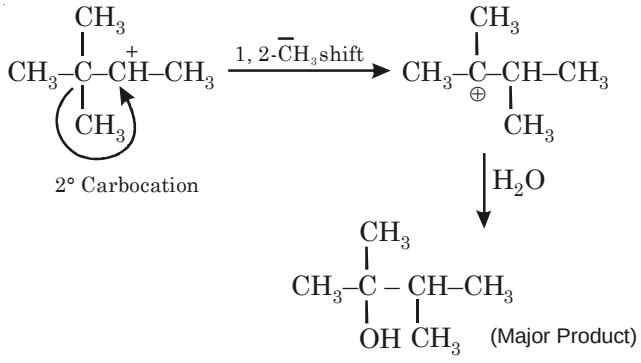
The major product is

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

Sol. Answer (3)



Reaction has carbocation as intermediate



89. Which nomenclature is **not** according to IUPAC system?

(1)	$CH_3–\underset{\displaystyle CH_3}{\underset{\vert}{CH}}–\underset{\displaystyle \bigcirc}{\underset{\vert}{CH}}–CH_2CH_3$, 2–Methyl–3–phenylpentane
(2)	$CH_3–\underset{\displaystyle O}{\overset{\displaystyle \Vert}{C}}–CH_2–CH_2COOH$, 5–oxohexanoic acid
(3)	$Br–CH_2–CH = CH_2$, 1–Bromo–prop–2–ene
(4)	$CH_3–CH_2–\underset{\displaystyle Br}{\underset{\vert}{\overset{\displaystyle CH_3}{\overset{\vert}{CH}}}}–CH_2–\underset{\displaystyle CH_3}{\underset{\vert}{CHCH_3}}$, 4–Bromo, 2, 4–di–methylhexane

Sol. Answer (3)

$Br–CH_2–CH = CH_2$

IUPAC name ⇒ 3 Bromoprop-1-ene

90. Among the following compounds the one that is most reactive towards electrophilic nitration is

(1) Toluene (2) Benzene

(3) Benzoic Acid (4) Nitrobenzene

Sol. Answer (1)

More the number of α-H, more the hyperconjugation and more the reactively.

91. Deficiency of vitamin B_1 causes the disease

(1) Cheilosis (2) Sterility

(3) Convulsions (4) Beri-Beri

Sol. Answer (4)

Beri-Beri

92. Which one of the following sets of monosaccharides forms sucrose?

(1) β–D–Glucopyranose and α–D–fructofuranose (2) α–D–Glucopyranose and β–D–fructopyranose

(3) α–D–Galactopyranose and α–D–Glucopyranose (4) α–D–Glucopyranose and β–D–fructofuranose

Sol. Answer (4)

α–D Glucopyranose + β–D fructofuranose

93. Which one of the following statements regarding photochemical smog is **not** correct?

(1) Photochemical smog is formed through photochemical reaction involving solar energy

(2) Photochemical smog does not cause irritation in eyes and throat

(3) Carbon monoxide does not play any role in photochemical smog formation

(4) Photochemical smog is an oxidising agent in character

Sol. Answer (2)

Photochemical smog causes irritation in eyes.

94. In the following sequence of reactions

$$CH_3-Br \xrightarrow{KCN} A \xrightarrow{H_3\overset{+}{O}} B \xrightarrow[ether]{LiAlH_4} C,$$

the end product (C) is

(1) Acetaldehyde (2) Ethyl alcohol

(3) Acetone (4) Methane

Sol. Answer (2)

$$CH_3Br \xrightarrow{KCN} \underset{(A)}{CH_3CN} \xrightarrow{H_3O^+} \underset{(B)}{CH_3COOH} \xrightarrow{LiAlH_4,\ ether} CH_3CH_2OH$$

95. Which one of the following is **not** a condensation polymer?

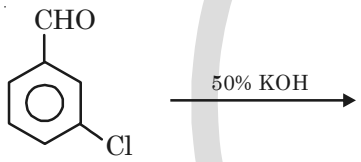
(1) Dacron (2) Neoprene

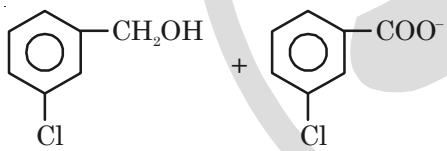
(3) Melamine (4) Glyptal

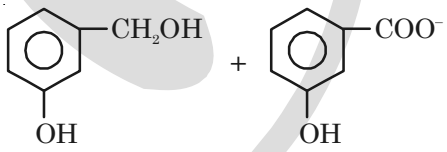
Sol. Answer (2)

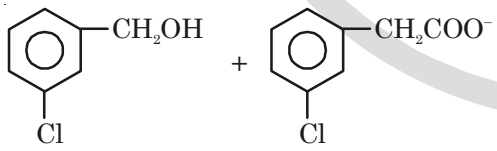
Neoprene is addition polymer of chloroprene

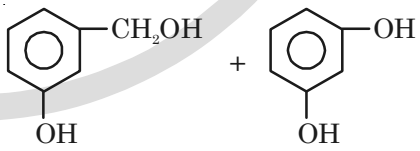
96. Predict the products in the given reaction.



(1) 

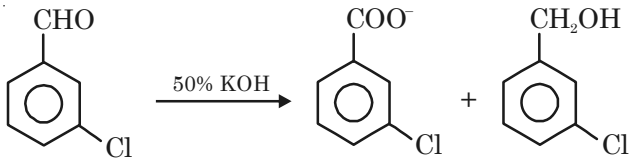
(2) 

(3) 

(4) 

Sol. Answer (1)

Cannizaro reaction



97. Which of the following acids does **not** exhibit optical isomerism?

(1) Lactic acid (2) Tartaric acid

(3) Maleic acid (4) α-amino acids

Sol. Answer (3)

Maleic acid.

98. CH_3CHO and $C_6H_5CH_2CHO$ can be distinguished chemically by:
(1) Tollen's reagent test (2) Fehling solution test
(3) Benedict test (4) Iodoform test

Sol. Answer (4)

CH_3CHO will give positive iodoform test but $C_6H_5CH_2CHO$ does not.

99. Which of the following statements is **false**?
(1) The repeat unit in natural rubber is isoprene.
(2) Both starch and cellulose are polymers of glucose.
(3) Artificial silk is derived from cellulose.
(4) Nylon-66 is an example of elastomer.

Sol. Answer (4)

Nylon 66 is fibre.

100. Acetone is treated with excess of ethanol in the presence of hydrochloric acid. The product obtained is:

(1) $(CH_3)_2C(OH)(OC_2H_5)$ (2) $(CH_3)_2C(OC_2H_5)_2$

(3) $CH_3CH_2CH_2-C(=O)-CH_3$ (4) $CH_3CH_2CH_2-C(=O)-CH_2CH_2CH_3$

Sol. Answer (2)

$$CH_3-C(=O)-CH_3 + C_2H_5OH \text{ (excess)} \xrightarrow{HCl} CH_3-C(OC_2H_5)_2-CH_3$$

101. *Cycas* and *Adiantum* resemble each other in having:
(1) Cambium (2) Vessels
(3) Seeds (4) Motile Sperms

Sol. Answer (4)

Both *Cycas* and *Adiantum* (walking fern) have multiciliated sperms.

Cambium & seeds are present in *Cycas*.

Vessels are absent in both.

102. Gymnosperms are also called soft wood spermatophytes because they lack:
(1) Thick-walled tracheids (2) Xylem fibres
(3) Cambium (4) Phloem fibres

Sol. Answer (2)

Xylem fibre is in very less amount in soft wood.

103. Maximum nutritional diversity is found in the group:
(1) Monera (2) Plantae
(3) Fungi (4) Animalia

Sol. Answer (1)

Monerans are photoautotrophs (photosynthetic) ecologically they are producers and decomposers.

104. Which one of the following is common to multicellular fungi, filamentous algae and protonema of mosses?
(1) Mode of Nutrition (2) Multiplication by fragmentation
(3) Diplontic life cycle (4) Members of kingdom Plantae

Sol. Answer (2)

Asexual reproduction in all by fragmentation.

105. Which statement is **wrong** for viruses?

(1) They have ability to synthesize nucleic acids and proteins.

(2) Antibiotics have no effect on them.

(3) All are parasites.

(4) All of them have helical symmetry.

Sol. Answer (4)

They are helical, polygonal and binal in shape.

106. Which one of the following is a **correct** statement?

(1) Antheridiophores and archegoniophores are present in pteridophytes.

(2) Origin of seed habit can be traced in pteridophytes.

(3) Pteridophyte gametophyte has a protonemal and leafy stage.

(4) In gymnosperms female gametophyte is free-living.

Sol. Answer (2)

Origin of seed habit from heterosporous pteriodophyte *i.e. Selaginella.*

107. Nuclear membrane is absent in

(1) *Volvox* (2) *Nostoc*

(3) *Penicillium* (4) *Agaricus*

Sol. Answer (2)

Nuclear membrane is absent in prokaryotes.

108. During gamete formation, the enzyme recombinase participates during

(1) Prophase-I (2) Prophase-II

(3) Metaphase-I (4) Anaphase-II

Sol. Answer (1)

Recombinase synthesis occurs in pachytene stage of prophase 1.

109. Which one of the following does **not** differ in *E.coli* and *Chlamydomonas*?

(1) Cell wall (2) Cell membrane

(3) Ribosomes (4) Chromosomal organization

Sol. Answer (2)

The cell membrane of prokaryotes is structurally similar to that of eukaryotes.

110. PCR and Restriction Fragment Length Polymorphism are the methods for

(1) DNA sequencing (2) Genetic fingerprinting

(3) Study of enzymes (4) Genetic transformation

Sol. Answer (2)

RFLP/VNTR is the basis of genetic finger printing. PCR is employed for gene/DNA amplification.

111. Removal of RNA polymerase III from nucleoplasm will affect the synthesis of

(1) mRNA (2) rRNA

(3) tRNA (4) hnRNA

Sol. Answer (3)

RNA polymerase III transcribes tRNA, ScRNA, 5S rRNA, and SnRNA.

112. Evolution of different species in a given area starting from a point and spreading to other geographical areas is known as

(1) Migration (2) Divergent evolution

(3) Adaptive radiation (4) Natural selection

Sol. Answer (3)

Evolution of different species in a given geographical area starting from a point and spreading to other geographical areas is known as adaptive radiation. Divergent evolution occurs in homologous structures.

113. Removal of introns and joining of exons in a defined order during transcription is called

(1) Slicing (2) Splicing

(3) Looping (4) Inducing

Sol. Answer (2)

Splicing

114. Which one of the following is **not** a part of a transcription unit in DNA?

(1) A promoter (2) The structural gene

(3) The inducer (4) A terminator

Sol. Answer (3)

The inducer (lactose/allolactose) is not the component of transcription unit.

115. An organic substance that can withstand environmental extremes and cannot be degraded by any enzyme is

(1) Lignin (2) Cellulose

(3) Cuticle (4) Sporopollenin

Sol. Answer (4)

Sporopollinin is resistant to enzyme, acid and alkali treatment.

116. Best defined function of Manganese in green plants is

(1) Nitrogen fixation (2) Water absorption

(3) Photolysis of water (4) Calvin cycle

Sol. Answer (3)

$\underset{(OEC)}{Mn^{2+}} \longrightarrow$ Photolysis of water

117. Water containing cavities in vascular bundles are found in

(1) *Cycas* (2) *Pinus*

(3) Sunflower (4) Maize

Sol. Answer (4)

Schizo-lysigenous water cavity is found in the VBs of Monocot stem.

118. Closed vascular bundles lack

(1) Cambium (2) Pith

(3) Ground tissue (4) Conjunctive tissue

Sol. Answer (1)

Cambium is absent in closed VBs.

119. Placentation in tomato and lemon is

(1) Marginal (2) Axile

(3) Parietal (4) Free central

Sol. Answer (2)

Axile placentation is characteristics of Solanaceae and Rutaceae.

120. Companion cells are closely associated with

(1) Trichomes (2) Guard cells

(3) Sieve elements (4) Vessel elements

Sol. Answer (3)

Companion cells associated with phloem.

121. Vexillary aestivation is characteristic of the family

(1) Solanaceae (2) Brassicaceae

(3) Fabaceae (4) Asteraceae

Sol. Answer (3)

Vexillary aestivation is found in corolla of family fabaceae

122. Phyllode is present in

(1) Australian Acacia (2) *Opuntia*

(3) *Asparagus* (4) *Euphorbia*

Sol. Answer (1)

Modified, green petiole/rachis in Australian acacia

123. The common bottle cork is a product of

(1) Xylem (2) Vascular cambium

(3) Dermatogen (4) Phellogen

Sol. Answer (4)

Cork cells and secondary cortex are formed by the activity of cork cambium (Phellogen)

124. Which one of the following is **wrong** statement?

(1) Phosphorus is a constituent of cell membranes, certain nucleic acids and all proteins

(2) *Nitrosomonas* and *Nitrobacter* are chemoautotrophs

(3) *Anabaena* and Nostoc are capable of fixing nitrogen in free-living state also

(4) Root nodule forming nitrogen fixers live as aerobes under free-living conditions

Sol. Answer (1)

P is component of DNA and RNA but not in proteins.

125. How many plants in the list given below have composite fruits that develop from an inflorescence?

Walnut, poppy, radish, fig, pineapple, apple, tomato, mulberry.

(1) Two

(2) Three

(3) Four

(4) Five

Sol. Answer (2)

Composite fruits are fig(syconus), mulberry and pineapple (sorosis)

126. Cymose inflorescence is present in

(1) *Trifolium* (2) *Brassica*

(3) *Solanum* (4) *Sesbania*

Sol. Answer (3)

Cymose inflorescence in solanaceae

127. Which one of the following is **correctly** matched?

(1) Potassium – Readily immobilisation (2) Bakane of rice seedlings – F. Skoog

(3) Passive transport of nutrients – ATP (4) Apoplast – Plasmodesmata

Sol. None of the option is correct w.r.t., question statement.

Answer may be (1), if option 1 statement be read as "potassium-readily mobilization" instead of "potassium readily immobilization".

128. A process that makes important difference between C_3 and C_4 plants is

(1) Photosynthesis (2) Photorespiration

(3) Transpiration (4) Glycolysis

Sol. Answer (2)

C4-plant lack photorespiration.

129. The correct sequence of cell organelles during photorespiration is

(1) Chloroplast, – mitochondria, – peroxisome

(2) Chloroplast, – vacuole, – peroxisome

(3) Chloroplast, – Golgibodies, – mitochondria

(4) Chloroplast, – Rough endoplasmic reticulum, – Dictyosomes

Sol. Answer (1)

Photorespiration required 3 cell organelles-chloroplast, peroxisome and mitochondria.

130. The coconut water and the edible part of coconut are equivalent to

(1) Mesocarp (2) Embryo

(3) Endosperm (4) Endocarp

Sol. Answer (3)

Coconut is fibrous drupe with edible endosperm.

131. The gynoecium consists of many free pistils in flowers of

(1) *Papaver* (2) *Michelia*

(3) *Aloe* (4) Tomato

Sol. Answer (2)

Apocarpous condition is found in *Michelia*.

132. Which one of the following is **correctly** matched?

(1) *Chlamydomonas* – Conidia (2) Yeast – Zoospores

(3) Onion – Bulb (4) Ginger – Sucker

Sol. Answer (3)

Chlamydomonas-Zoospores.

133. Both, autogamy and geitonogamy are prevented in

(1) Castor (2) Maize

(3) Papaya (4) Cucumber

Sol. Answer (3)

Papaya is dioecious plant.

134. Even in absence of pollinating agents seed-setting is assured in

(1) *Salvia* (2) Fig

(3) *Commellina* (4) *Zostera*

Sol. Answer (3)

Closed bisexual flowers are found in *Commelina*.

135. Which one of the following areas in India, is a hotspot of biodiversity?

(1) Sunderbans (2) Western Ghats

(3) Eastern Ghats (4) Gangetic Plain

Sol. Answer (2)

Hotspots of India - Western Ghats and Sri Lank Himalayas and Indo-Burma.

136. Which one of the following is **not** a functional unit of an ecosystem?

(1) Productivity (2) Stratification

(3) Energy flow (4) Decomposition

Sol. Answer (2)

Stratification is structural component.

137. The upright pyramid of number is absent in

(1) Lake (2) Grassland

(3) Pond (4) Forest

Sol. Answer (4)

Forest/tree ecosystem supporting parasitic food chain

138. Which one of the following is **not** a gaseous biogeochemical cycle in ecosystem?

(1) Nitrogen cycle (2) Carbon cycle

(3) Sulphur cycle (4) Phosphorus cycle

Sol. Answer (4)

Phosphorus shows sedimentary cycle.

139. Which one of the following is a wrong statement?

(1) Greenhouse effect is a natural phenomenon

(2) Eutrophication is a natural phenomenon in freshwater bodies

(3) Most of the forests have been lost in tropical areas

(4) Ozone in upper part of atmosphere is harmful to animals

Sol. Answer (4)

Ozone in upper part i.e., stratosphere is beneficial.

140. The highest number of species in the world is represented by

(1) Algae (2) Lichens

(3) Fungi (4) Mosses

Sol. Answer (3)

Fungi - 7200 species.

141. Yeast is used in the production of

(1) Bread and beer (2) Cheese and butter

(3) Citric acid and lactic acid (4) Lipase and pectinase

Sol. Answer (1)

Yeast is used in bread and beer production.

142. Which one of the following microbes forms symbiotic association with plants and helps them in their nutrition?

(1) *Glomus* (2) *Trichoderma*

(3) *Azotobacter* (4) *Aspergillus*

Sol. Answer (1)

Glomus is endomycorrhiza.

143. A single strand of nucleic acid tagged with a radioactive molecule is called

(1) Plasmid (2) Probe

(3) Vector (4) Selectable marker

Sol. Answer (2)

A single stranded DNA or RNA, tagged with a radioactive molecule is called a probe, it is allowed to hybridise to its complementary DNA in a clone of cells followed by detection using autoradiography.

144. A patient brought to a hospital with myocardial infarction is normally immediately given

(1) Cyclosporin–A (2) Statins

(3) Penicillin (4) Streptokinase

Sol. Answer (4)

To dissolve clot in heart patients the doctors give *streptokinase* injection.

145. A nitrogen fixing microbe associated with *Azolla* in rice fields is

(1) *Frankia* (2) *Tolypothrix*

(3) *Spirulina* (4) *Anabaena*

Sol. Answer (4)

Cyanobacteria (*Anabaena*) are important biofertilizers of paddy field.

146. Which one is a **true** statement regarding DNA polymerase used in PCR?

(1) It is isolated from a virus

(2) It remains active at high temperature

(3) It is used to ligate introduced DNA in recipient cells

(4) It serves as a selectable marker

Sol. Answer (2)

In PCR, thermostable Taq DNA polymerase is used isolated from a bacterium, *Thermus aquaticus*.

147. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin 'A' deficiency?

(1) Golden rice (2) Bt-Brinjal

(3) Flaver Savr' tomato (4) Canolla

Sol. Answer (1)

Golden rice is rich in vitamin A and iron.

148. Which one of the following is a case of **wrong** matching?

(1) Micropropagation-In vitro production of plants in large numbers

(2) Callus - Unorganised mass of cells produced in tissue culture

(3) Somatic hybridization - Fusion of two diverse cells

(4) Vector DNA - Site for t-RNA synthesis

Sol. Answer (4)

RNA polymerase III activity in nucleus for tRNA synthesis.

149. Which part would be most suitable for raising virus-free plants for micropropagation?

(1) Meristem (2) Node

(3) Bark (4) Vascular tissue

Sol. Answer (1)

Virus-free plants are obtained from apical or axillary meristem.

150. For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of

(1) Silicon or Platinum (2) Gold or Tungsten

(3) Silver or Platinum (4) Platinum or Zinc

Sol. Answer (2)

Biolistic or gene gun is a direct or vector less method of gene transfer. In this microparticles of gold or tungsten coated with DNA are bombarded on plant cells.

151. The cyanobacteria are also referred to as

(1) Slime moulds (2) Blue green algae

(3) Protists (4) Golden algae

Sol. Answer (2)

Cyanobacteria or BGA

152. Which one single organism or the pair of organisms is **correctly** assigned to its or their named taxonomic group?

(1) Yeast used in making bread and beer is a fungus

(2) *Nostoc* and *Anabaena* are examples of protista

(3) *Paramecium* and *Plasmodium* belong to the same kingdom as that of *Penicillium*.

(4) Lichen is a composite organism formed from the symbiotic association of an algae and a protozoan.

Sol. Answer (1)

Yeast is used in bread and beer production.

153. In which one of the following, the genus name, its two characters and its phylum are **not** correctly matched, whereas the remaining three are correct?

	Genus Name	**Two Characters**		**Phylum**
(1)	*Sycon*	(a)	Pore bearing	Porifera
		(b)	Canal System	
(2)	*Periplaneta*	(a)	Jointed Appendages	Arthropoda
		(b)	Chitinous Exoskeleton	
(3)	*Pila*	(a)	Body segmented	Mollusca
		(b)	Mouth with Radula	
(4)	*Asterias*	(a)	Spiny skinned	Echinodermata
		(b)	Water vascular System	

Sol. Answer (3)

Pila belongs to the phylum mollusca. In this phylum we include soft bodied unsegmented animals including *Pila*.

154. Select the **correct** statement from the following regarding cell membrane

(1) Lipids are arranged in a bilayer with polar heads towards the inner part.

(2) Fluid mosaic model of cell membrane was proposed by Singer and Nicolson.

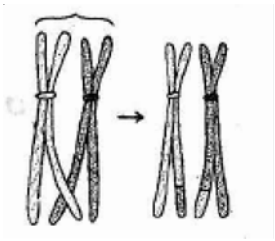
(3) Na^+ and K^+ ions move across cell membrane by passive transport.

(4) Proteins make up 60 to 70% of the cell membrane

Sol. Answer (2)

Most accepted model.

155. Given below is the representation of a certain event at a particular stage of a type of cell division. Which is this stage?

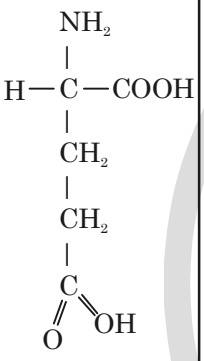
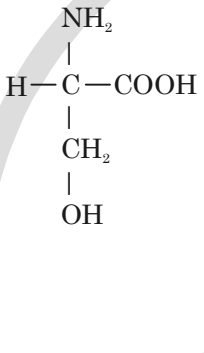
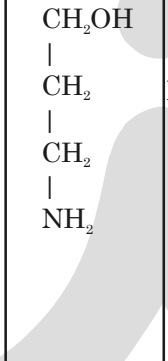
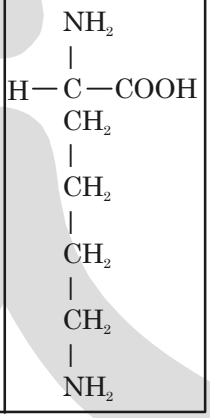


(1) Prophase of Mitosis
(2) Both prophase and metaphase of mitosis
(3) Prophase I during meiosis
(4) Prophase II during meiosis

Sol. Answer (3)

Crossing over occurs in pachytene (Prophase-I)

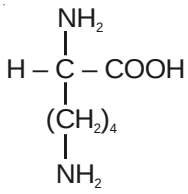
156. Which one out of A - D given below correctly represents the structural formula of the basic amino acid?

A	B	C	D
			

Options :

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

Sol. Answer (4)

The choice (4) represents basic amino acid lysine, with the structure formula 

Whereas, the choice A, represents glutamic amino acid, and choice B represent alcoholic amino and acid.

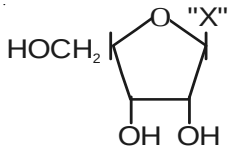
157. What is **true** about ribosomes ?

(1) These are found only in eukaryotic cells
(2) These are self-splicing introns of some RNAs.
(3) The prokaryotic ribosomes are 80S, where "S" stands for sedimentation coefficient
(4) These are composed of ribonucleic acid and proteins.

Sol. Answer (4)

Ribosomes = r-RNA + Protein

158. Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the **category** shown and the one blank **component** "X' in it



	Category	**Component**
(1)	Nucleotide	Adenine
(2)	Nucleoside	Uracil
(3)	Cholesterol	Guanin
(4)	Amino acid	NH_2

Sol. Answer (2)

Nucleoside is made up of ribose sugar and nitrogenous base only.

159. Ribosomal RNA is actively synthesized in :

(1) Nucleoplasm (2) Ribosomes

(3) Lysosomes (4) Nucleolus

Sol. Answer (4)

Nucleolus is the site of rRNA synthesis.

160. F_2 generation in a Mendelian cross showed that both genotypic and phenotypic ratios are same as 1 : 2 : 1. It represents a case of

(1) Monohybrid cross with complete dominance

(2) Monohybrid cross with incomplete dominance

(3) Co-dominance

(4) Dihybrid cross

Sol. Answer (2)

Both phenotypic and genotypic ratio are similar in incomplete dominance.

161. What was the most significant trend in the evolution of modern man (Homo sapiens) from his ancestors?

(1) Increasing cranial capacity (2) Upright posture

(3) Shortening of jaws (4) Binocular vision

Sol. Answer (1)

The most important trend in human evolution is increase in cranial capacity.

162. If one strand of DNA has the nitrogenous base sequence as ATCTG, what would be the complementary RNA strand sequence?

(1) AACTG (2) ATCGU

(3) TTAGU (4) UAGAC

Sol. Answer (4)

Sequence on RNA will be UAGAC.

163. Which one of the following options gives one correct example each of convergent evolution and divergent evolution?

	Convergent Evolution	**Divergent evolution**
(1)	Bones of forelimbs of vertebrates	Wings of butterfly and birds
(2)	Thorns of BougainvillIa and tendrils of *Cucurbita*	Eyes of Octopus and mammals
(3)	Eyes of octopus and mammals	Bones of forelimbs of vertebrates
(4)	Thorns of Bougainvillia and tendrils of *Cucurbita*	Wings of butterflies and birds

Sol. Answer (3)

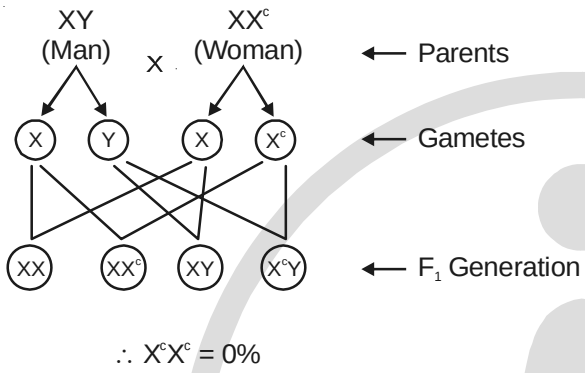
Eye of octopus and mammals is an example of convergent evolution, whereas bones of forelimbs of vertebrates is an example of divergent evolution.

164. A normal-visioned man whose father was colour-blind, marries a woman whose father was also colour blind. They have their first child as a daughter. What are the chances that this child would be colour-blind?

(1) 25% (2) 50%

(3) 100% (4) Zero percent

Sol. Answer (4)



$\therefore X^cX^c = 0\%$

165. Select the **correct** statement regarding the specific disorder of muscular or skeletal system :

(1) *Myasthenia gravis* - Auto immune disosrder which inhibits sliding of myosin filaments

(2) *Gout* - inflammation of joints due to extra deposition of calcium

(3) *Muscular dystrophy* - age related shortening of muscles

(4) *Osteoporosis* - decrease in bone mass and higher chances of fractures with advancing age

Sol. Answer (4)

Myasthenia gravis is an autoimmune disorder involving weakening and paralysis of skeletal muscles. Gouty arthritis in due to deposition of uric acid crystals in the joint. Muscular dystrophy is genetic disorder leading to degeneration of skeletal muscles.

166. A certain road accident patient with unknown blood group needs immediate blood transfusion. His one doctor friend at once offers his blood. What was the blood group of the donor?

(1) Blood group O (2) Blood group A

(3) Blood group B (4) Blood group AB

Sol. Answer (1)

People with blood group O, are universal donors.

167. The maximum amount of electrolytes and water (70 - 80 percent) from the glomerular filtrate is reabsorbed in which part of the nephron?

(1) Proximal convoluted tubule (2) Descending limb of loop of Henle

(3) Ascending limb of loop of Henle (4) Distal convoluted tubule

Sol. Answer (1)

The maximum of electrolytes and water (70 – 80%) from the glomerular filtrate are absorbed in PCT.

168. The human hind brain comprises three parts, one of which is

(1) Cerebellum (2) Hypothalamus

(3) Spinal cord (4) Corpus callosum

Sol. Answer (1)

169. Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside it (mostly in the nucleus)

(1) Somatostatin, oxytocin (2) Cortisol, testosterone

(3) Insulin, glucagon (4) Thyroxin, Insulin

Sol. Answer (2)

Cortisol and testosterone are lipid soluble hormones, which can directly pass through the cells membrane and bind with intracellular receptors.

170. The Leydig cells as found in the human body are the secretory source of

(1) Glucagon (2) Androgens

(3) Progesterone (4) Intestinal mucus

Sol. Answer (2)

Leydig cells/interstitial cells, secrete a group of male sex hormones called as androgens.

171. Select the **correct** statement from the ones given below with respect to *Periplaneta americana*

(1) There are 16 very long Malpighian tubules present at the junctions of midgut and hindgut

(2) Grinding of food is carried out only by the mouth parts

(3) Nervous system located dorsally, consists of segmentally arranged ganglia joined by a pair of longitudinal connectives

(4) Males bear a pair of short thread like anal styles

Sol. Answer (4)

172. Anxiety and eating spicy food together in an otherwise normal human, may lead to

(1) Diarrhoea (2) Vomiting

(3) Indigestion (4) Jaundice

Sol. Answer (3)

173. Which one of the following is the **correct** statement for respiration in humans?

(1) Workers in grinding and stone-breaking industries may suffer, from lung fibrosis

(2) About 90% of carbon dioxide (CO_2) is carried by haemoglobin as carbaminohaemoglobin

(3) Cigarette smoking may lead to inflammation of bronchi

(4) Neural signals from pneumotoxic centre in pons region of brain can increase the duration of inspiration

Sol. Answer (1)

174. What is **correct** to say about the hormone action in humans?

(1) In females, FSH first binds with specific receptors on ovarian cell membrane

(2) FSH stimulates the secretion of estrogen and progesterone

(3) Glucagon is secreted by β-cells of Islets of langerhans and stimulates glycogenolysis

(4) Secretion of thymosins is stimulated with aging

Sol. Answer (1)

FSH hormone is one of the gonadotropins secreted by anterior lobe of pituitary. It is a proteinaceous hormone, so binds with extracellular or membrane bound receptors.

175. *Pheretima* and its close relatives derive nourishment from

(1) Soil insects (2) Small pieces of fresh fallen leaves of maize etc

(3) Sugarcane roots (4) Decaying fallen leaves and soil organic matter

Sol. Answer (4)

176. Compared to those of humans, the erythrocytes in frog are

(1) Very much smaller and fewer (2) Nucleated and without haemoglobin

(3) Without nucleus but with haemoglobin (4) Nucleated and with haemoglobin

Sol. Answer (4)

In frog the erythrocytes are oval, nucleated with haemoglobin.

177. Which one is the **most** abundant protein in the animal world?

(1) Collagen (2) Insulin

(3) Trypsin (4) Haemoglobin

Sol. Answer (1)

178. Which part of the human ear plays no role in hearing as such but is otherwise very much required?

(1) Vestibular apparatus (2) Ear ossicles

(3) Eustachian tube (4) Organ of Corti

Sol. Answer (1)

Vestibular apparatus is concerned with balancing

179. A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neuro-hormonal control system?

(1) Hypothalamus activates the parasympathetic division of brain

(2) Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal cortex

(3) Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal medulla

(4) Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse

Sol. Answer (3)

In emergency conditions the catecholamines are secreted.

180. In a normal pregnant woman, the amount of total gonadotropin activity was assessed. The result expected was

(1) High levels of FSH and LH in uterus to stimulate endometrial thickening

(2) High level of circulating HCG to stimulate estrogen and progesterone synthesis

(3) High level of circulating FSH and LH in the uterus to stimulate implantation of the embryo

(4) High level of circulating HCG to stimulate endometrial thickening

Sol. Answer (2)

In a pregnant female high levels of HCG will maintain corpus luteum and stimulate it to secrete estrogen and progesterone.

181. The Test-tube Baby Programme employs which one of the following techniques?

(1) Gamete intra fallopian transfer (GIFT) (2) Zygote intra fallopian transfer (ZIFT)

(3) Intra cytoplasmic sperm injection (ICSI) (4) Intra uterine insemination (IUI)

Sol. Answer (2)

182. Signals for parturition originate from

(1) Placenta only

(2) Fully developed foetus only

(3) Both placenta as well as fully developed foetus

(4) Oxytocin released from maternal pituitary

Sol. Answer (3)

Signals for parturition originate from fully developed foetus and placenta.

183. Which one of the following statements is **false** in respect of viability of mammalian sperm?

(1) Viability of sperm is determined by its motility

(2) Sperms must be concentrated in a thick suspension

(3) Sperm is viable for only up to 24 hours

(4) Survival of sperm depends on the pH of the medium and is more active in alkaline medium

Sol. Answer (3)

Sperms are viable for 48 hours to 72 hours. Whereas, the human ovum is viable only for 24 hours.

184. The extinct human who lived 1,00,000 to 40,000 years ago, in Europe, Asia and parts of Africa, with short stature, heavy eye brows, retreating fore heads, large jaws with heavy teeth, stocky bodies, a lumbering gait and stooped posture was

(1) Cro-magnan humans

(2) *Ramapithecus*

(3) *Homo habilis*

(4) Neanderthal human

Sol. Answer (4)

Neanderthal man roamed about in east and central Asia about 100,000 to 40,000 years ago.

185. What is the figure given below showing in particular?

(1) Tubectomy

(2) Vasectomy

(3) Ovarian cancer

(4) Uterine cancer

Sol. Answer (1)

186. In an area where DDT had been used extensively, the population of birds declined significantly because

(1) Cobras were feeding exclusively on birds

(2) Many of the birds eggs laid, did not hatch

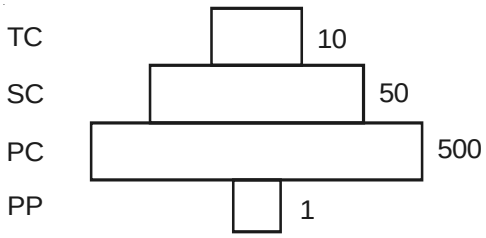
(3) Birds stopped laying eggs

(4) Earthworms in the area got eradicated

Sol. Answer (2)

DDT disturbs Ca-metabolism.

187. Given below is an imaginary pyramid of numbers. What could be one of the possibilities about certain organisms at some of the different levels?



(1) Level one PP is "pipal trees" and the level SC is "sheep"

(2) Level PC is "rats" and level SC is "cats"

(3) Level PC is "insects" and level SC is "small insectivorous birds"

(4) Level PP is "phytoplanktons" in sea and "Whale" on top level TC

Sol. Answer (3)

Single tree ecosystem w.r.t. GFC.

188. Common cold differs from pneumonia in, that

(1) Pneumonia is caused by a virus while the common cold is caused by the bacterium *Haemophilus influenzae*

(2) Pneumonia pathogen infects alveoli whereas the common cold affects nose and respiratory passage but not the lungs

(3) Pneumonia is a communicable disease whereas the common cold is a nutritional deficiency disease

(4) Pneumonia can be prevented by a live attenuated bacterial vaccine whereas the common cold has no effective vaccine

Sol. Answer (2)

189. Identify the possible link "A" in the following food chain

Plant → insect → frog → "A" → Eagle

(1) Cobra (2) Parrot

(3) Rabbit (4) Wolf

Sol. Answer (1)

Cobra → Tertiary consumer.

190. Which one of the following is an example of carrying out biological control of pests/diseases using microbes?

(1) Bt-cotton to increase cotton yield

(2) Lady bird beetle against aphids in mustard

(3) *Trichoderma* sp. against certain plant pathogens

(4) Nucleopolyhedrovirus against white rust in *Brassica*

Sol. Answer (1)

An example of microbial biocontrol agents that can be introduced in order to control butterfly caterpillars is the bacteria Bt.

191. Widal Test is carried out to test

(1) HIV/AIDS

(2) Typhoid fever

(3) Malaria

(4) Diabetes mellitus

Sol. Answer (2)

192. Cirrhosis of liver is caused by the chronic intake of

(1) Tobacco (Chewing) (2) Cocaine

(3) Opium (4) Alcohol

Sol. Answer (4)

193. Which one of the following in **not** a property of cancerous cells whereas the remaining three are?

(1) They divide in an uncontrolled manner

(2) They show contact inhibition

(3) They compete with normal cells for vital nutrients

(4) They do not remain confined in the area of formation

Sol. Answer (2)

Cancerous cells do not show the property of contact inhibition.

194. Motile zygote of *Plasmodium* occurs in

(1) Human RBCs (2) Human liver

(3) Gut of female *Anopheles* (4) Salivary glands of *Anopheles*

Sol. Answer (3)

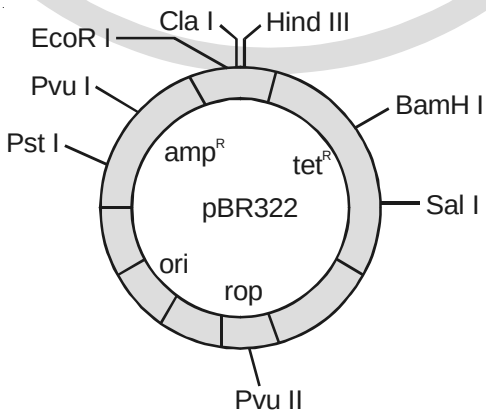
195. In which one of the following options the two examples are **correctly** matched with their particular type of immunity?

	Examples		**Type of immunity**
(1)	Saliva in mouth and tears in eyes	–	Physical barriers
(2)	Mucus coating of epithelium lining the urinogenital tract and the HCl in stomach	–	Physiological barriers
(3)	Polymorphonuclear leukocytes and monocytes	–	Cellular barriers
(4)	Anti-tetanus and anti-snake bite injections	–	Active immunity

Sol. Answer (3)

Polymorpho nuclear leucocytes (PMNL) also called as neutrophils and monocytes are included in cellular barrier.

196. The figure below is the diagrammatic representation of the *E.coli* vector pBR 322. Which one of the given options **correctly** identifies its certain component(s)?



(1) Hind III, EcoRI-selectable markers

(2) amp^R, tet^R-antibiotic resistance genes

(3) ori-original restriction enzyme

(4) rop-reduced osmotic pressure

Sol. Answer (2)

197. Measuring Biochemical Oxygen Demand (BOD) is a method used for

(1) Measuring the activity of *Saccharomyces cervisae* in producing curd on a commercial scale

(2) Working out the efficiency of R.B.Cs. about their capacity to carry oxygen

(3) Estimating the amount of organic matter in sewage water

(4) Working out the efficiency of oil driven automobile engines

Sol. Answer (3)

BOD is a measure of the organic matter present in the water.

198. The most abundant prokaryotes helpful to humans in making curd from milk and in production of antiobiotics are the ones categorised as

(1) Chemosynthetic autotrophs (2) Heterotrophic bacteria

(3) Cyanobacteria (4) Archaebacteria

Sol. Answer (2)

Heterotrophic bacteria are helpful in making curd from milk, antibiotic production etc.

199. People who have migrated from the planes to an area adjoining Rohtang Pass about six months back

(1) Suffer from altitude sickness with symptoms like nausea, fatigue, etc

(2) Have the usual RBC count but their haemoglobin has very high binding affinity to O_2

(3) Have more RBCs and their haemoglobin has a lower binding affinity to O_2

(4) Are not physically fit to play games like football

Sol. Answer (3)

As a person moves up a hill the pO_2 and total atmospheric pressure decreases. Decrease in pO_2, due to increasing altitude, stimulates the JG-cells of kidney to secrete erythropoietin hormone, increasing the number of RBCs to compensate the supply of O_2. At higher altitude haemoglobin has lower binding affinity to O_2, because the primary factor responsible for binding is pO_2, which decreases at higher altitude.

200. *Monascus purpureus* is a yeast used commercially in the production of

(1) Citric acid

(2) Blood cholesterol lowering statins

(3) Ethanol

(4) Streptokinase for removing clots from the blood vessels

Sol. Answer (2)

Statins are obtained from a yeast (*Monascus purpureus*).

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