NEET(UG)–2024 (EXAMINATION)

(Held On Sunday 5th MAY, 2024) CODE – Q6

PHYSICS

TEST PAPER WITH ANSWER AND SOLUTION

Physics : Section-A (Q. No. 1 to 35)

1. A bob is whirled in a horizontal plane by means of a string with an initial speed of ω rpm. The tension in the string is T. If speed becomes 2ω while keeping the same radius, the tension in the string becomes :

(1) T

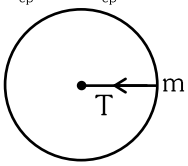
(2) 4T

(3) $\frac{T}{4}$

(4) $\sqrt{2}T$

Ans. (2)

Sol. $F_{cp} = ma_{cp}$



$F_{cp} = m\omega^2 r$

$T = m\omega^2 r$

Now speed becomes '2ω'

$T' = m(2\omega)^2 r$

$T' = 4\ m\omega^2 r$

$T' = 4T$

2. A particle moving with uniform speed in a circular path maintains :

(1) constant velocity

(2) constant acceleration.

(3) constant velocity but varying acceleration

(4) varying velocity and varying acceleration

Ans. (4)

Sol. In uniform circular motion direction of velocity and acceleration keeps on changing

3. A logic circuit provides the output Y as per the following truth table :

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

The expression for the output Y is

(1) $A.B + \bar{A}$

(2) $A.\bar{B} + \bar{A}$

(3) $\bar{B}$

(4) B

Ans. (3)

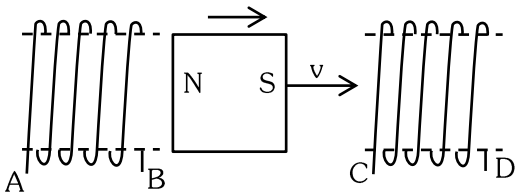
Sol.

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

According to truth table, relation is inverse between Y and B.

Here, $Y = \bar{B}$

4.



Solenoid-1 Solenoid-2

In the above diagrams, a strong bar magnet is moving towards solenoid-2 from solenoid-1. The direction of induced current in solenoid-1 and that in solenoid-2, respectively, are through the directions :

(1) AB and DC

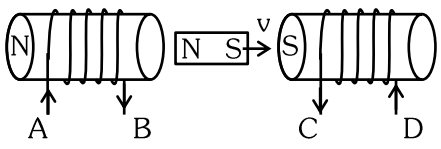
(2) BA and CD

(3) AB and CD

(4) BA and DC

Ans. (1)

Sol.



A to B & D to C

5. Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion (A) :- The potential (V) at any axial point, at 2 m distance (r) from the centre of the dipole of dipole moment vector $\vec{P}$ of magnitude, 4×10^{-6} C m, is $\pm9\times10^{3}$ V.

(Take $\frac{1}{4\pi\epsilon_0}=9\times10^{9}$ SI Units)

Reason (R) :- $V=\pm\frac{2P}{4\pi\epsilon_0 r^2}$,, where r is the distance of any axial point, situated at 2 m from the centre of the dipole.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both A and R are true and R is the correct explanation of A.

(2) Both A and R are true and R is NOT the correct explanation of A.

(3) A is true but R is false.

(4) A is false but R is true.

Ans. (3)

Sol. $V_{dipole}=\frac{kp\cos\theta}{r^2}$

at axis ($\theta = 0°$ or $180°$)

$V_{Axis}=\pm\frac{kp}{r^2}=\pm\frac{9\times10^{9}\times4\times10^{-6}}{2^2}$

$=\pm9\times10^{3}V$

A $\rightarrow$ Correct

R $\rightarrow$ False. $\because V=\pm\frac{p}{4\pi\varepsilon_0 r^2}$

6. Match **List-I** with **List-II**

List-I (Material)	**List-II (Susceptibility (χ))**
A. Diamagnetic	I. $\chi = 0$
B. Ferromagnetic	II. $0 > \chi \geq -1$
C. Paramagnetic	III. $\chi >> 1$
D. Non-Magnetic	IV. $0 < \chi < \varepsilon$ (a small positive number)

Choose the correct answer from the options given below:

(1) A–II, B–III, C–IV, D–I

(2) A–II, B–I, C–III, D–IV

(3) A–III, B–II, C–I, D–IV

(4) A–IV, B–III, C–II, D–I

Ans. (1)

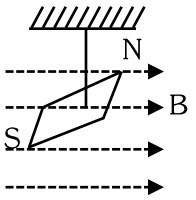
Sol. (A) Dia $\rightarrow$ II

(B) Ferro $\rightarrow$ III

(C) Para $\rightarrow$ (IV)

(D) Non magnetic $\rightarrow$ I

7. In a uniform magnetic field of 0.049 T, a magnetic needle performs 20 complete oscillations in 5 seconds as shown. The moment of inertia of the needle is 9.8×10^{-6} kg m^2. If the magnitude of magnetic moment of the needle is $x\times10^{-5}$ Am^2; then the value of 'x' is :



(1) $5\pi^2$

(2) $128\pi^2$

(3) $50\pi^2$

(4) $1280\pi^2$

Ans. (4)

Sol. B = 0.049 T, $f=\frac{20}{5}=4Hz$

$I = 9.8\times10^{-6}$ kg – m^2

$M = x\times10^{-5}$ A – m^2

$f=\frac{1}{2\pi}\sqrt{\frac{MB}{I}}$

$M=\frac{f^2I(4\pi^2)}{B}=\frac{16\times4\pi^2\times98\times10^{-7}}{49\times10^{-3}}$

$x\times10^{-5}=128\pi^2\times10^{-4}$

$x = 1280\pi^2$

8. In a ideal transformer, the turns ratio $\frac{N_p}{N_s}=\frac{1}{2}$. The ratio $V_s : V_p$ is equal to (the symbols carry their usual meaning) :

(1) 1 : 2 (2) 2 : 1

(3) 1 : 1 (4) 1 : 4

Ans. (2)

Sol. For ideal transformer

$$\frac{V_S}{V_P}=\frac{N_S}{N_P}=2:1$$

9. In a vernier calipers, (N+1) divisions of vernier scale coincide with N divisions of main scale. If 1 MSD represents 0.1 mm, the vernier constant (in cm) is :

(1) $\frac{1}{10N}$ (2) $\frac{1}{100(N+1)}$

(3) 100N (4) 10(N+1)

Ans. (2)

Sol. Vernier Constant = MSD – VSD

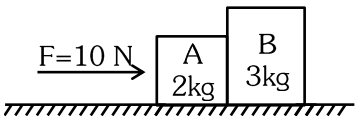
$$= \text{MSD} - \frac{N}{N+1}\text{MSD}$$

$$= \frac{1}{N+1}(\text{MSD})$$

$$= \frac{1}{N+1}(0.01)\,\text{cm}$$

$$= \frac{1}{100(N+1)}$$

10. A horizontal force 10 N is applied to a block A as shown in figure. The mass of blocks A and B are 2 kg and 3 kg, respectively. The blocks slide over a frictionless surface. The force exerted by block A on block B is :



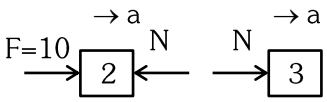
(1) zero (2) 4 N

(3) 6 N (4) 10 N

Ans. (3)

Sol. From Newton's II[nd] law.

$F_{net} = ma$



Block A : F – N = 2a or 10 – N = 2a ....(i)

Block B : N = 3a ...(ii)

On solving (i) & (ii)

$a = 2\ m/s^2$ and $N = 6\ N$

11. If $x = 5\sin\left(\pi t+\frac{\pi}{3}\right)$m represents the motion of a particle executing simple harmonic motion, the amplitude and time period of motion respectively, are :

(1) 5 cm, 2 s (2) 5 m, 2 s

(3) 5 cm, 1 s (4) 5 m, 1 s

Ans. (2)

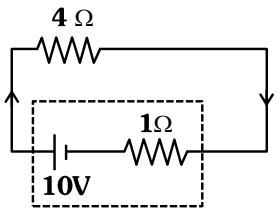
Sol. $x = 5\sin(\pi t + \frac{\pi}{3})$

comparing with $x = A\sin(\omega t + \phi)$

we get A = 5 m and $\omega = \pi$

$$\Rightarrow T = \frac{2\pi}{\omega}=\frac{2\pi}{\pi}=2\,\text{sec}.$$

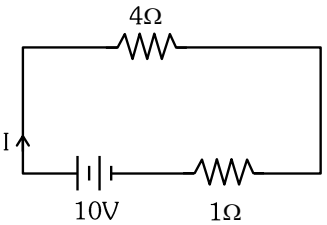
12. The terminal voltage of the battery, whose emf is 10V and internal resistance 1Ω, when connected through an external resistance of 4Ω as shown in the figure.



(1) 4V (2) 6V (3) 8V (4) 10V

Ans. (3)

Sol.



$$I = \frac{E}{R+r}=\frac{10}{4+1}=2A$$

$V_T = E - Ir$

$= 10 - 2\,(1)$

$= 8V$

13. Given below are two statements :

Statement I : Atoms are electrically neutral as they contain equal number of positive and negative charges.

Statement II : Atoms of each element are stable and emit their characteristic spectrum.

In the light of the above statements, choose the *most appropriate* answer from the options given below :

(1) Both Statement I and Statement II are correct.

(2) Both Statement I and Statement II are incorrect.

(3) Statement I is correct but Statement II is incorrect.

(4) Statement I is incorrect but Statement II is correct.

Ans. (3)

Sol. Statement I is correct.

Statement II is incorrect because atom of radioactive elements are not stable.

14. If c is the velocity of light in free space, the correct statements about photon among the following are :

A. The energy of a photon is $E = h\nu$

B. The velocity of a photon is c.

C. The momentum of a photon, $p = \frac{h\nu}{c}$

D. In a photon-electron collision, both total energy and total momentum are conserved.

E. Photon possesses positive charge.

Choose the correct answer from the options given below :

(1) A and B only (2) A, B, C and D only

(3) A, C and D only (4) A, B, D and E only

Ans. (2)

Sol. For a photon,

(i) Energy $E = h\nu \Rightarrow$ (statement A is correct)

(ii) All photons travel with speed of light (= c in free space)

$\Rightarrow$ statement B is correct

(iii) Momentum of a photon. $p = \frac{E}{c} = \frac{h\nu}{c}$

$\Rightarrow$ Statement C is correct.

(iv) In a photon-electron collision, total energy and total momentum are conserved.

$\Rightarrow$ statement D is also correct.

(v) Photons are massless and do not carry any charge.

$\Rightarrow$ statement E is incorrect.

Correct choice (2)

A, B, C, & D are correct.

15. Match List I with List II.

List I (Spectral Lines of Hydrogen for transitions from)	**List II (Wavelengths (nm))**
A. $n_2 = 3$ to $n_1 = 2$	I. 410.2
B. $n_2 = 4$ to $n_1 = 2$	II. 434.1
C. $n_2 = 5$ to $n_1 = 2$	III. 656.3
D. $n_2 = 6$ to $n_1 = 2$	IV. 486.1

Choose the correct answer from the options given below :

(1) A–II, B–I, C–IV, D–III

(2) A–III, B–IV, C–II, D–I

(3) A–IV, B–III, C–I, D–II

(4) A–I, B–II, C–III, D–IV

Ans. (2)

Sol. $\Delta E = \frac{hc}{\lambda}$

$\Delta E \rightarrow$ less

$\lambda \rightarrow$ large

$E_A < E_B < E_C < E_D$

$\Rightarrow 656.3 > 486.1 > 434.1 > 410.2$

III IV II I

$\Rightarrow$ A-III B-IV C-II D-I

16. A tightly wound 100 turns coil of radius 10 cm carries a current of 7 A. The magnitude of the magnetic field at the centre of the coil is (Take permeability of free space as $4\pi \times 10^{-7}$ SI units) :

(1) 44 mT (2) 4.4 T

(3) 4.4 mT (4) 44 T

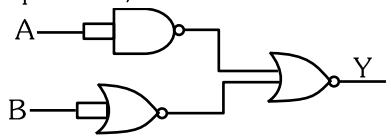
Ans. (3)

Sol. $B = \frac{\mu_0 NI}{2R}$

$= \frac{4\pi \times 10^{-7} \times 100 \times 7}{2 \times 0.1}$

$= 4.4$ mT

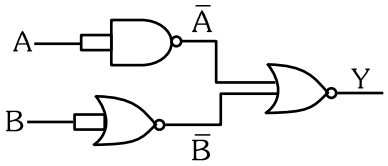
17. The output (Y) of the given logic gate is similar to the output of an/a :



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

Ans. (4)

Sol.



$\overline{\bar{A}+\bar{B}} \Rightarrow \bar{\bar{A}} \cdot \bar{\bar{B}} \Rightarrow A \cdot B$ (AND GATE)

18. A wire of length 'ℓ' and resistance 100Ω is divided into 10 equal parts. The first 5 parts are connected in series while the next 5 parts are connected in parallel. The two combinations are again connected in series. The resistance of this final combination is:

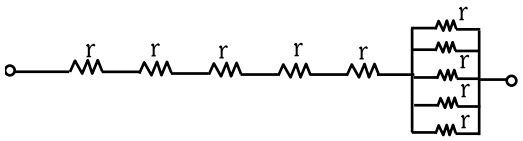
(1) 26Ω (2) 52Ω
(3) 55Ω (4) 60Ω

Ans. (2)

Sol. Wire resistance = 100Ω

Divided into 10 equal parts

so each part resistance r = $\frac{100}{10} = 10\Omega$



Req. = $5(10) + \frac{10}{5}$

= $52\ \Omega$

19. $^{290}_{82}X \xrightarrow{\alpha} Y \xrightarrow{e^+} Z \xrightarrow{\beta^-} P \xrightarrow{e^-} Q$

In the nuclear emission stated above, the mass number and atomic number of the product Q respectively, are :

(1) 280, 81 (2) 286, 80
(3) 288, 82 (4) 286, 81

Ans. (4)

Sol. $^{290}_{82}X \xrightarrow{\alpha} Y \xrightarrow{e^+} Z \xrightarrow{\beta^-} P \xrightarrow{e^-} {}_{81}Q^{286}$

20. The maximum elongation of a steel wire of 1m length if the elastic limit of steel and its Young's modulus, respectively, are 8×10^8 N m^{-2} and 2×10^{11} N m^{-2} is :

(1) 4 mm (2) 0.4 mm
(3) 40 mm (4) 8 mm

Ans. (1)

Sol. $Y = \frac{F\ell}{A\Delta\ell}$

$\Delta\ell = \frac{\left(\frac{F}{A}\right)\ell}{Y}$

$\Delta\ell = \frac{8\times10^8\times1}{2\times10^{11}}$

$\Delta\ell = 4\text{mm}$

21. If the monochromatic source in Young's double slit experiment is replaced by white light, then

(1) interference pattern will disappear.

(2) there will be a central dark fringe surrounded by a few coloured fringes.

(3) there will be a central bright white fringe surrounded by a few coloured fringes.

(4) all bright fringes will be of equal width.

Ans. (3)

Sol. When white light is used, then path difference due to all the colours at centre will be zero. Hence at centre, central bright white fringe will be observed but surrounding fringes will be coloured.

22. At any instant of time t, the displacement of any particle is given by $2t - 1$ (SI unit) under the influence of force of 5N. The value of instantaneous power is (in SI unit) :

(1) 10 (2) 5
(3) 7 (4) 6

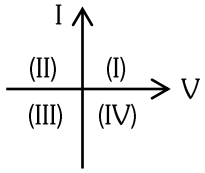
Ans. (1)

Sol. $x = 2t - 1$

$$\frac{dx}{dt} = v = 2 \text{ m/s}$$

$$P = \vec{F}.\vec{v} = 5(2) = 10 \text{ watt}$$

23. Consider the following statements A and B and identify the correct answer :



A. For a solar-cell, the I-V characteristics lies in the IV quadrant of the given graph.

B. In a reverse biased *pn* junction diode, the current measured in (μA), is due to majority charge carriers.

(1) A is correct but B is incorrect.

(2) A is incorrect but B is correct.

(3) Both A and B are correct.

(4) Both A and B are incorrect.

Ans. (1)

Sol. A. Solar-cell, the I-V characteristics lie in the IV quadrant.

B. In reverse biased condition due to drift of minority charge carriers current flow in μA

Answer should be (1) A is correct and (B) is incorrect

24. Two bodies A and B of same mass undergo completely inelastic one dimensional collision. The body A moves with velocity v_1 while body B is at rest before collision. The velocity of the system after collision is v_2. The ratio $v_1 : v_2$ is :

(1) 1 : 2

(2) 2 : 1

(3) 4 : 1

(4) 1 : 4

Ans. (2)

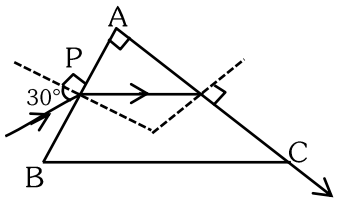
Sol. By Conservation of linear momentum :-

$$mv_1 = (m + m)\, v_2$$

$$\Rightarrow mv_1 = 2mv_2$$

$$\Rightarrow \frac{v_1}{v_2} = 2 : 1$$

25. A light ray enters through a right angled prism at point P with the angle of incidence 30° as shown in figure. It travels through the prism parallel to its base BC and emerges along the face AC. The refractive index of the prism is :



(1) $\frac{\sqrt{5}}{4}$

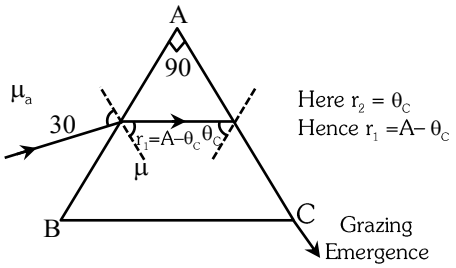
(2) $\frac{\sqrt{5}}{2}$

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

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

Ans. (2)

Sol.



By snell's law

$$\mu_a \sin 30 = \mu \sin r_1$$

$$\Rightarrow (1)\sin 30 = \mu \sin(A - \theta_C)$$

$$\Rightarrow \sin 30 = \mu \sin(90 - \theta_C)$$

$$\Rightarrow \sin 30 = \mu \cos \theta_C$$

$$\Rightarrow \sin 30 = \mu \frac{\sqrt{\mu^2 - 1}}{\mu}$$

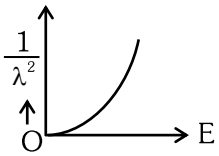
$$\Rightarrow \frac{1}{2} = \sqrt{\mu^2 - 1} \qquad \because \sin\theta_C = \frac{1}{\mu}$$

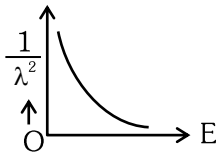
$\Rightarrow \frac{1}{4} = \mu^2 - 1$ $\qquad \cos\theta_C = \frac{\sqrt{\mu^2-1}}{\mu}$

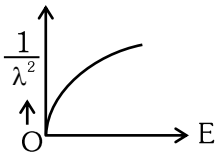
$\Rightarrow \mu^2 = 5/4$

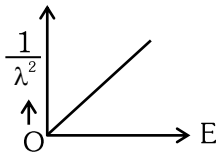
$\Rightarrow \mu = \frac{\sqrt{5}}{2}$

26. The graph which shows the variation of $\left(\frac{1}{\lambda^2}\right)$ and its kinetic energy, E is (where λ is de Broglie wavelength of a free particle) :

(1) 

(2) 

(3) 

(4) 

Ans. (4)

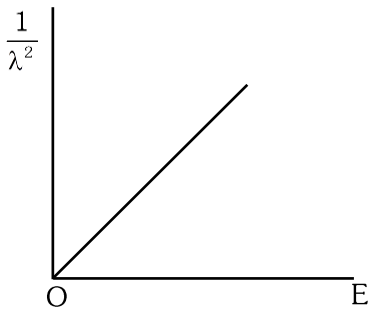
Sol. de-Broglie wavelength and energy relation of a free particle

$\lambda = \frac{h}{\sqrt{2mE}}$

$\lambda^2 = \frac{h^2}{2mE}$

$\frac{1}{\lambda^2} = \frac{2m}{h^2}E$

Graph $\frac{1}{\lambda^2}$ v / s E



27. The quantities which have the same dimensions as those of solid angle are :

(1) strain and angle

(2) stress and angle

(3) strain and arc

(4) angular speed and stress

Ans. (1)

Sol. Solid angle (Ω) = $\frac{A}{r^2}$

It is dimensionless quantity

So from options

Option (1) Strain & Angle both are dimensionless

28. An unpolarised light beam strikes a glass surface at Brewster's angle. Then :-

(1) the reflected light will be partially polarised.

(2) the refracted light will be completely polarised.

(3) both the reflected and refracted light will be completely polarised.

(4) the reflected light will be completely polarised but the refracted light will be partially polarised.

Ans. (4)

Sol. At Brewster's angle reflected and refracted rays are perpendicular to each other. Reflected light is completely polarised and refracted light is partially polarised.

29. The moment of inertia of a thin rod about an axis passing through its mid point and perpendicular to the rod is 2400 g cm^2. The length of the 400 g rod is nearly :

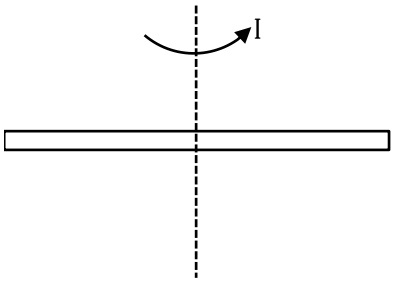
(1) 8.5 cm (2) 17.5 cm

(3) 20.7 cm (4) 72.0 cm

Ans. (1)

Sol. I = 2400 gcm^2

m = 400 g



$I = \frac{ML^2}{12}$

$2400 = \frac{400 \times L^2}{12}$

$\Rightarrow L^2 = 72$

$\Rightarrow L = \sqrt{72} \approx 8.5$ cm

30. A thin flat circular disc of radius 4.5 cm is placed gently over the surface of water. If surface tension of water is 0.07 Nm^{-1}, then the excess force required to take it away from the surface is :

(1) 19.8 mN

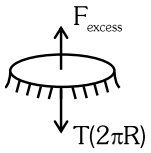
(2) 198 N

(3) 1.98 mN

(4) 99 N

Ans. (1)

Sol.



$F_{excess} = (T)(2\pi R)$

$$= (0.07)\left[2\times\frac{22}{7}\times4.5\times10^{-2}\right]$$

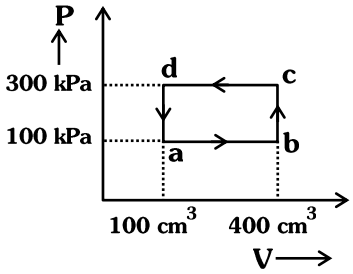
$$= 44\times4.5\times10^{-4}$$

$$= 198.0\times10^{-4}\,N$$

$$= 19.8\times10^{-3}\,N$$

$$= 19.8\,mN$$

31. A thermodynamic system is taken through the cycle abcda. The work done by the gas along the path bc is :



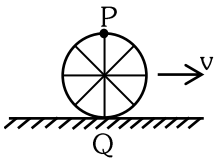
(1) zero (2) 30 J

(3) –90 J (4) –60 J

Ans. (1)

Sol. For path bc volume is constant
so work done is zero
$\Rightarrow W = 0$

32. A wheel of a bullock cart is rolling on a level road as shown in the figure below. If its linear speed is v in the direction shown, which one of the following options is correct (P and Q are any highest and lowest points on the wheel, respectively) ?



(1) Point P moves slower than point Q.

(2) Point P moves faster than point Q.

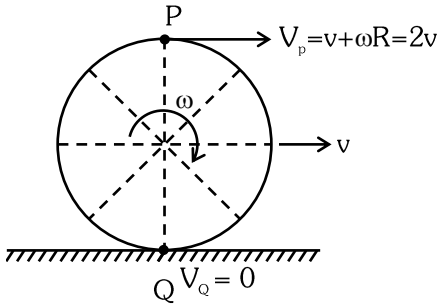
(3) Both the points P and Q move with equal speed.

(4) Point P has zero speed.

Ans. (2)

Sol. In case of Pure Rolling :-

$v = \omega R$



$\therefore V_p = 2V$

$V_Q = 0$

$\therefore$ Point 'P' moves faster than point Q.

33. The mass of a planet is $\frac{1}{10}$th that of the earth and its diameter is half that of the earth. The acceleration due to gravity on that planet is :

(1) 19.6 m s^{-2}

(2) 9.8 m s^{-2}

(3) 4.9 m s^{-2}

(4) 3.92 m s^{-2}

Ans. (4)

Sol. At Earth surface

$$g = \frac{GM}{R^2} = 9.8\ m/s^2$$

At given planet

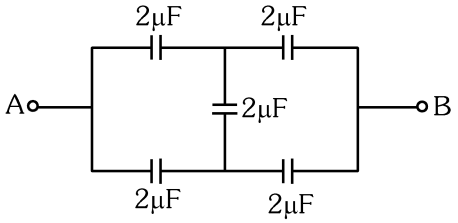
$$m' = \frac{m}{10}$$

$$R' = \frac{R}{2}$$

$$g' = \frac{G\left(\frac{m}{10}\right)}{\left(\frac{R}{2}\right)^2} = 0.4g$$

$$\boxed{g' = 3.92 m/s^2}$$

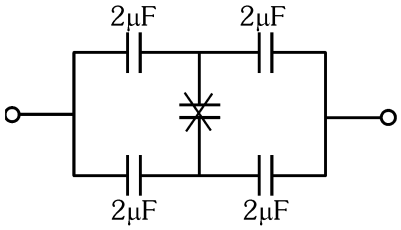
34. In the following circuit, the equivalent capacitance between terminal A and terminal B is :

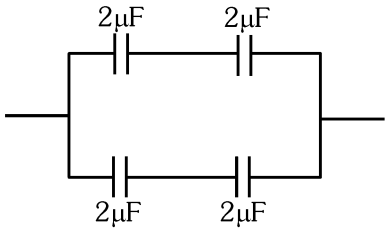


(1) 2μF
(2) 1μF
(3) 0.5μF
(4) 4μF

Ans. (1)

Sol. Balanced wheat stone bridge

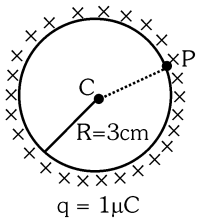




C_{eq} = 2μF

35. A thin spherical shell is charged by some source. The potential difference between the two points C and P (in V) shown in the figure is :

(Take $\frac{1}{4\pi \in_0} = 9 \times 10^9$ SI units)



(1) 3×10^5
(2) 1×10^5
(3) 0.5×10^5
(4) zero

Ans. (4)

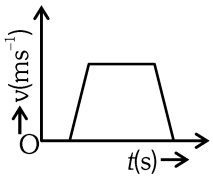
Sol. Shell is equipotential surface

So, $V_p = V_c$

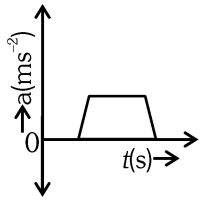
$\therefore$ Potential Difference = 0

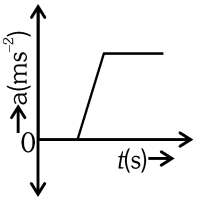
Physics : Section-B (Q. No. 36 to 50)

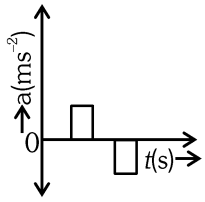
36. The velocity (v) – time (t) plot of the motion of a body is shown below :

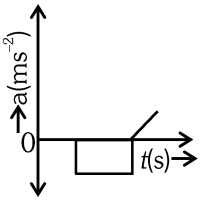


The acceleration (*a*) – time (*t*) graph that best suits this motion is :

(1) 

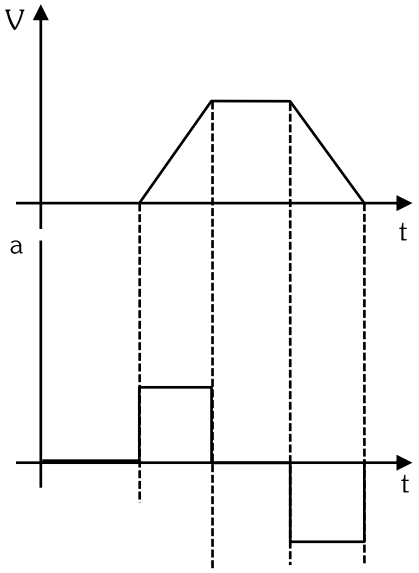
(2) 

(3) 

(4) 

Ans. (3)

Sol.



37. If the mass of the bob in a simple pendulum is increased to thrice its original mass and its length is made half its original length, then the new time period of oscillation is $\frac{x}{2}$ times its original time period. Then the value of x is :

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

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

Ans. (2)

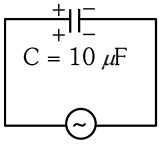
Sol. $T = 2\pi\sqrt{\frac{\ell}{g}}$

$T' = 2\pi\sqrt{\frac{\ell'}{g}} = 2\pi\sqrt{\frac{\ell/2}{g}}$

$T' = \frac{T}{\sqrt{2}} = \frac{x}{2}T$

$\Rightarrow x = \sqrt{2}$

38. A 10 μF capacitor is connected to a 210 V, 50 Hz source as shown in figure. The peak current in the circuit is nearly (π = 3.14) :



210V, 50 Hz

(1) 0.58 A (2) 0.93 A

(3) 1.20 A (4) 0.35 A

Ans. (2)

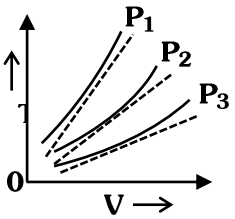
Sol. $I_{Peak} = \frac{V_{Peak}}{X_c} = V_{Peak}(\omega c)$

$= V_{Peak}(2\pi fc)$

$= (210\sqrt{2})(2\pi \times 50 \times 10 \times 10^{-6})$

$= 0.93$ Ampere

39. The following graph represents the T-V curves of an ideal gas (where T is the temperature and V the volume) at three pressures P_1, P_2 and P_3 compared with those of Charles's law represented as dotted lines.



Then the correct relation is :

(1) $P_3 > P_2 > P_1$

(2) $P_1 > P_3 > P_2$

(3) $P_2 > P_1 > P_3$

(4) $P_1 > P_2 > P_3$

Ans. (4)

Sol. PV = nRT

$\Rightarrow T = \frac{P}{nR}.V$

comparing with y = mx

$m = \text{slope} = \frac{P}{nR} \propto P$

$\Rightarrow P_1 > P_2 > P_3$

40. An iron bar of length L has magnetic moment M. It is bent at the middle of its length such that the two arms make an angle 60° with each other. The magnetic moment of this new magnet is :

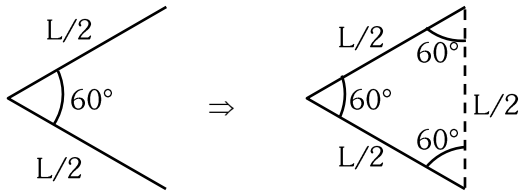
(1) M (2) $\frac{M}{2}$ (3) 2M (4) $\frac{M}{\sqrt{3}}$

Ans. (2)

Sol. Magnetic moment M = mL

where m is magnetic strength and L is length.

Now,



New magnetic moment,

$$M' = m \times \frac{L}{2} = \frac{mL}{2}$$

$$M' = \frac{M}{2}$$

41. The minimum energy required to launch a satellite of mass *m* from the surface of earth of mass *M* and radius *R* in a circular orbit at an altitude of 2R from the surface of the earth is :

(1) $\frac{5GmM}{6R}$

(2) $\frac{2GmM}{3R}$

(3) $\frac{GmM}{2R}$

(4) $\frac{GmM}{3R}$

Ans. (1)

Sol. Final Energy of satellite

$$TE_f = -\frac{GMm}{2(R+h)} = -\frac{GMm}{2(3R)} = -\frac{GMm}{6R}$$

Initial energy

$$PE_i = -\frac{GMm}{R}$$

Now by COME

$KE_i + PE_i = (KE_f + PE_f)$

$$KE_i - \frac{GMm}{R} = -\frac{GMm}{6R}$$

$$KE_i = -\frac{GMm}{6R} + \frac{GMm}{R}$$

$$\boxed{KE_i = \frac{5}{6}\frac{GMm}{R}}$$

42. A parallel plate capacitor is charged by connecting it to a battery through a resistor. If I is the current in the circuit, then in the gap between the plates :

(1) there is no current.

(2) displacement current of magnitude equal to I flows in the same direction as I.

(3) displacement current of magnitude equal to I flows in a direction opposite to that of I.

(4) displacement current of magnitude greater than I flows but can be in any direction.

Ans. (2)

Sol. Displacement current is equal to conduction correct and flows in same direction.

43. The property which is not of an electromagnetic wave travelling in free space is that :

(1) they are transverse in nature.

(2) the energy density in electric field is equal to energy density in magnetic field.

(3) they travel with a speed equal to $\frac{1}{\sqrt{\mu_0 \in_0}}$

(4) they originate from charges moving with uniform speed.

Ans. (4)

Sol. EMW is emitted from charge performing nonuniform motion

44. A metallic bar of Young's modulus, 0.5×10^{11} N m^{-2} and coefficient of linear thermal expansion 10^{-5} $°C^{-1}$, length 1 m and area of cross-section 10^{-3} m^2 is heated from 0°C to 100°C without expansion or bending. The compressive force developed in it is:

(1) 5×10^3 N

(2) 50×10^3 N

(3) 100×10^3 N

(4) 2×10^3 N

Ans. (2)

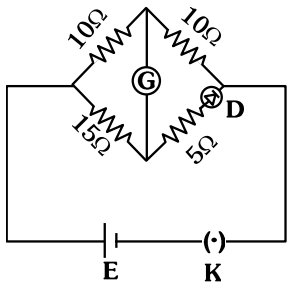
Sol. $F = YA\alpha\Delta\theta$

$= 0.5 \times 10^{11} \times 10^{-3} \times 10^{-5} \times (100 - 0)$

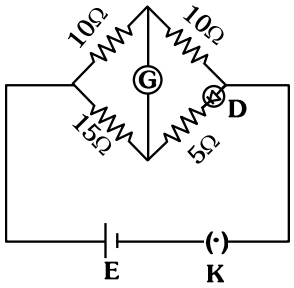
$= 50 \times 10^3$N

45. Choose the correct circuit which can achieve the bridge balance.

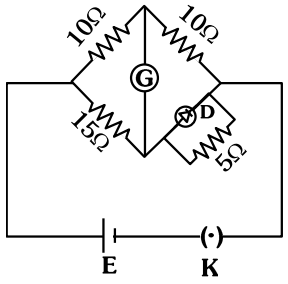
(1)



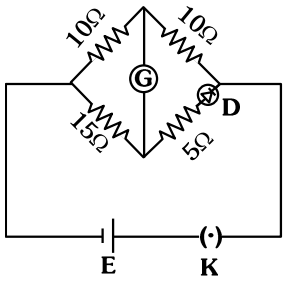
(2)



(3)



(4)



Ans. (1)

Sol. To Balance Bridge $\frac{P}{Q}=\frac{R}{S}$

Here P = 10 Ω

Q = 10 Ω

R = 15 Ω

and $S = 5 + R_{Diode}$

where R_{Diode} should be 10 Ω to Balance Bridge.

46. A sheet is placed on a horizontal surface in front of a strong magnetic pole. A force is needed to :

A. hold the sheet there if it is magnetic.

B. hold the sheet there if it is non-magnetic.

C. move the sheet away from the pole with uniform velocity if it is conducting.

D. move the sheet away from the pole with uniform velocity if it is both, non-conducting and non-polar.

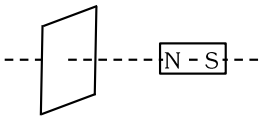
Choose the correct statement(s) from the options given below:

(1) B and D only (2) A and C only

(3) A, C and D only (4) C only

Ans. (2)

Sol.



A force is needed to

(A) hold the sheet there if it is magnetic

(C) move the sheet away from the pole with uniform velocity if it is conducting.

47. If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then

A. the charge stored in it, increases.

B. the energy stored in it, decreases.

C. its capacitance increases.

D. the ratio of charge to its potential remains the same.

E. the product of charge and voltage increases.

Choose the most appropriate answer from the options given below :

(1) A,B and E only (2) A,C and E only

(3) B, D and E only (4) A, B and C only

Ans. (2)

Sol. Battery connected so V = constant

Now $d\downarrow \Rightarrow C\uparrow$

A : $Q = CV \propto C \Rightarrow Q\uparrow$

B : $U = \frac{1}{2}CV^2 \propto C \Rightarrow U\uparrow$

C : $C = \frac{\epsilon_0 A}{d} \Rightarrow C\uparrow$

D : $\frac{Q}{V} = C \Rightarrow C\uparrow$

E : $(Q)(V) \propto C \Rightarrow QV\uparrow$

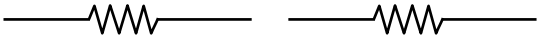
Therefore statements A, C and E are correct.

48. Two heaters A and B have power rating of 1 kW and 2 kW, respectively. Those two are first connected in series and then in parallel to a fixed power source. The ratio of power outputs for these two cases is :

(1) 1 :1 (2) 2 : 9 (3) 1 : 2 (4) 2 : 3

Ans. (2)

Sol. $P_1 = 1kW$ $P_2 = 2kW$



$$\underline{\text{In series}}\ P_S = \frac{P_1P_2}{P_1+P} = \frac{1\times 2}{1+2} = \frac{2}{3}kW$$

$$\underline{\text{In parallel}}\ P_P = P_1 + P_2 = 1+2 = 3kW$$

$$\Rightarrow \quad \frac{P_S}{P_P} = \frac{\frac{2}{3}}{3} = \frac{2}{9}$$

49. A small telescope has an objective of focal length 140 cm and an *eye* piece of focal length 5.0 cm. The magnifying power of telescope for viewing a distant object is :

(1) 34 (2) 28 (3) 17 (4) 32

Ans. (2)

Sol. For Telescope –

Magnifying power

$$\text{M.P.} = \frac{-fo}{fe} = \frac{-140}{5} = -28$$

MP = –28

50. A force defined by $F = \alpha t^2 + \beta t$ acts on a particle at a given time t. The factor which is dimensionless, if α and β are constants, is :

(1) $\frac{\beta t}{\alpha}$ (2) $\frac{\alpha t}{\beta}$

(3) $\alpha\beta t$ (4) $\frac{\alpha\beta}{t}$

Ans. (2)

Sol. Dimensional Formula of

$[\alpha t^2] = [F]$

$$[\alpha] = \left[\frac{MLT^{-2}}{T^2}\right] = [MLT^{-4}]$$

and $[\beta t] = [F]$

$$[\beta] = \frac{MLT^{-2}}{T} = [MLT^{-3}]$$

Option (2) is satisfied as $\frac{\alpha t}{\beta} = \frac{[MLT^{-4}][T]}{[MLT^{-3}]}$

$= [M^0L^0T^0]$

Chemistry : Section-A (Q. No. 51 to 85)

51. 'Spin only' magnetic moment is same for which of the following ions ?

A. Ti^{3+} B. Cr^{2+}

C. Mn^{2+} D. Fe^{2+}

E. Sc^{3+}

Choose the most appropriate answer from the options given below :

(1) B and D only (2) A and E only

(3) B and C only (4) A and D only

Ans. (1)

Sol. μ_{spin} only = $\sqrt{n(n+2)}$

where n = no. of unpaired e^-

(A) $Ti^{+3} \rightarrow 3d^1$ n = 1

(B) $Cr^{+2} \rightarrow 3d^4$ n = 4

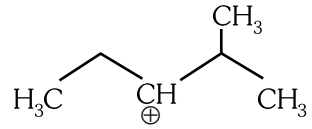
(C) $Mn^{+2} \rightarrow 3d^5$ n = 5

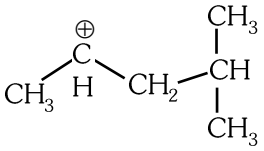
(D) $Fe^{+2} \rightarrow 3d^6$ n = 4

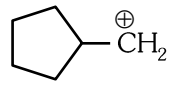
(E) $Sc^{+3} \rightarrow 3d^0$ n = 0

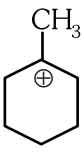
Since (B) and (D) contain same number of unpaired e^- so they have same spin only magnetic moment.

52. The most stable carbocation among the following is :

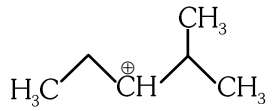
(1) 

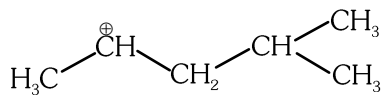
(2) 

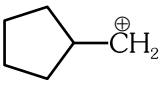
(3) 

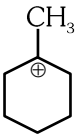
(4) 

Ans. (4)

Sol. (1)  $\alpha_H = 3$

(2)  $\alpha_H = 5$

(3)  $\alpha_H = 1$

(4)  $\alpha_H = 7$

53. Given below are two statements :

Statement-I : The boiling point of hydrides of Group-16 elements follow the order

$H_2O > H_2Te > H_2Se > H_2S$.

Statement-II : On the basis of molecular mass, H_2O is expected to have lower boiling point than the other members of the group but due to the presence of extensive H-bonding in H_2O, it has higher boiling point.

In the light of the above statements, choose the *correct* answer from the options given below :

(1) Both statement-I and Statement-II are true.

(2) Both statement-I and Statement-II are false.

(3) Statement-I is the true but Statement-II is false.

(4) Statement-I is false but Statement-II is true.

Ans. (1)

Sol. Boiling point order

$H_2O > H_2Te > H_2Se > H_2S$

$\Rightarrow$ Water has max. bpt due to presence of high extent of H-Bonding even though its molecular mass is minimum among these hydrides.

54. Match List I with List II.

List I (Compound)	**List II (Shape/geometry)**
(A) NH_3	(I) Trigonal Pyramidal
(B) BrF_5	(II) Square Planar
(C) XeF_4	(III) Octahedral
(D) SF_6	(IV) Square Pyramidal

Choose the correct answer from the options given below :

(1) A-I, B-IV, C-II, D-III (2) A-II, B-IV, C-III, D-I

(3) A-III, B-IV, C-I, D-II (4) A-II, B-III, C-IV, D-I

Ans. (1)

Sol. A-I, B-IV, C-II, D-III

(A) NH_3 - sp^3 + 1LP → Trigonal Pyramidal - (I)

(B) BrF_5 - sp^3d^2 + 1LP → Square Pyramidal - (IV)

(C) XeF_4 - sp^3d^2 + 2LP → Square Planar - (II)

(D) SF_6 - sp^3d^2 → Octahedral - (III)

55. The highest number of helium atoms is in :

(1) 4 mol of helium

(2) 4 u of helium

(3) 4 g of helium

(4) 2.271098 L of helium at STP

Ans. (1)

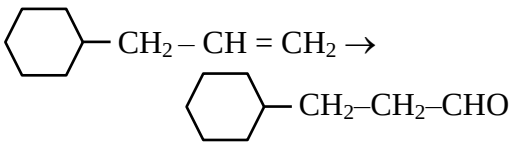
Sol. (1) 4 mol of He ; Number of He atom = $4 \times N_A$

(2) 4u of He ; Number of He atom = 1

(3) 4 g of He ; Number of He atom = N_A

(4) 0.1 mol of He ; Number of He atom = $0.1\ N_A$

56. Identify the correct reagents that would bring about the following transformation



(1) (i) H_2O/H^+ (ii) CrO_3

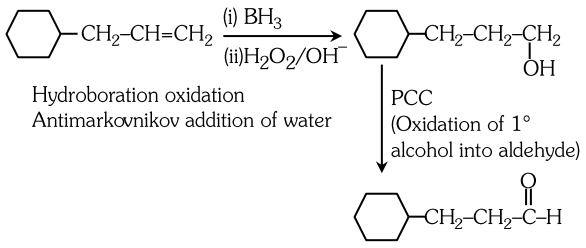
(2) (i) BH_3 (ii) H_2O_2 / $\overset{\ominus}{O}H$ (iii) PCC

(3) (i) BH_3 (ii) H_2O_2 / $\overset{\ominus}{O}H$ (iii) Alk. $KMnO_4$ (iv) $H_3O^{\oplus}$

(4) (i) H_2O/H^+ (ii) PCC

Ans. (2)

Sol.



57. Match List I with List II.

List-I (Process)	**List-II (Conditions)**
A. Isothermal process	I. No heat exchange
B. Isochoric process	II. Carried out at constant temperature
C. Isobaric process	III. Carried out at constant volume
D. Adiabatic process	IV. Carried out at constant pressure

Choose the correct answer from the options given below :

(1) A-IV, B-III, C-II, D-I

(2) A-IV, B-II, C-III, D-I

(3) A-I, B-II, C-III, D-IV

(4) A-II, B-III, C-IV, D-I

Ans. (4)

Sol. (A) Isothermal process → Temperature is constant(II)

(B) Isochoric process → Volume is constant(III)

(C) Isobaric process → Pressure is constant(IV)

(D) Adiabatic process → No exchange of heat(I)

58. Which one one of the following alcohols reacts instantaneously with Lucas reagent ?

(1) $CH_3 - CH_2 - CH_2 - CH_2OH$

(2) $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - OH$

(3) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2OH$

(4) $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - OH$

Ans. (4)

Sol. Reactivity order of alcohols towards Lucas' reagent

3° alcohol > 2° alcohol > 1° alcohol

$CH_3-CH_2-CH_2-CH_2-OH$ 1°

$CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-OH$ 2°

$CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-OH$ 1°

$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-OH$ 3°

59. In which of the following equilibria, K_p and K_c are **NOT** equal ?

(1) $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

(2) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

(3) $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$

(4) $2BrCl_{(g)} \rightleftharpoons Br_{2(g)} + Cl_{2(g)}$

Ans. (1)

Sol. $K_p = K_c(RT)^{\Delta n_g}$

when $\Delta n_g = 0$ then $K_p = K_c$

$\Delta n_g \neq 0$ $K_p \neq K_c$

(1) $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

$\Delta n_g \neq 0$

$K_p \neq K_c$

60. Match List I with List II.

List I	**List II**
Quantum Number	**Information provided**
A. m_ℓ	I. shape of orbital
B. m_s	II. size of orbital
C. ℓ	III. orientation of orbital
D. n	IV. orientation of spin of electron

Choose the correct answer from the options given below :

(1) A-I, B-III, C-II, D-IV (2) A-III, B-IV, C-I, D-II

(3) A-III, B-IV, C-II, D-I (4) A-II, B-I, C-IV, D-III

Ans. (2)

Sol. $m_\ell \rightarrow$ orientation of orbital

$m_s \rightarrow$ orientation of spin of e^-

$\ell \rightarrow$ shape of orbital

$n \rightarrow$ size of orbital

61. Given below are two statements :

Statement I : Aniline does not undergo Friedel-Crafts alkylation reaction

Statement II : Aniline cannot be prepared through Gabriel synthesis.

In the light of the above statements, choose the *correct* answer from the options given below :

(1) Both Statement I and Statement II are true.

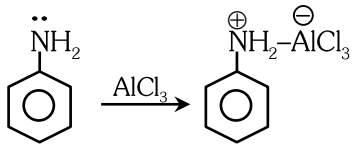
(2) Both Statement I and Statement II are false.

(3) Statement I is correct but Statement II is false.

(4) Statement I is incorrect but Statement II is true.

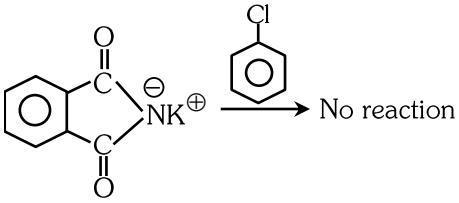
Ans. (1)

Sol. **Statement-I Explanation :** Aniline forms complex with lewis acid ($AlCl_3$),

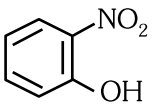


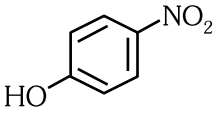
So statement-I is correct.

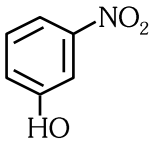
Statement-II Explanation : Aryl halide are not good substrate for nucleophilic substitution reaction so aniline does not give Gabriel synthesis.



62. Intramolecular hydrogen bonding is present in :

(1) 

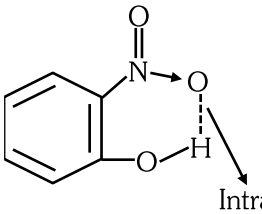
(2) 

(3) 

(4) HF

Ans. (1)

Sol. O-nitrophenol will show intra molecular H-Bonding



63. On heating, some solid substances change from solid to vapour state without passing through liquid state. The technique used for the purification of such solid substances based on the above principle is known as :

(1) Crystallization (2) Sublimation

(3) Distillation (4) Chromatography

Ans. (2)

Sol. Sublimation

64. In which of the following processes entropy increases ?

A. A liquid evaporates to vapour

B. Temperature of a crystalline solid lowered from 130 K to 0K.

C. $2NaHCO_{3(s)} \rightarrow Na_2CO_{3(s)} + CO_{2(g)} + H_2O_{(g)}$

D. $Cl_{2(g)} \rightarrow 2\,Cl_{(g)}$

Choose the correct answer from the options given below :

(1) A and C (2) A, B and D

(3) A, C and D (4) C and D

Ans. (3)

Sol. (A) When liquid evaporates to vapour, randomness increases hence entropy increases.

(B) Temperature decreases $\Rightarrow$ entropy decreases

(C) $\Delta n_g = 2 - 0 = 2$

$\Delta n_g = +ve \rightarrow \Delta S = +ve \Rightarrow$ entropy increases

(D) $\Delta n_g = 2 - 1 = 1$

$\Delta n_g = +ve \rightarrow \Delta S = +ve \Rightarrow$ entropy increases

(A), (C), (D) are correct.

65. Among Group 16 elements, which one does **NOT** show –2 oxidation state ?

(1) O (2) Se

(3) Te (4) Po

Ans. (4)

Sol. **Po** does not show –2 oxidation state due to its metallic nature

66. Match List-I with List-II.

List-I (Conversion)	**List-II (Number of Faraday required)**
(A) 1 mol of H_2O to O_2	(I) 3F
(B) 1 mol of MnO_4^- to Mn^{2+}	(II) 2F
(C) 1.5 mole of Ca from molten $CaCl_2$	(III) 1F
(D) 1 mol of FeO to Fe_2O_3	(IV) 5F

(1) A-II, B-IV, C-I, D-III

(2) A-III, B-IV, C-I, D-II

(3) A-II, B-III, C-I, D-IV

(4) A-III, B-IV, C-II, D-I

Ans. (1)

Sol. (A) $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$

1 mol H_2O will req. 2F charge

(B) $8H^+ + MnO_4^- + 5e^- \rightarrow Mn^{+2} + 4H_2O$

1 mole MnO_4^- will req. 5F charge.

(C) $CaCl_2 + 2e^- \rightarrow Ca + 2Cl^{-1}$

1.5 mole Ca will req. 3F charge.

(D) $2FeO + H_2O \rightarrow Fe_2O_3 + 2H^+ + 2e^-$

1 mole FeO will req. 1 F charge.

(A)-(II), (B)-(IV), (C)-(I), (D)-(III)

67. Arrange the following elements in increasing order of electronegativity.

N, O, F, C, Si

Choose the correct answer from the options given below :

(1) Si < C < N < O < F (2) Si < C < O < N < F

(3) O < F < N < C < Si (4) F < O < N < C < Si

Ans. (1)

Sol. EN order (Pauling scale value)

Si < C < N < O < F

1.8 < 2.5 < 3.0 < 3.5 < 4

68. A compound with a molecular formula of C_6H_{14} has two tertiary carbons. Its IUPAC name is :

(1) n-hexane (2) 2-methylpentane

(3) 2, 3-dimethylbutane (4) 2, 2-dimethylbutane

Ans. (3)

Sol. (1) $CH_3–CH_2–CH_2–CH_2–CH_2–CH_3$

No tertiary carbon

(2) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_2 - CH_3$

One tertiary carbon

(3) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - \underset{\underset{CH_3}{|}}{CH} - CH_3$

Two tertiary carbon

(4) $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - CH_3$

No tertiary carbon

69. Fehling's solution 'A' is

(1) aqueous copper sulphate

(2) alkaline copper sulphate

(3) alkaline solution of sodium potassium tartrate (Rochelle's salt)

(4) aqueous sodium citrate

Ans. (1)

Sol. Fehling reagent comprises of two solution

Fehling A $\rightarrow$ aq. solution of $CuSO_4$

Fehling B $\rightarrow$ alkaline sodium potassium tartrate (Rochelle salt)

70. Activation energy of any chemical reaction can be calculated if one knows the value of

(1) rate constant at standard temperature.

(2) probability of collision.

(3) orientation of reactant molecules during collision.

(4) rate constant at two different temperatures.

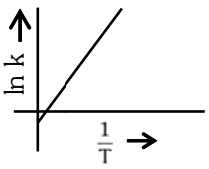
Ans. (4)

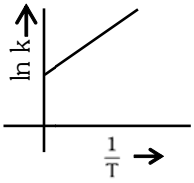
Sol. $\log_{10}\left(\frac{k_2}{k_1}\right) = \frac{E_a}{2.303R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

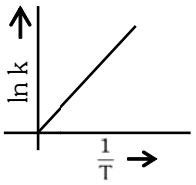
Here k_1 is rate constant at T_1.

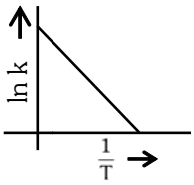
k_2 is rate constant at T_2.

71. Which plot of ln k vs $\frac{1}{T}$ is consistent with Arrhenius equation?

(1) 

(2) 

(3) 

(4) 

Ans. (4)

Sol. $k = A \cdot e^{-E_a/RT}$

$\ell n\, k = \ell n\, A - \frac{E_a}{RT}$

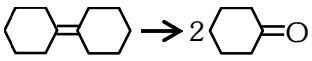
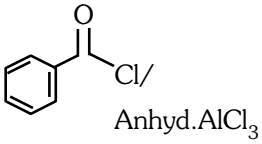
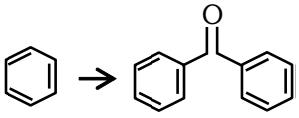
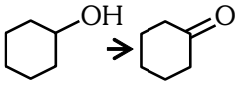
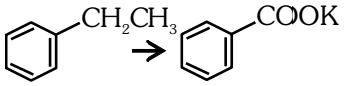
$\ell nk = \frac{-E_a}{R}\left(\frac{1}{T}\right) + \ell nA$

$y = mx + c$

On comparing $\Rightarrow \ell n\, k \rightarrow y$; $\frac{1}{T} \rightarrow x$

This is a equation of straight line with negative slope.

72. Match List I with List II.

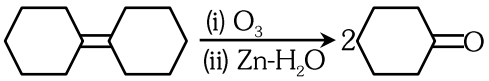
List I (Reaction)	**List II (Reagents/Condition)**
(A) 	(I) 
(B) 	(II) CrO_3
(C) 	(III) $KMnO_4/KOH,\Delta$
(D) 	(IV) (i) O_3 (ii) Zn-H_2O

Choose the correct answer from the options given below :

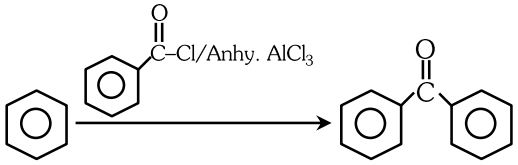
(1) A-IV, B-I, C-III, D-II (2) A-III, B-I, C-II, D-IV

(3) A-IV, B-I, C-II, D-III (4) A-I, B-IV, C-II, D-III

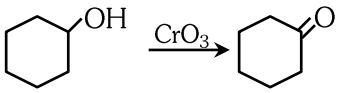
Ans. (3)

Sol. A-IV 

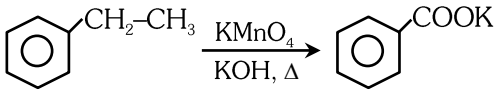
Reductive Ozonolysis

B-I 

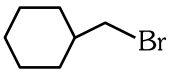
Friedal craft Acylation

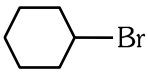
C-II 

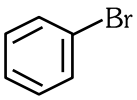
Mild oxidising agent

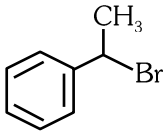
D-III 

73. The compound that will undergo S_N1 reaction with the fastest rate is :

(1) 

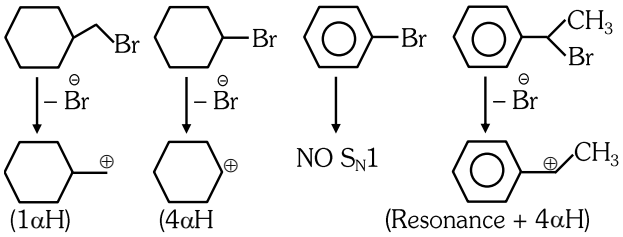
(2) 

(3) 

(4) 

Ans. (4)

Sol. Reactivity towards $S_N1 \propto$ stability of carbocation



74. Which reaction is **NOT** a redox reaction ?

(1) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

(2) $2\,KClO_3 + I_2 \rightarrow 2\,KIO_3 + Cl_2$

(3) $H_2 + Cl_2 \rightarrow 2\,HCl$

(4) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

Ans. (4)

+2 –1 +1 +6 –2 +2 +6 –2 +1 –1

Sol. $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

As there is no change in oxidation state of any element therefore this is not a redox reaction.

75. Given below are two statements :

Statement I : The boiling point of three isomeric pentanes follows the order

n-pentane > isopentane > neopentane

Statement II : When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak, thereby lowering the boiling point.

In the light of the above statements, choose the *most appropriate* answer from the options given below :

(1) Both statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

Ans. (1)

Sol. For alkanes

Boiling point $\propto$ molecular mass

$$\propto \frac{1}{\text{Branching}} \text{ (if molecular mass is same)}$$

Boiling point

$\underset{\text{n-pentane}}{CH_3–CH_2–CH_2–CH_2–CH_3}$ > $\underset{\text{isopentane}}{CH_3–\underset{\displaystyle CH_3}{\underset{|}{CH}}–CH_2–CH_3}$

> $\underset{\text{neopentane}}{CH_3–\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}–CH_3}$

76. Given below are two statements :

Statement I : Both $[Co(NH_3)_6]^{+3}$ and $[CoF_6]^{3-}$ complexes are octahedral but differ in their magnetic behaviour.

Statement II : $[Co(NH_3)_6]^{3+}$ is diamagnetic whereas $[CoF_6]^{3-}$ is paramagnetic.

In the light of the above statements, choose the *correct* answer from the options given below :

(1) Both statement I and Statement II are true

(2) Both Statement I and Statement II are false

(3) Statement I is true but Statement II is false

(4) Statement I is false but Statement II is true

Ans. (1)

Sol.

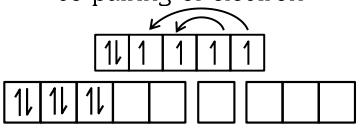
$[Co(NH_3)_6]^{+3}$

$_{27}Co \rightarrow 3d^7\ 4s^2$

$Co^{+3} \rightarrow 3d^6$

$(NH_3 \rightarrow SFL)$

so pairing of electron



d^2sp^3

dia.

$\mu = 0$

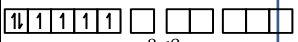
$[CoF_6]^{-3}$

$_{27}Co \rightarrow 3d^7 4s^2$

$Co^{+3} \rightarrow 3d^6$

$(F^- \rightarrow WFL)$

no pairing of electron



sp^3d^2

Para

$\mu = 4.9$

77. Match List I with List II.

List-I (Molecule)	**List-II (Number and types of bond/s between two carbon atoms)**
A. ethane	I. one σ-bond and two π-bonds
B. ethene	II. two π-bonds
C. carbon molecule, C_2	III. one σ-bond
D. ethyne	IV. one σ-bond and one π-bond

Choose the correct answer from the options given below :

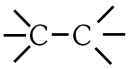
(1) A-I, B-IV, C-II, D-III

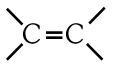
(2) A-IV, B-III, C-II, D-I

(3) A-III, B-IV, C-II, D-I

(4) A-III, B-IV, C-I, D-II

Ans. (3)

Sol. (A) ethane  1σ

(B) ethene  1σ, 1π

(C) C_2 C = C 2π (as per MOT)

(D) ethyne $-C \equiv C-$ 1σ, 2π

78. The Henry's law constant (K_H) values of three gases (A, B, C) in water are 145, 2×10^{-5} and 35 kbar, respectively. The solubility of these gases in water follow the order :

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

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

Ans. (2)

Sol. Solubility $\propto \frac{1}{K_H}$

$K_H \downarrow \rightarrow$ Solubility $\uparrow$

B > C > A

79. The energy of an electron in the ground state (n = 1) for He^+ ion is –xJ, then that for an electron in n = 2 state for Be^{3+} ion in J is :

(1) – x (2) $-\frac{x}{9}$

(3) –4x (4) $-\frac{4}{9}x$

Ans. (1)

Sol. $E \propto \frac{Z^2}{n^2}$

$\frac{E_1}{E_2} = \frac{Z_1^2}{n_1^2} \times \frac{n_2^2}{Z_2^2}$

$He^+ \rightarrow n_1 = 1$ & $Z_1 = 2$

$Be^{+3} \rightarrow n_2 = 2$ & $Z_2 = 4$

$\frac{E_1}{E_2} = \frac{2^2}{1^2} \times \frac{2^2}{4^2} = 1$

$E_1 = E_2$

80. The E° value for the Mn^{3+}/Mn^{2+} couple is more positive than that of Cr^{3+}/Cr^{2+} or Fe^{3+}/Fe^{2+} due to change of

(1) d^5 to d^4 configuration (2) d^5 to d^2 configuration

(3) d^4 to d^5 configuration (4) d^3 to d^5 configuration

Ans. (3)

Sol. Mn^{+3}/Mn^{+2} E^0 = +ve

$_{25}Mn \rightarrow 3d^5 4s^2$

$Mn^{+2} \rightarrow 3d^5$

$Mn^{+3} \rightarrow 3d^4$

81. The reagents with which glucose does **not** react to give the corresponding tests/products are

A. Tollens' reagent B. Schiff's reagent

C. HCN D. NH_2OH

E. $NaHSO_3$

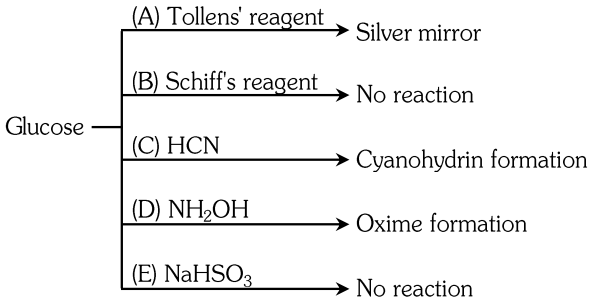
Choose the correct options from the given below :

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

(3) B and E (4) E and D

Ans. (3)

Sol.



82. Match List I with List II.

List-I (Complex)	**List-II (Type of isomerism)**
A. $[Co(NH_3)_5(NO_2)]Cl_2$	I. Solvate isomerism
B. $[Co(NH_3)_5(SO_4)]Br$	II. Linkage isomerism
C. $[Co(NH_3)_6][Cr(CN)_6]$	III. Ionization isomerism
D. $[Co(H_2O)_6]Cl_3$	IV. Coordination isomerism

Choose the correct answer from the options given below :

(1) A-II, B-III, C-IV, D-I

(2) A-I, B-III, C-IV, D-II

(3) A-I, B-IV, C-III, D-II

(4) A-II, B-IV, C-III, D-I

Ans. (1)

Sol.

(A) $[Co(NH_3)_5(NO_2)]Cl_2$ Linkage

NO_2^- can be converted into ONO^-

(B) $[Co(NH_3)_5SO_4]Br$ Ionisation

$[Co(NH_3)_5Br]\,SO_4$

(C) $[Co(NH_3)_6]\,[Cr(CN)_6]$ Coordination

(D) $[Co(H_2O)_6]Cl_3$ Solvate

83. Arrange the following elements in increasing order of first ionization enthalpy :

Li, Be, B, C, N

Choose the correct answer from the options given below :

(1) Li < Be < B < C < N

(2) Li < B < Be < C < N

(3) Li < Be < C < B < N

(4) Li < Be < N < B < C

Ans. (2)

Sol. Li < Be > B < C < N

$2s^1$ $2s^2$ $2s^22p^1$ $2s^22p^2$ $2p^22p^3$

Li < B < Be < C < N

84. 1 gram of sodium hydroxide was treated with 25 mL of 0.75 M HCL solution, the mass of sodium hydroxide left unreacted is equal to

(1) 750 mg (2) 250 mg

(3) Zero mg (4) 200 mg

Ans. (2)

Sol. $NaOH + HCl \rightarrow NaCl + H_2O$

Given $\Rightarrow$ 1g (0.75 M, 25 ml)

moles of NaOH = $\frac{1}{40}$ mol = 0.025 mol

moles of HCl = $\frac{0.75\times25}{1000} = 0.01875$ mol

now find the L.R. $\Rightarrow$ Value = $\frac{\text{given amount}}{\text{S.C}}$

NaOH ; HCl

$\frac{0.025}{1} > \frac{0.01875}{1}$

So, L.R will be HCl

Unreacted moles of NaOH = 0.025 – 0.01875

= 0.00625 mol

Unreacted mass = 0.00625 ×40 g

= 0.25 g

= 250 mg

85. For the reaction $2A \rightleftharpoons B + C, K_c = 4 \times 10^{-3}$. At a given time, the composition of reaction mixture is: $[A] = [B] = [C] = 2 \times 10^{-3}$ M.

Then, which of the following is correct ?

(1) Reaction is at equilibrium.

(2) Reaction has a tendency to go in forward direction.

(3) Reaction has a tendency to go in backward direction

(4) Reaction has gone to completion in forward direction.

Ans. (3)

Sol. $2A \rightleftharpoons B + C$; $K_c = 4 \times 10^{-3}$

At a given time $\Rightarrow [A] = [B] = [C] = 2 \times 10^{-3}$ M

$$Q_c = \frac{[B][C]}{[A]^2}$$

$Q_c = 1$

as $Q_c > K_c$

Reaction has a tendency to go in backward direction.

Chemistry : Section-B (Q. No. 86 to 100)

86. Given below are certain cations. Using inorganic qualitative analysis, arrange them in increasing group number from 0 to VI.

A. Al^{3+} B. Cu^{2+}

C. Ba^{2+} D. Co^{2+}

E. Mg^{2+}

Choose the correct answer from the options given below:

(1) B, A, D, C, E (2) B, C, A, D, E

(3) E, C, D, B, A (4) E, A, B, C, D

Ans. (1)

Sol.

Basic Radicals	**Group Number**
B. Cu^{+2}	II
A. Al^{+3}	III
D. Co^{+2}	IV
C. Ba^{+2}	V
E. Mg^{+2}	VI

Ans. (1) B, A, D, C, E

87. The products A and B obtained in the following reactions, respectively, are

$3ROH + PCl_3 \rightarrow 3RCl + A$

$ROH + PCl_5 \rightarrow RCl + HCl + B$

(1) $POCl_3$ and H_3PO_3 (2) $POCl_3$ and H_3PO_4

(3) H_3PO_4 and $POCl_3$ (4) H_3PO_3 and $POCl_3$

Ans. (4)

Sol. $3R–OH + PCl_3 \rightarrow 3RCl + H_3PO_3$

$R–OH + PCl_5 \rightarrow R–Cl + HCl + POCl_3$

$A \rightarrow H_3PO_3$

$B \rightarrow POCl_3$

88. Mass in grams of copper deposited by passing 9.6487 A current through a voltmeter containing copper sulphate solution for 100 seconds is:

(Given : Molar mass of Cu : 63 g mol^{-1}, 1F = 96487 C)

(1) 3.15 g (2) 0.315 g

(3) 31.5 g (4) 0.0315 g

Ans. (2)

Sol. $$W = \frac{Eit}{96487}$$

$$W = \frac{\frac{63}{2} \times 9.6487 \times 100}{96487}$$

W = 0.315 g of Cu

89. The plot of osmotic pressure (Π) vs concentration (mol L^{-1}) for a solution gives a straight line with slope 25.73 L bar mol^{-1}. The temperature at which the osmotic pressure measurement is done is:

(Use R = 0.083 L bar mol^{-1} K^{-1})

(1) 37°C (2) 310°C

(3) 25.73°C (4) 12.05°C

Ans. (1)

Sol. $\underset{\downarrow \text{bar}}{\pi} = \underset{\downarrow \text{mol } L^{-1}}{C} RT$

On comparing with **y = mx**

Slope (m) = RT

$25.73 = 0.083 \times T$

T = 310 K = 37°C

90. Identify the major product C formed in the following reaction sequence:

$$CH_3 - CH_2 - CH_2 - I \xrightarrow{NaCN} A \xrightarrow[\text{Partial hydrolysis}]{OH^-} B \xrightarrow[Br_2]{NaOH} \underset{\text{(Major)}}{C}$$

(1) propylamine

(2) butylamine

(3) butanamide

(4) α – bromobutanoic acid

Ans. (1)

Sol.

$$CH_3–CH_2–CH_2–I \xrightarrow[(S_N2)]{NaCN} \underset{(A)}{CH_3–CH_2–CH_2–CN}$$

$$\overset{\ominus}{OH}\ \text{Partial hydrolysis}$$

$$CH_3–CH_2–CH_2–NH_2 \xleftarrow[Br_2]{NaOH} \underset{(B)}{CH_3–CH_2–CH_2–CONH_2}$$

91. Identify the **correct** answer.

(1) Three resonance structures can be drawn for ozone

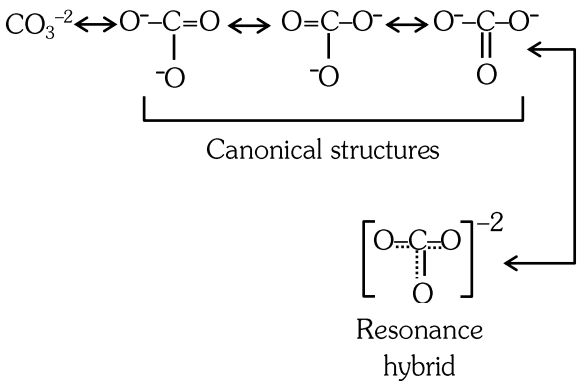
(2) BF_3 has non-zero dipole moment

(3) Dipole moment of NF_3 is greater than that of NH_3

(4) Three canonical forms can be drawn for CO_3^{2-} ion.

Ans. (4)

Sol.



92. Given below are two statements :

Statement I : $\left[Co(NH_3)_6\right]^{3+}$ is a homoleptic complex whereas $\left[Co(NH_3)_4Cl_2\right]^{+}$ is a heteroleptic complex.

Statement II : Complex $\left[Co(NH_3)_6\right]^{3+}$ has only one kind of ligands but $\left[Co(NH_3)_4Cl_2\right]^{+}$ has more than one kind of ligands.

In the light of the above statements, choose the *correct* answer from the options given below.

(1) Both Statement I and Statement II are true.

(2) Both Statement I and Statement II are false.

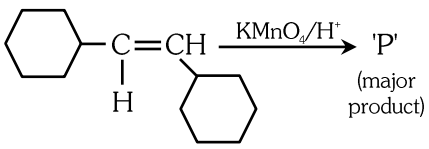
(3) Statement I is true but Statement II is false.

(4) Statement I is false but Statement II is true.

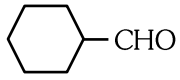
Ans. (1)

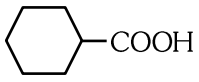
Sol. In Homoleptic complex only one kind of ligands are present. While in Hetereoleptic complex more than one kind of ligands are present in coordination sphere.

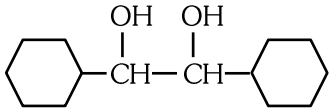
93. For the given reaction

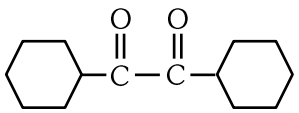


'P' is

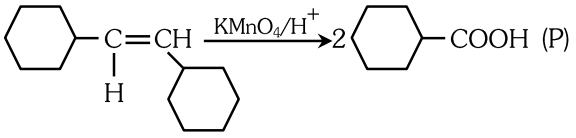
(1) 

(2) 

(3) 

(4) 

Ans. (2)

Sol. 

94. The pair of lanthanoid ions which are diamagnetic is

(1) Ce^{4+} and Yb^{2+} (2) Ce^{3+} and Eu^{2+}

(3) Gd^{3+} and Eu^{3+} (4) Pm^{3+} and Sm^{3+}

Ans. (1)

Sol. $Ce^{+4} = {}_{54}[Xe]$

$Yb^{+2} = {}_{54}[Xe]4f^{14}5d^{0}$

Both species do not contain any unpaired electron. Hence, they are diamagnetic.

95. Consider the following reaction in a sealed vessel at equilibrium with concentrations of

$N_2 = 3.0 \times 10^{-3}$ M, $O_2 = 4.2 \times 10^{-3}$ M and

NO = 2.8×10^{-3} M.

$2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$

If 0.1 mol L^{-1} of $NO_{(g)}$ is taken in a closed vessel, what will be degree of dissociation (α) of $NO_{(g)}$ at equilibrium?

(1) 0.00889 (2) 0.0889

(3) 0.8889 (4) 0.717

Ans. (4)

Sol.

	$2NO(g)$	$\rightleftharpoons$	$N_2(g)$	+	$O_2(g)$
$t = t_{eq}$	$(2.8\times10^{-3})M$		$(3\times10^{-3})M$		$(4.2\times10^{-3})M$

$$K_C = \frac{3\times10^{-3}\times4.2\times10^{-3}}{(2.8\times10^{-3})^2} = \frac{3\times4.2}{2.8\times2.8} = 1.60$$

	$2NO(g)$	$\rightleftharpoons$	$N_2(g)$	+	$O_2(g)$
$t = t_{eq}$	$(C - C\alpha)$		$\frac{C\alpha}{2}$		$\frac{C\alpha}{2}$

$$K_C = \frac{(C\alpha)^2}{4C^2(1-\alpha)^2}$$

$$\left(\frac{\alpha}{1-\alpha}\right)^2 = 4\times1.6$$

$$\frac{\alpha}{1-\alpha} = 2\times1.26$$

$$\frac{\alpha}{1-\alpha} = 2.52$$

$\Rightarrow \alpha = 2.52 - 2.52\,\alpha$

$\Rightarrow \alpha = \frac{2.52}{3.52} = 0.717$

96. A compound X contains 32% of A, 20% of B and remaining percentage of C. Then, the empirical formula of X is :

(Given atomic masses of A = 64; B = 40; C = 32 u)

(1) A_2BC_2 (2) ABC_3

(3) AB_2C_2 (4) ABC_4

Ans. (2)

Sol.

Element	%	Moles	Simple Ratio
A	32	$\frac{32}{64} = \frac{1}{2}$	1
B	20	$\frac{20}{40} = \frac{1}{2}$	1
C	48	$\frac{48}{32} = \frac{3}{2}$	3

Empirical formula = ABC_3

97. The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from pressure of 20 atmosphere to 10 atmosphere is :

(Given R = 2.0 cal K^{-1} mol^{-1})

(1) 0 calorie

(2) –413.14 calories

(3) 413.14 calories

(4) 100 calories

Ans. (2)

Sol. In Reversible Isothermal process,

$$W = -2.303\ nRT\ \log_{10}\left(\frac{P_1}{P_2}\right)$$

$$= -2.303\times1\times2\times298\ \log_{10}\left(\frac{20}{10}\right)$$

$$= -413.14 \text{ calories}$$

98. During the preparation of Mohr's salt solution (Ferrous ammonium sulphate), Which of the following acid is added to prevent hydrolysis of Fe^{2+} ion?

(1) dilute hydrochloric acid

(2) concentrated sulphuric acid

(3) dilute nitric acid

(4) dilute sulphuric acid

Ans. (4)

Sol. Dil. H_2SO_4 do not acts as oxidising agent which prevent oxidation of Fe^{+2} into Fe^{+3}. While concentrated H_2SO_4 will oxidise Fe^{+2} into Fe^{+3}

99. The rate of a reaction quadruples when temperature changes from 27°C to 57°C.

Calculate the energy of activation.

Given R = 8.314 J K^{-1} mol^{-1}, log 4 = 0.6021

(1) 38.04 kJ/mol (2) 380.4 kJ/mol

(3) 3.80 kJ/mol (4) 3804 kJ/mol

Ans. (1)

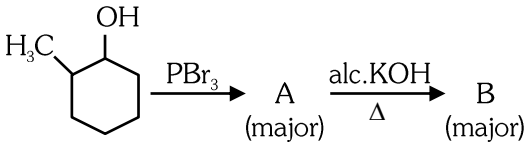
Sol. $\frac{r_2}{r_1} = 4 = \frac{k_2}{k_1}$

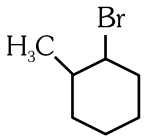
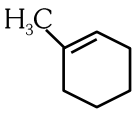
$$\log_{10}\left(\frac{k_2}{k_1}\right) = \frac{E_a}{2.303R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

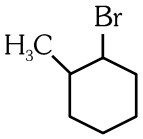
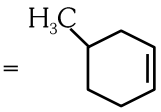
$$\log_{10}(4) = \frac{E_a \times 1000}{2.303 \times 8.314}\left(\frac{1}{300} - \frac{1}{330}\right)$$

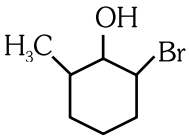
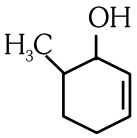
$E_a = 38.04$ kJ/mol

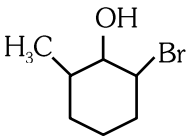
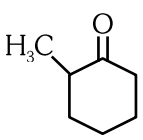
100. Major products A and B formed in the following reaction sequence, are



(1) A =  ; B = 

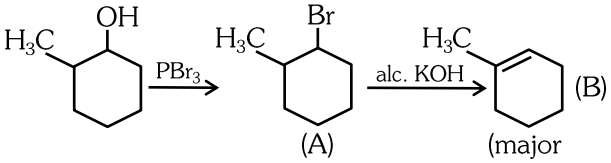
(2) A =  ; B = 

(3) A =  ; B = 

(4) A =  ; B = 

Ans. (1)

Sol.



Botany : Section-A (Q. No. 101 to 135)

101. Lecithin, a small molecular weight organic compound found in living tissues, is an example of :
(1) Amino acids (2) Phospholipids
(3) Glycerides (4) Carbohydrates

Ans. **(2)**

Sol. NCERT-XI, Pg. # 106, 107

102. Which of the following are required for the dark reaction of photosynthesis?
A. Light B. Chlorophyll
C. CO_2 D. ATP
E. NADPH
Choose the correct answers from the options given below:
(1) A, B and C only (2) B, C and D only
(3) C, D and E only (4) D and E only

Ans. **(3)**

Sol. NCERT-XI, Pg. # 143, 144

103. Spindle fibers attach to kinetochores of chromosomes during
(1) Prophase (2) Metaphase
(3) Anaphase (4) Telophase

Ans. **(2)**

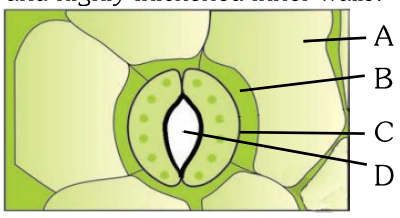
Sol. NCERT-XI, Pg. # 123

104. Bulliform cells are responsible for
(1) Inward curling of leaves in monocots.
(2) Protecting the plant from salt stress.
(3) Increased photosynthesis in monocots.
(4) Providing large spaces for storage of sugars.

Ans. **(1)**

Sol. NCERT-XI, Pg. # 77

105. In the given figure, which component has thin outer walls and highly thickened inner walls?



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

Ans. **(1)**

Sol. NCERT-XI, Pg. # 72

106. What is the fate of a piece of DNA carrying only gene of interest which is transferred into an alien organism?
A. The piece of DNA would be able to multiply itself independently in the progeny cells of the organism.
B. It may get integrated into the genome of the recipient.
C. It may multiply and be inherited along with the host DNA.
D. The alien piece of DNA is not an integral part of chromosome.
E. It shows ability to replicate.
Choose the correct answer from the options given below:
(1) A and B only
(2) D and E only
(3) B and C only
(4) A and E only

Ans. **(3)**

Sol. NCERT-XII, Pg. # 164

107. Given below are two statements:
Statement I : Bt toxins are insect group specific and coded by a gene *cry* IAc.
Statement II : Bt toxin exists as inactive protoxin in *B. thuringiensis*. However, after ingestion by the insect the inactive protoxin gets converted into active form due to acidic pH of the insect gut.
In the light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false
(4) Statement I is false but Statement II is true

Ans. **(3)**

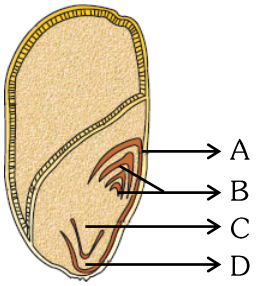
Sol. NCERT-XII, Pg. # 179, 180

108. List of endangered species was released by-
(1) GEAC (2) WWF (3) FOAM (4) IUCN

Ans. **(4)**

Sol. NCERT-XII, Pg. # 217

109. Identify the part of the seed from the given figure which is destined to form root when the seed germinates.



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

Ans. **(3)**

Sol. NCERT-XI, Pg. # 67

110. Match List I with List II.

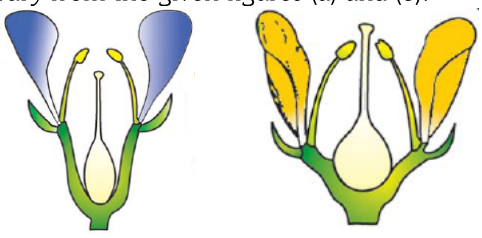
List I	List II
A. *Clostridium butylicum*	I. Ethanol
B. *Saccharomyces cerevisiae*	II. Streptokinase
C. *Trichoderma polysporum*	III. Butyric acid
D. *Streptococcus* sp.	IV. Cyclosporin-A

Choose the correct answer from the options given below:
(1) A-III, B-I, C-II, D-IV (2) A-II, B-IV, C-III, D-I
(3) A-III, B-I, C-IV, D-II (4) A-IV, B-I, C-III, D-II

Ans. **(3)**

Sol. NCERT-XII, Pg. # 153

111. Identify the type of flowers based on the position of calyx, corolla and androecium with respect to the ovary from the given figures (a) and (b).



(a) (b)

(1) (a) Epigynous; (b) Hypogynous
(2) (a) Hypogynous; (b) Epigynous
(3) (a) Perigynous; (b) Epigynous
(4) (a) Perigynous; (b) Perigynous

Ans. **(4)**

Sol. NCERT-XI, Pg. # 62

112. Auxin is used by gardeners to prepare weed-free lawns. But no damage is caused to grass as auxin
(1) promotes apical dominance.
(2) promotes abscission of mature leaves only.
(3) does not affect mature monocotyledonous plants.
(4) can help in cell division in grasses, to produce growth.

Ans. **(3)**

Sol. NCERT-XI, Pg. # 176

113. A pink flowered Snapdragon plant was crossed with a red flowered Snapdragon plant. What type of phenotype/s is/are expected in the progeny?
(1) Only red flowered plants
(2) Red flowered as well as pink flowered plants
(3) Only pink flowered plants
(4) Red, Pink as well as white flowered plants

Ans. **(2)**

Sol. NCERT-XII, Pg. # 60

114. Which one of the following is not a criterion for classification of fungi?
(1) Morphology of mycelium
(2) Mode of nutrition
(3) Mode of spore formation
(4) Fruiting body

Ans. **(2)**

Sol. NCERT-XI, Pg. # 16

115. The lactose present in the growth medium of bacteria is transported to the cell by the action of:
(1) Beta-galactosidase (2) Acetylase
(3) Permease (4) Polymerase

Ans. **(3)**

Sol. NCERT-XII, Pg. # 100, 101

116. In a plant, black seed color (BB/Bb) is dominant over white seed color (bb). In order to find out the genotype of the black seed plant, with which of the following genotype will you cross it?
(1) BB (2) bb
(3) Bb (4) BB/Bb

Ans. **(2)**

Sol. NCERT-XII, Pg. # 62

117. Given below are two statements:

Statement I : Parenchyma is living but collenchyma is dead tissue.

Statement II : Gymnosperms lack xylem vessels but presence of xylem vessels is the characteristic of angiosperms.

In the light of the above statements, choose the correct answer from the options given below:

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

(3) Statement I is true but Statement II is false

(4) Statement I is false but Statement II is true

Ans. (4)

Sol. NCERT-XI, Pg. # 86, 87 [Old NCERT]

118. How many molecules of ATP and NADPH are required for every molecule of CO_2 fixed in the Calvin cycle?

(1) 2 molecules of ATP and 3 molecules of NADPH.

(2) 2 molecules of ATP and 2 molecules of NADPH.

(3) 3 molecules of ATP and 3 molecules of NADPH.

(4) 3 molecules of ATP and 2 molecules of NADPH.

Ans. (4)

Sol. NCERT-XI, Pg. # 145

119. A transcription unit in DNA is defined primarily by the three regions in DNA and these are with respect to upstream and down stream end;

(1) Repressor, Operator gene, Structural gene

(2) Structural gene, Transposons, Operator gene

(3) Inducer, Repressor, Structural gene

(4) Promotor, Structural gene, Terminator

Ans. (4)

Sol. NCERT-XII, Pg. # 92

120. Tropical regions show greatest level of species richness because

A. Tropical latitudes have remained relatively undisturbed for millions of years, hence more time was available for species diversification.

B. Tropical environments are more seasonal.

C. More solar energy is available in tropics.

D. Constant environments promote niche specialization.

E. Tropical environments are constant and predictable.

Choose the correct answer from the options given below:

(1) A, C, D and E only (2) A and B only

(3) A, B and E only (4) A, B and D only

Ans. (1)

Sol. NCERT-XII, Pg. # 219,220

121. The equation of Verhulst-Pearl logistic growth is

$$\frac{dN}{dt} = rN\left[\frac{K-N}{K}\right]$$

From this equation, K indicates :

(1) Intrinsic rate of natural increase

(2) Biotic potential

(3) Carrying capacity

(4) Population density

Ans. (3)

Sol. NCERT-XII, Pg. # 195

122. Inhibition of Succinic dehydrogenase enzyme by malonate is a classical example of :

(1) Cofactor inhibition (2) Feedback inhibition

(3) Competitive inhibition (4) Enzyme activation

Ans. (3)

Sol. NCERT-XI, Pg. # 117

123. Which one of the following can be explained on the basis of Mendel's Law of Dominance?

A. Out of one pair of factors one is dominant and the other is recessive.

B. Alleles do not show any expression and both the characters appear as such in F_2 generation.

C. Factors occur in pairs in normal diploid plants.

D. The discrete unit controlling a particular character is called factor.

E. The expression of only one of the parental characters is found in a monohybrid cross.

Choose the correct answer from the options given below :

(1) A, B and C only (2) A, C, D and E only

(3) B, C and D only (4) A, B, C, D and E

Ans. (2)

Sol. NCERT-XII, Pg. # 59

124. Match List I with List II

	List I		**List II**
A.	Nucleolus	I.	Site of formation of glycolipid
B.	Centriole	II.	Organization like the cartwheel
C.	Leucoplasts	III.	Site for active ribosomal RNA synthesis
D.	Golgi apparatus	IV.	For storing nutrients

Choose the correct answer from the options given below :

(1) A-III, B-II, C-IV, D-I (2) A-II, B-III, C-I, D-IV

(3) A-III, B-IV, C-II, D-I (4) A-I, B-II, C-III, D-IV

Ans. (1)

Sol. NCERT-XI, Pg. # 96,97,99,100

125. Identify the set of correct statements :

A. The flowers of *Vallisneria* are colourful and produce nectar.

B. The flowers of waterlily are not pollinated by water.

C. In most of water-pollinated species, the pollen grains are protected from wetting.

D. Pollen grains of some hydrophytes are long and ribbon like.

E. In some hydrophytes, the pollen grains are carried passively inside water.

Choose the correct answer from the options given below :

(1) C, D and E only (2) A, B, C and D only

(3) A, C, D and E only (4) B, C, D and E only

Ans. (4)

Sol. NCERT-XII, Pg. # 13

126. Match List-I with List-II

	List-I		**List-II**
A.	*Rhizopus*	I.	Mushroom
B.	*Ustilago*	II.	Smut fungus
C.	*Puccinia*	III.	Bread mould
D.	*Agaricus*	IV.	Rust fungus

Choose the correct answer from the options given below :

(1) A-III, B-II, C-IV, D-I (2) A-I, B-III, C-II, D-IV

(3) A-III, B-II, C-I, D-IV (4) A-IV, B-III, C-II, D-I

Ans. (1)

Sol. NCERT-XI, Pg. # 17,18

127. Hind II always cuts DNA molecules at a particular point called recognition sequence and it consists of :

(1) 8 bp (2) 6 bp

(3) 4 bp (4) 10 bp

Ans. (2)

Sol. NCERT-XII, Pg. # 165

128. Which of the following is an example of actinomorphic flower ?

(1) *Datura* (2) *Cassia*

(3) *Pisum* (4) *Sesbania*

Ans. (1)

Sol. NCERT-XI, Pg. # 62

129. The type of conservation in which the threatened species are taken out from their natural habitat and placed in special setting where they can be protected and given special care is called ;

(1) *in-situ* conservation

(2) Biodiversity conservation

(3) Semi-conservative method

(4) Sustainable development

Ans. (2)

Sol. NCERT-XII, Pg. # 224

130. Given below are two statements :

Statement-I : Chromosomes become gradually visible under light microscope during leptotene stage.

Statement-II : The begining of diplotene stage is recognized by dissolution of synaptonemal complex.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both Statement-I and Statement-II are true

(2) Both Statement-I and Statement-II are false

(3) Statement-I is true but Statement-II is false

(4) Statement-I is false but Statement-II is true

Ans. (1)

Sol. NCERT-XI, Pg. # 126

131. Formation of interfascicular cambium from fully developed parenchyma cells is an example for

(1) Differentiation (2) Redifferentiation

(3) Dedifferentiation (4) Maturation

Ans. (3)

Sol. NCERT-XI, Pg. # 172

132. The capacity to generate a whole plant from any cell of the plant is called :

(1) Totipotency (2) Micropropagation

(3) Differentiation (4) Somatic hybridization

Ans. (1)

Sol. NCERT-XII, Pg. # 178

133. Match List I with List II

	List I		**List II**
A.	Two or more alternative forms of a gene	I.	Back cross
B.	Cross of F_1 progeny with homozygous recessive parent	II.	Ploidy
C.	Cross of F_1 progeny with any of the parents	III.	Allele
D.	Number of chromosome sets in plant	IV.	Test cross

Choose the correct answer from the options given below:

(1) A–I, B–II, C–III, D–IV

(2) A–II, B–I, C–III, D–IV

(3) A–III, B–IV, C–I, D–II

(4) A–IV, B–III, C–II, D–I

Ans. (3)

Sol. NCERT-XII, Pg. # 56, 58, Module

134. The cofactor of the enzyme carboxypeptidase is :
(1) Zinc (2) Niacin (3) Flavin (4) Haem

Ans. **(1)**

Sol. NCERT-XI, Pg. # 118

135. These are regarded as major causes of biodiversity loss :
A. Over exploitation
B. Co-extinction
C. Mutation
D. Habitat loss and fragmentation
E. Migration
Choose the correct option :
(1) A, C and D only (2) A, B, C and D only
(3) A, B and E only (4) A, B and D only

Ans. **(4)**

Sol. NCERT-XII, Pg. # 222,223

Botany : Section-B (Q. No. 136 to 150)

136. Match List I with List II

	List I (Types of Stamens)		**List II (Example)**
A.	Monoadelphous	I.	Citrus
B.	Diadelphous	II.	Pea
C.	Polyadelphous	III.	Lily
D.	Epiphyllous	IV.	China-rose

Choose the correct answer from the options given below:
(1) A–IV, B–II, C–I, D–III
(2) A–IV, B–I, C–II, D–III
(3) A–I, B–II, C–IV, D–III
(4) A–III, B–I, C–IV, D–II

Ans. **(1)**

Sol. NCERT-XI, Pg. # 64

137. Match List I with List II

	List I		**List II**
A.	GLUT-4	I.	Hormone
B.	Insulin	II.	Enzyme
C.	Trypsin	III.	Intercellular ground substance
D.	Collagen	IV.	Enables glucose transport into cells

Choose the correct answer from the options given below:
(1) A–IV, B–I, C–II, D–III
(2) A–I, B–II, C–III, D–IV
(3) A–II, B–III, C–IV, D–I
(4) A–III, B–IV, C–I, D–II

Ans. **(1)**

Sol. NCERT-XI, Pg. # 109

138. Identify the step in tricarboxylic acid cycle, which does not involve oxidation of substrate.
(1) Malic acid → Oxaloacetic acid
(2) Succinic acid → Malic acid
(3) Succinyl-CoA → Succinic acid
(4) Isocitrate → α-ketoglutaric acid

Ans. **(3)**

Sol. NCERT-XI, Pg. # 159

139. Match List I with List II

	List I		**List II**
A.	Citric acid cycle	I.	Cytoplasm
B.	Glycolysis	II.	Mitochondrial matrix
C.	Electron transport system	III.	Intermembrane space of mitochondria
D.	Proton gradient	IV.	Inner mitochondrial membrane

Choose the correct answer from the options given below:
(1) A–I, B–II, C–III, D–IV
(2) A–II, B–I, C–IV, D–III
(3) A–III, B–IV, C–I, D–II
(4) A–IV, B–III, C–II, D–I

Ans. **(2)**

Sol. NCERT-XI, Pg. # 155,158,159,161

140. Match List I with List II

	List I		**List II**
A.	Frederick Griffith	I.	Genetic code
B.	Francois Jacob & Jacque Monod	II.	Semi-conservative mode of DNA replication
C.	Har Gobind Khorana	III.	Transformation
D.	Meselson & Stahl	IV.	*Lac* operon

Choose the correct answer from the options given below:
(1) A–III, B–II, C–I, D–IV
(2) A–III, B–IV, C–I, D–II
(3) A–II, B–III, C–IV, D–I
(4) A–IV, B–I, C–II, D–III

Ans. **(2)**

Sol. NCERT-XII, Pg. # 84, 89, 95, 100

141. Given below are two statements :

Statement I : In C_3 plants, some O_2 binds to RuBisCO, hence CO_2 fixation is decreased.

Statement II : In C_4 plants, mesophyll cells show very little photorespiration while bundle sheath cells do not show photorespiration.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

(3) Statement I is true but Statement II is false

(4) Statement I is false but Statement II is true

Ans. (3)

Sol. NCERT-XI, Pg. # 147

142. Identify the correct description about the given figure :

(1) Wind pollinated plant inflorescence showing flowers with well exposed stamens.

(2) Water pollinated flowers showing stamens with mucilaginous covering.

(3) Cleistogamous flowers showing autogamy

(4) Compact inflorescence showing complete autogamy.

Ans. (1)

Sol. NCERT-XII, Pg. # 13

143. Match List I with List II

	List I		List II
A.	Rose	I.	Twisted aestivation
B.	Pea	II.	Perigynous flower
C.	Cotton	III.	Drupe
D.	Mango	IV.	Marginal placentation

Choose the correct answer from the options given below :

(1) A-II, B-IV, C-I, D-III (2) A-I, B-II, C-III, D-IV

(3) A-IV, B-III, C-II, D-I (4) A-II, B-III, C-IV, D-I

Ans. (1)

Sol. NCERT-XI, Pg. # 63-66

144. Read the following statements and choose the set of correct statements :

In the members of Phaeophyceae,

A. Asexual reproduction occurs usually by biflagellate zoospores.

B. Sexual reproduction is by oogamous method only.

C. Stored food is in the form of carbohydrates which is either mannitol or laminarin.

D. The major pigments found are chlorophyll a, c and carotenoids and xanthophyll.

E. Vegetative cells have a cellulosic wall, usually covered on the outside by gelatinous coating of algin.

Choose the correct answer from the options given below :

(1) A, B, C and D only

(2) B, C, D and E only

(3) A, C, D and E only

(4) A, B, C and E only

Ans. (3)

Sol. NCERT-XI, Pg. # 26, 27

145. In an ecosystem if the Net Primary Productivity (NPP) of first trophic level is $100\ x\ (kcal\ m^{-2})\ yr^{-1}$, what would be the GPP (Gross Primary Productivity) of the third trophic level of the same ecosystem ?

(1) $\frac{x}{10}(kcal\,m^{-2})yr^{-1}$ (2) $x(kcal\ m^{-2})yr^{-1}$

(3) $10x(kcal\ m^{-2})yr^{-1}$ (4) $\frac{100x}{3x}(kcal\,m^{-2})yr^{-1}$

Ans. (3)

Sol. NCERT-XII, Pg. # 207

146. Which of the following statement is **correct** regarding the process of replication in *E.coli*?

(1) The DNA dependent DNA polymerase catalyses polymerization in one direction that is 3' → 5'

(2) The DNA dependent RNA polymerase catalyses polymerization in one direction, that is 5' → 3'

(3) The DNA dependent DNA polymerase catalyses polymerization in 5' → 3' as well as 3' → 5' direction

(4) The DNA dependent DNA polymerase catalyses polymerization in 5' → 3' direction.

Ans. (4)

Sol. NCERT-XII, Pg. # 90

147. Which of the following are fused in somatic hybridization involving two varieties of plants ?

(1) Callus

(2) Somatic embryos

(3) Protoplasts

(4) Pollens

Ans. (3)

Sol. NCERT-XII, Pg. # 178

148. Spraying sugarcane crop with which of the following plant growth regulators, increases the length of stem, thus, increasing the yield ?

(1) Auxin (2) Gibberellin

(3) Cytokinin (4) Abscisic acid

Ans. (2)

Sol. NCERT-XI, Pg. # 176

149. Match List I with List II

	List I		**List II**
A.	Robert May	I.	Species-Area relationship
B.	Alexander von Humboldt	II.	Long term ecosystem experiment using out door plots
C.	Paul Ehrlich	III.	Global species diversity at about 7 million
D.	David Tilman	IV.	Rivet popper hypothesis

Choose the correct answer from the options given below :

(1) A-II, B-III, C-I, D-IV (2) A-III, B-I, C-IV, D-II

(3) A-I, B-III, C-II, D-IV (4) A-III, B-IV, C-II, D-I

Ans. (2)

Sol. NCERT-XII, Pg. # 217, 220, 221

150. The DNA present in chloroplast is :

(1) Linear, double stranded

(2) Circular, double stranded

(3) Linear, single stranded

(4) Circular, single stranded

Ans. (2)

Sol. NCERT-XI, Pg. # 98

Zoology : Section-A (Q. No. 151 to 185)

151. Match List I with List II :

	List I		**List II**
A.	Common cold	I.	*Plasmodium*
B.	Haemozoin	II.	Typhoid
C.	Widal test	III.	Rhinoviruses
D.	Allergy	IV.	Dust mites

Choose the correct answer from the options given below:

(1) A-II, B-IV, C-III, D-I (2) A-I, B-III, C-II, D-IV

(3) A-III, B-I, C-II, D-IV (4) A-IV, B-II, C-III, D-I

Ans. (3)

Sol. NCERT-XII, Pg. # 131, 132, 137

152. Match List I with List II :

	List I		**List I**
A.	Cocaine	I.	Effective sedative in surgery
B.	Heroin	II.	*Cannabis sativa*
C.	Morphine	III.	*Erythroxylum*
D.	Marijuana	IV.	*Papaver somniferum*

Choose the correct answer from the options given below:

(1) A-IV, B-III, C-I, D-II (2) A-I, B-III, C-II, D-IV

(3) A-II, B-I, C-III, D-IV (4) A-III, B-IV, C-I, D-II

Ans. (4)

Sol. NCERT-XII, Pg. # 142, 143

153. Match List I with List II :

	List I		**List II**
A.	Fibrous joints	I.	Adjacent vertebrae, limited movement
B.	Cartilaginous joints	II.	Humerus and Pectoral girdle, rotational
C.	Hinge joints	III.	Skull, don't allow any movement
D.	Ball and socket joints	IV.	Knee, help in locomotion

Choose the correct answer from the options given below:

(1) A-IV, B-II, C-III, D-I (2) A-I, B-III, C-II, D-IV

(3) A-II, B-III, C-I, D-IV (4) A-III, B-I, C-IV, D-II

Ans. (4)

Sol. NCERT-XI, Pg. # 227

154. Which of the following are Autoimmune disorders?

A. Myasthenia gravis

B. Rheumatoid arthritis

C. Gout

D. Muscular dystrophy

E. Systemic Lupus Erythematosus (SLE)

Choose the most appropriate answer from the options given below:

(1) A, B & D only (2) A, B & E only

(3) B, C & E only (4) C, D & E only

Ans. (2)

Sol. NCERT-XI, Pg. # 227 (One Option Out of NCERT)

155. Which of the following is not a component of Fallopian tube?

(1) Uterine fundus (2) Isthmus

(3) Infundibulum (4) Ampulla

Ans. (1)

Sol. NCERT-XII, Pg. # 29

156. The flippers of the Penguins and Dolphins are the example of the

(1) Adaptive radiation (2) Natural selection

(3) Convergent evolution (4) Divergent evolution

Ans. (3)

Sol. NCERT-XII, Pg. # 115

157. Match List I with List II :

	List I		**List II**
A.	α-1 antitrypsin	I.	Cotton bollworm
B.	Cry IAb	II.	ADA deficiency
C.	Cry IAc	III.	Emphysema
D.	Enzyme replacement therapy	IV.	Corn borer

Choose the correct answer from the options given below:

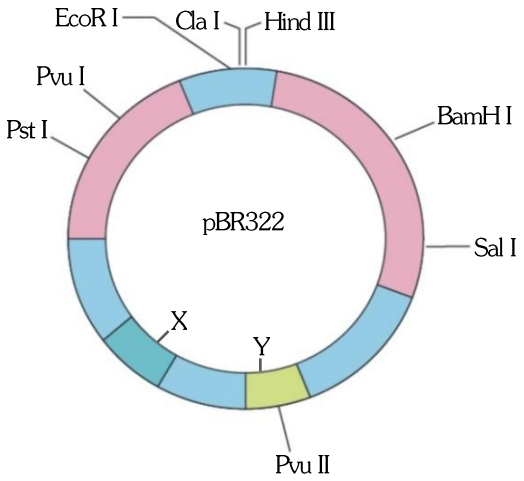
(1) A-II, B-I, C-IV, D-III (2) A-III, B-I, C-II, D-IV

(3) A-III, B-IV, C-I, D-II (4) A-II, B-IV, C-I, D-III

Ans. (3)

Sol. NCERT-XII, Pg. # 179, 180, 182, 184

158. The following diagram showing restriction sites in *E.coli* cloning vector pBR322. Find the role of '*X*' and '*Y*' genes.



(1) The gene '*X*' is responsible for resistance to antibiotics and '*Y*' for protein involved in the replication of Plasmid.

(2) The gene '*X*' is responsible for controlling the copy number of the linked DNA and '*Y*' for protein involved in the replication of Plasmid.

(3) The gene '*X* ' is for protein involved in replication of Plasmid and '*Y* ' for resistance to antibiotics.

(4) Gene '*X*' is responsible for recognition sites and '*Y*' is responsible for antibiotic resistance.

Ans. (2)

Sol. NCERT-XII, Pg. # 169

159. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A : Breast-feeding during initial period of infant growth is recommended by doctors for bringing a healthy baby.

Reason R : Colostrum contains several antibodies absolutely essential to develop resistance for the new born baby.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both A and R are correct and R is the correct explanation of A.

(2) Both A and R are correct but R is NOT the correct explanation of A.

(3) A is correct but R is not correct.

(4) A is not correct but R is correct.

Ans. (1)

Sol. NCERT-XII, Pg. # 38

160. The "Ti plasmid" of *Agrobacterium tumefaciens* stands for
(1) Tumour inhibiting plasmid
(2) Tumor independent plasmid
(3) Tumor inducing plasmid
(4) Temperature independent plasmid

Ans. (3)

Sol. NCERT-XII, Pg. # 170

161. Match List I with List II :

List I	List II
A. Pleurobrachia	I. Mollusca
B. Radula	II. Ctenophora
C. Stomochord	III. Osteichthyes
D. Air bladder	IV. Hemichordata

Choose the correct answer from the options given below :
(1) A-IV, B-II, C-III, D-I
(2) A-II, B-I, C-IV, D-III
(3) A-II, B-IV, C-I, D-III
(4) A-IV, B-III, C-II, D-I

Ans. (2)

Sol. NCERT-XI, Pg. # 42, 44, 45, 48

162. Given below are some stages of human evolution.
Arrange them in correct sequence (Past to Recent)
A. *Homo habilis*
B. *Homo sapiens*
C. *Homo neanderthalensis*
D. *Homo erectus*
Choose the correct sequence of human evolution from the options given below :
(1) D-A-C-B (2) B-A-D-C
(3) C-B-D-A (4) A-D-C-B

Ans. (4)

Sol. NCERT-XII, Pg. # 124, 125

163. Which of the following is not a steroid hormone ?
(1) Cortisol (2) Testosterone
(3) Progesterone (4) Glucagon

Ans. (4)

Sol. NCERT-XI, Pg. # 248

164. In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on :
(1) 5^{th} segment (2) 10^{th} segment
(3) 8^{th} and 9^{th} segment (4) 11^{th} segment

Ans. (2)

Sol. NCERT-XI, Pg. # 112 [Old NCERT]

165. Which one of the following factors will not affect the Hardy-Weinberg equilibrium ?
(1) Genetic recombination
(2) Genetic drift
(3) Gene migration
(4) Constant gene pool

Ans. (4)

Sol. NCERT-XII, Pg. # 121

166. Match List I with List II :

List I	List II
A. Pons	I. Provides additional space for Neurons, regulates posture and balance.
B. Hypothalamus	II. Controls respiration and gastric secretions
C. Medulla	III. Connects different regions of the brain
D. Cerebellum	IV. Neuro secretory cells

Choose the correct answer from the options given below :
(1) A-II, B-III, C-I, D-IV (2) A-III, B-IV, C-II, D-I
(3) A-I, B-III, C-II, D-IV (4) A-II, B-I, C-III, D-IV

Ans. (2)

Sol. NCERT-XI, Pg. # 235, 236

167. Match List I with List II :

List I	List II
A. Down's syndrome	I. 11^{th} chromosome
B. α-Thalassemia	II. 'X' chromosome
C. β-Thalassemia	III. 21^{st} chromosome
D. Klinefelter's syndrome	IV. 16^{th} chromosome

Choose the correct answer from the options given below :
(1) A-I, B-II, C-III, D-IV (2) A-II, B-III, C-IV, D-I
(3) A-III, B-IV, C-I, D-II (4) A-IV, B-I, C-II, D-III

Ans. (3)

Sol. NCERT-XII, Pg. # 73, 74, 75, 76

168. Which one is the correct product of DNA dependent RNA polymerase to the given template ?
3'TACATGGCAAATATCCATTCA5'
(1) 5'AUGUACCGUUUAUAGGUAAGU3'
(2) 5'AUGUAAAGUUUAUAGGUAAGU3'
(3) 5'AUGUACCGUUUAUAGGGAAGU3'
(4) 5'ATGTACCGTTTATAGGTAAGT3'

Ans. (1)

Sol. NCERT-XII, Pg. # 92

169. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: FSH acts upon ovarian follicles in female and Leydig cells in male.

Reason R: Growing ovarian follicles secrete estrogen in female while interstitial cells secrete androgen in male human being.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both A and R are true and R is the correct explanation of A.

(2) Both A and R are true but R is NOT the correct explanation of A.

(3) A is true but R is false.

(4) A is false but R is true.

Ans. (4)

Sol. NCERT-XI, Pg. # 241, 242

170. Which of the following is not a natural/traditional contraceptive method ?

(1) Coitus interruptus

(2) Periodic abstinence

(3) Lactational amenorrhea

(4) Vaults

Ans. (4)

Sol. NCERT-XII, Pg. # 44

171. Match List-I with List-II :

List-I		**List-II**	
A.	Non-medicated IUD	I.	Multiload 375
B.	Copper releasing IUD	II.	Progestogens
C.	Hormone releasing IUD	III.	Lippes loop
D.	Implants	IV.	LNG-20

Choose the correct answer from the options given below :

(1) A-III, B-I, C-II, D-IV (2) A-I, B-III, C-IV, D-II

(3) A-IV, B-I, C-II, D-III (4) A-III, B-I, C-IV, D-II

Ans. (4)

Sol. NCERT-XII, Pg. # 44, 45

172. Consider the following statements :

A. Annelids are true coelomates

B. Poriferans are pseudocoelomates

C. Aschelminthes are acoelomates

D. Platyhelminthes are pseudocoelomates

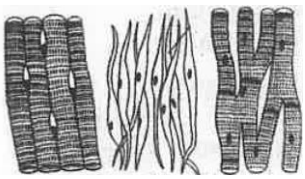
Choose the correct answer from the options given below :

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

Ans. (2)

Sol. NCERT-XI, Pg. # 40

173. Three types of muscles are given as a, b and c. Identify the correct matching pair along with their location in human body :



(a) (b) (c)

Name of muscle/location

(1) (a) Smooth-Toes
(b) Skeletal - Legs
(c) Cardiac - Heart

(2) (a) Skeletal - Triceps
(b) Smooth - Stomach
(c) Cardiac - Heart

(3) (a) Skeletal - Biceps
(b) Involuntary - Intestine
(c) Smooth - Heart

(4) (a) Involuntary - Nose tip
(b) Skeletal - Bone
(c) Cardiac - Heart

Ans. (2)

Sol. NCERT-XI, Pg. # 105 [Old NCERT]

174. Following are the stages of pathway for conduction of an action potential through the heart :

A. AV bundle B. Purkinje fibres

C. AV node D. Bundle branches

E. SA node

Choose the correct sequence of pathway from the options given below :

(1) E-C-A-D-B (2) A-E-C-B-D

(3) B-D-E-C-A (4) E-A-D-B-C

Ans. (1)

Sol. NCERT-XI, Pg. # 199

175. Match List I with List-II :

List-I	List-II
A. Lipase	I. Peptide bond
B. Nuclease	II. Ester bond
C. Protease	III. Glycosidic bond
D. Amylase	IV. Phosphodiester bond

Choose the correct answer from the options given below :

(1) A-IV, B-II, C-III, D-I (2) A-III, B-II, C-I, D-IV
(3) A-II, B-IV, C-I, D-III (4) A-IV, B-I, C-III, D-II

Ans. (3)

Sol. NCERT-XI, Pg. # 117

176. Match List I with List-II :

List-I	List-II
A. Axoneme	I. Centriole
B. Cartwheel pattern	II. Cilia and flagella
C. Crista	III. Chromosome
D. Statellite	IV. Mitochondria

Choose the correct answer from the options given below :

(1) A-IV, B-III, C-II, D-I (2) A-IV, B-II, C-III, D-I
(3) A-II, B-IV, C-I, D-III (4) A-II, B-I, C-IV, D-III

Ans. (4)

Sol. NCERT-XI, Pg. # 97, 99, 102

177. Match List I with List-II :

List-I (Sub Phases of Prophase I)	List-II (Specific characters)
A. Diakinesis	I. Synaptonemal complex formation
B. Pachytene	II. Completion of terminalisation of chiasmata
C. Zygotene	III. Chromosomes look like thin threads
D. Leptotene	IV. Appearance of recombination nodules

Choose the correct answer from the options given below :

(1) A-IV, B-II, C-III, D-I (2) A-I, B-II, C-IV, D-III
(3) A-II, B-IV, C-I, D-III (4) A-IV, B-III, C-II, D-I

Ans. (3)

Sol. NCERT-XI, Pg. # 128

178. Which of the following factors are favourable for the formation of oxyhaemoglobin in alveoli?

(1) High pO_2 and High pCO_2
(2) High pO_2 and Lesser H^+ concentration
(3) Low pCO_2 and High H^+ concentration
(4) Low pCO_2 and High temperature

Ans. (2)

Sol. NCERT-XI, Pg. # 189

179. Match List I with List-II :

List-I	List-II
A. *Pterophyllum*	I. Hag fish
B. Myxine	II. Saw fish
C. *Pristis*	III. Angel fish
D. *Exocoetus*	IV. Flying fish

Choose the correct answer from the options given below :

(1) A-II, B-I, C-III, D-IV (2) A-III, B-I, C-II, D-IV
(3) A-IV, B-I, C-II, D-III (4) A-III, B-II, C-I, D-IV

Ans. (2)

Sol. NCERT-XI, Pg. # 47, 48

180. Match List I with List II :

List-I	List-II
A. Typhoid	I. Fungus
B. Leishmaniasis	II. Nematode
C. Ringworm	III. Protozoa
D. Filariasis	IV. Bacteria

Choose the correct answer from the options given below :

(1) A-I, B-III, C-II, D-IV (2) A-IV, B-III, C-I, D-II
(3) A-III, B-I, C-IV, D-II (4) A-II, B-IV, C-III, D-I

Ans. (2)

Sol. NCERT-XII, Pg. # 130, 133, 134

181. Which of the following statements is incorrect?

(1) A bio-reactor provides optimal growth conditions for achieving the desired product.
(2) Most commonly used bio-reactors are of stirring type.
(3) Bio-reactors are used to produce small scale bacterial cultures.
(4) Bio- reactors have an agitator system, an oxygen delivery system and foam control system.

Ans. (3)

Sol. NCERT-XII, Pg. # 174

182. Given below are two statements:

Statement I : In the nephron, the descending limb of loop of Henle is impermeable to water and permeable to electrolytes.

Statement II : The proximal convoluted tubule is lined by simple columnar brush border epithelium and increases the surface area for reabsorption.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both Statement I and Statement II are true.
(2) Both Statement I and Statement II are false.
(3) Statement I is true but Statement II is false.
(4) Statement I is false but Statement II is true.

Ans. (2)

Sol. NCERT-XI, Pg. # 209

183. Given below are two statement :

Statement I : The presence or absence of hymen is not a reliable indicator of virginity.

Statement II : The hymen is torn during the first coitus only.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false.
(3) Statement I is true but Statement II is false.
(4) Statement I is false but Statement II is true.

Ans. (3)

Sol. NCERT-XII, Pg. # 301

184. Match List I with List II :

	List I		**List II**
A.	Expiratory capacity	I.	Expiratory reserve volume + Tidal Volume + Inspiratory reserve volume
B.	Functional residual capacity	II.	Tidal volume + Expiratory reserve volume
C.	Vital capacity	III.	Tidal volume + Inspiratory reserve volume
D.	Inspiratory capacity	IV	Expiratory reserve volume + Residual volume

Choose the correct answer from the options given below

(1) A-II, B-IV,C-I,D-III (2) A-III, B-II,C-IV,D-I
(3) A-II, B-I,C-IV,D-III (4) A-I, B-III,C-II,D-IV

Ans. (1)

Sol. NCERT-XI, Pg. # 186, 187

185. Following are the stages of cell division :

A. Gap 2 phase B. Cytokinesis
C. Synthesis phase D. Karyokinesis
E. Gap 1 phase

Choose the correct sequence of stages from the options given below :

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

Ans. (4)

Sol. NCERT-XI, Pg. # 121

Zoology : Section-B (Q. No. 186 to 200)

186. Given below are two statements:

Statement I : Mitochondria and chloroplasts are both double membrane bound organelles.

Statement II : Inner membrane of mitochondria is relatively less permeable, as compared to chloroplast.

In the light of the above statement, choose the most appropriate answer from the options given below :

(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect.
(3) Statement I is correct but Statement II is incorrect.
(4) Statement I is incorrect but Statement II is correct

Ans. (3)

Sol. NCERT-XI, Pg. # 97, 98

NCERT Statement – Of the two the inner chloroplast membrane is relatively less permeable.

187. Match List I with List II

	List I		**List II**
A.	Mesozoic Era	I.	Lower invertebrates
B.	Proterozoic Era	II.	Fish & Amphibia
C.	Cenozoic Era	III.	Birds & Reptiles
D.	Paleozoic Era	IV	Mammals

Choose the correct answer from the options given below :

(1) A-II, B-I,C-III,D-IV (2) A-III, B-I,C-II,D-IV
(3) A-I, B-II,C-IV,D-III (4) A-III, B-I,C-IV,D-II

Ans. (4)

Sol. Module

188. Given below are two statements :

Statement I : Gause's competitive exclusion principle states that two closely related species competing for different resources cannot exist indefinitely.

Statement II : According to Gause's principle, during competition, the inferior will be eliminated. This may be true if resources are limiting.

In the light of the above statements, choose the correct answer from the options given below.

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false.

(3) Statement I is true but Statement II is false.

(4) Statement I is false but Statement II is true.

Ans. (4)

Sol. NCERT-XII, Pg. # 199

189. Match List I with List II

	List I		**List II**
A.	Unicellular glandular epithelium	I.	Salivary glands
B.	Compound epithelium	II.	Pancreas
C.	Multicellular glandular epithelium	III.	Goblet cells of alimentary canal
D.	Endocrine glandular epithelium	IV	Moist surface of buccal cavity

Choose the correct answer from the options given below :

(1) A-II, B-I,C-III,D-IV (2) A-IV, B-III,C-I,D-II

(3) A-III, B-IV,C-I,D-II (4) A-II, B-I,C-IV,D-III

Ans. (3)

Sol. NCERT-XI, Pg. # 102, [Old NCERT]

190. Match List I with List II related to digestive system of cockroach.

	List I	**List II**
A.	The structures used for storing of food.	I. Gizzard
B.	Ring of 6-8 blind tubules at junction of foregut and midgut.	II. Gastric Caeca
C.	Ring of 100-150 yellow coloured thin filaments at junction of midgut and hindgut.	III. Malpighian tubules
D.	The structures used for grinding the food.	IV Crop

Choose the correct answer from the options given below:

(1) A-IV, B-II,C-III,D-I (2) A-I, B-II,C-III,D-IV

(3) A-IV, B-III,C-II,D-I (4) A-III, B-II,C-IV,D-I

Ans. (1)

Sol. NCERT-XI, Pg. # 113 [Old NCERT]

191. Choose the correct statement given below regarding juxta medullary nephron.

(1) Juxta medullary nephrons are located in the coloumns of Bertini.

(2) Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla.

(3) Loop of Henle of juxta medullary nephron runs deep into medulla.

(4) Juxta medullary nephrons outnumber the cortical nephrons.

Ans. (3)

Sol. NCERT-XI, Pg. # 207, 208

192. Match List I with List II :

List I		**List II**	
(A)	RNA polymerase III	(I)	snRNPs
(B)	Termination of transcription	(II)	Promotor
(C)	Splicing of Exons	(III)	Rho factor
(D)	TATA box	(IV)	SnRNAs, tRNA

Choose the correct answer from the options given below :

(1) A-II, B-IV, C-I, D-III (2) A-III, B-II, C-IV, D-I

(3) A-III, B-IV, C-I, D-II (4) A-IV, B-III, C-I, D-II

Ans. (4)

Sol. NCERT-XII, Pg. # 94, 95

193. Given below are two statements :

Statement I: The cerebral hemispheres are connected by nerve tract known as corpus callosum.

Statement II: The brain stem consists of the medulla oblongata, pons and cerebrum.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both Statement I and Statement II are correct.

(2) Both Statement I and Statement II are incorrect.

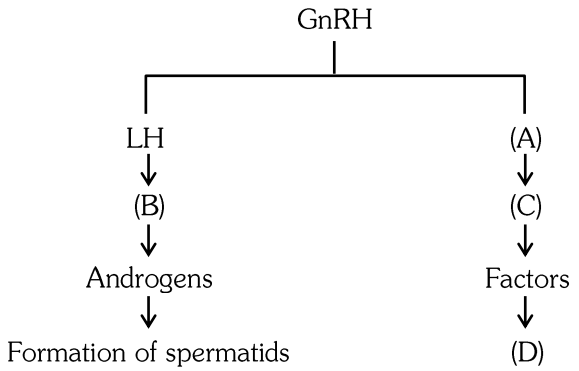
(3) Statement I is correct but Statement II is incorrect.

(4) Statement I is incorrect but Statement II is correct.

Ans. (3)

Sol. NCERT-XI, Pg. # 235, 236

194. Identify the correct option (A), (B), (C), (D) with respect to spermatogenesis.



(1) FSH, Leydig cells, Sertoli cells, spermiogenesis
(2) ICSH, Interstitial cells, Leydig cells, spermiogensis.
(3) FSH, Sertoli cells, Leydig cells, spermatogenesis.
(4) ICSH, Leydig cells, Sertoli cells, spermatogenesis.

Ans. (1)

Sol. NCERT-XII, Pg. # 131, 132

195. As per ABO blood grouping system, the blood group of father is B^+, mother is A^+ and child is O^+. Their respective genotype can be

A. I^Bi / I^Ai / ii
B. I^BI^B / I^AI^A / ii
C. I^AI^B / iI^A / I^Bi
D. I^Ai / I^Bi / I^Ai
E. iI^B / iI^A / I^AI^B

Choose the most appropriate answer from the options given below :

(1) A only
(2) B only
(3) C & B only
(4) D & E only

Ans. (1)

Sol. NCERT-XII, Pg. # 61

196. Given below are two statements :

Statement I: Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.

Statement II: Both bone marrow and thymus provide micro environments for the development and maturation of T-Lymphocytes.

In the light of the above statements, choose the most appropriate answer from the options given below :

(1) Both Statement I and Statement II are correct.
(2) Both Statement I and Statement II are incorrect.
(3) Statement I is correct but Statement II is incorrect.
(4) Statement I is incorrect but Statement II is correct.

Ans. (1)

Sol. NCERT-XII, Pg. # 138

197. Regarding catalytic cycle of an enzyme action, select the correct sequential steps :

A. Substrate enzyme complex formation.
B. Free enzyme ready to bind with another substrate.
C. Release of products.
D. Chemical bonds of the substrate broken
E. Substrate binding to active site.

Choose the correct answer from the options given below:

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

Ans. (1)

Sol. NCERT-XI, Pg. # 115

198. Match List I with List II :

	List I		List II
A	P wave	I	Heart muscles are electrically silent.
B	QRS complex	II	Depolarisation of ventricles.
C	T wave	III	Depolarisation of atria.
D	T-P gap	IV	Repolarisation of ventricles.

Choose the correct answer from the options given below:

(1) A-I, B-III, C-IV, D-II
(2) A-III, B-II, C-IV, D-I
(3) A-II, B-III, C-I, D-IV
(4) A-IV, B-II, C-I, D-III

Ans. (2)

Sol. NCERT-XI, Pg. # 201

199. Match List I with List II.

	List I		List II
A	Exophthalmic goiter	I	Excess secretion of cortisol, moon face & hyperglycemia.
B	Acromegaly	II	Hypo-secretion of thyroid hormone and stunted growth.
C	Cushing's syndrome	III	Hyper secretion of thyroid hormone & protruding eye balls.
D	Cretinism	IV	Excessive secretion of growth hormone.

Choose the correct answer from the options given below:

(1) A-I, B-III, C-II, D-IV
(2) A-IV, B-II, C-I, D-III
(3) A-III, B-IV, C-II, D-I
(4) A-III, B-IV, C-I, D-II

Ans. (4)

Sol. NCERT-XI, Pg. # 241, 242, 247

200. The following are the statements about non-chordates :

A. Pharynx is perforated by gill slits.
B. Notochord is absent.
C. Central nervous system is dorsal.
D. Heart is dorsal if present.
E. Post anal tail is absent.

(1) A & C only
(2) A, B & D only
(3) B, D & E only
(4) B, C & D only

Ans. (3)

Sol. NCERT-XI, Pg. # 46