15/04/2026

Code-B_Phase-1

Corporate Office : AESL, 3rd Floor, Incuspaze Campus-2, Plot No. 13, Sector-18, Udyog Vihar, Gurugram, Haryana - 122015, ***Ph.***+91-1244168300

MM : 720 Final Test Series(P1)_NEET2026_Test-09B **Time : 180 Min.**

PHYSICS

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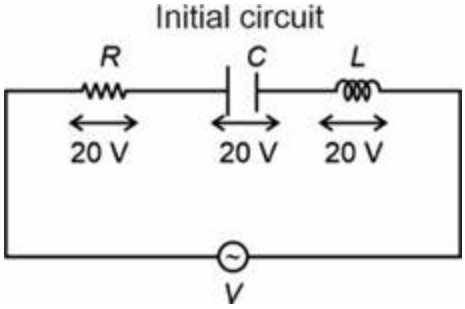
Hints and Solutions

PHYSICS

(1) **Answer :** (2)
Solution:



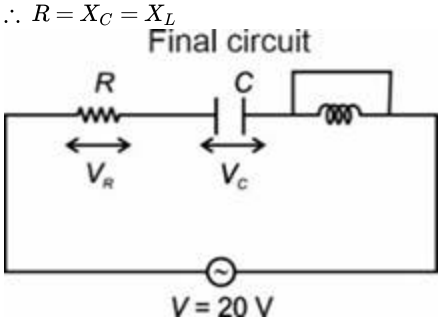
$V^2 = V_R^2 + (V_L - V_C)^2$

$V^2 = (20)^2 + (20-20)^2$

V = 20 V

$V_R = V_C = V_L$

$\therefore\ R = X_C = X_L$



$V^2 = V_R^2 + V_C^2$

$\because\ R = X_C$

$\Downarrow$

$V_R = V_C$

$V^2 = V_C^2 + V_C^2$

$(20)^2 = 2V_C^2$

$V_C = \frac{20}{\sqrt{2}} = 10\sqrt{2}$ V

(2) **Answer :** (2)
Solution:

$v = \omega\sqrt{A^2 - x^2}$

$8 = \omega\sqrt{A^2 - (5)^2}$

$\Rightarrow\ \frac{64}{\omega^2} + 25 = A^2$ ...(i)

$10 = \omega\sqrt{A^2 - (4)^2}$

$\Rightarrow\ \frac{100}{\omega^2} + 16 = A^2$ ...(ii)

From, (i) and (ii)

$\frac{64}{\omega^2} + 25 = \frac{100}{\omega^2} + 16$

$\frac{36}{\omega^2} = 9$

$\omega^2 = \frac{36}{9}$

ω = 2 rad/s

$\because\ \omega = \frac{2\pi}{T} = 2$

$T = \pi = 3.14$ s

(3) **Answer :** (2)

Solution:

$C_1 = 2K\frac{C}{2} = KC$

$C_2 = 3K\frac{C}{2} = \frac{3}{2}KC$

Now $C_{eq} = C_1 + C_2$ (parallel combination)

$= KC + \frac{3KC}{2}$

$= \frac{5}{2}KC$

(4) **Answer :** (4)

Solution:

Electric field at axial point

$\vec{E}_1 = \frac{2\vec{p}}{4\pi\varepsilon_0 r^3} \quad \Rightarrow \quad \vec{E}' = \frac{2\vec{p}}{4\pi\varepsilon_0 a^3}$

Electric field at equatorial point

$\vec{E}_2 = \frac{-\vec{p}}{4\pi\varepsilon_0 r^3} \quad \Rightarrow \quad \vec{E}' = \frac{-\vec{p}}{4\pi\varepsilon_0 a^3} \quad \therefore \quad \vec{E}' = -2\vec{E}$

(5) **Answer :** (3)

Solution:

$_{92}U^{237} \xrightarrow[\text{emissions}]{7\alpha\text{-particle}} {}_{78}Pt^{209} \xrightarrow[\text{emissions}]{5\beta^- \text{ particle}} {}_{83}Bi^{209}$

(6) **Answer :** (1)

Solution:

$\frac{1}{f_l} = (\mu - 1)\left(\frac{2}{R}\right)$

$\frac{1}{20} = \frac{0.5 \times 2}{R}$

$R = 20$ cm

$\frac{1}{f'} = (1.5 - 1)\left(\frac{1}{-20} - \frac{1}{20}\right)$

$\frac{1}{f'} = (0.5) \times \left(\frac{-2}{20}\right) = \frac{-1}{20}$

Power of arrangement (P) = $\frac{1}{f} + \frac{1}{f'} + \frac{1}{f}$

$= \frac{1}{20} + \left(\frac{-1}{20}\right) + \frac{1}{20}$

$P = \frac{1}{20\text{ cm}} = +5$ D

(7) **Answer :** (4)

Solution:

$\vec{P}_i = mv\sin 60^\circ \hat{j} + mv\cos 60^\circ \hat{i}$

$= \frac{mv\sqrt{3}\hat{j}}{2} + \frac{mv}{2}\hat{i}$

$\vec{P}_f = -mv\sin 60^\circ \hat{j} + mv\cos 60^\circ \hat{i}$

$= -\frac{mv\sqrt{3}}{2}\hat{j} + \frac{mv}{2}\hat{i}$

$\Delta\vec{P} = \vec{P}_f - \vec{P}_i$

$\overrightarrow{\Delta P} = -mv\sqrt{3}\,\hat{j}$

$\left|\overrightarrow{\Delta P}\right| = mv\sqrt{3}$

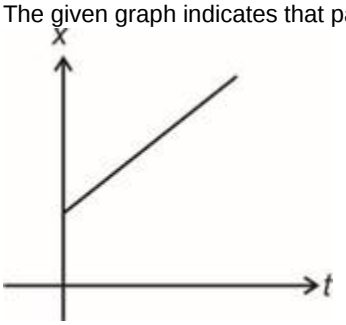
(8) **Answer :** (2)

Solution:

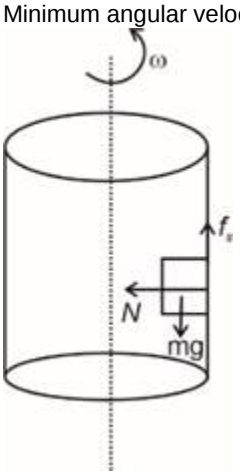
After a long time, capacitor will be completely charged and will act as open wire while inductor will act as a resistance less wire.

$i = \frac{10}{10} = 1\,\text{A} \therefore P = i^2R = 10\,\text{W}$

(9) **Answer :** (2)
Solution:
The given graph indicates that particle is moving with constant velocity and hence, zero acceleration



(10) **Answer :** (1)
Solution:
For equilibrium:
$f_S = mg$ and ..(i)
$N = ma = mr\omega^2$
Minimum angular velocity will be needed when friction become maximum.



$(f_s)_{max} = \mu N = mg$

$\mu mr\omega^2 = mg \Rightarrow \mu = \frac{g}{r\omega^2}$

$\mu = \frac{10}{1.5 \times 10 \times 10} = \frac{1}{15}$

(11) **Answer :** (1)
Solution:

Dimensional formula of $\text{kg}\,\frac{\text{m}^2}{\text{s}^2}$ is

$\left[\text{ML}^2\text{T}^{-2}\right]$

$n_2 = n_1\left[\frac{M_1}{M_2}\right]^1\left[\frac{L_1}{L_2}\right]^2\left[\frac{T_1}{T_2}\right]^{-2}$

$n_2 = 10\left[\frac{1\text{ kg}}{10\text{ kg}}\right]^1\left[\frac{1\text{ m}}{100\text{ m}}\right]^2\left[\frac{1\text{ s}}{10^3\text{s}}\right]^{-2}$

$n_2 = 100$

(12) **Answer :** (1)
Solution:
Maximum loss of kinetic energy happens when the collision is perfectly inelastic.

(13) **Answer :** (4)
Solution:

$$\vec{\tau} = \vec{r} \times \vec{F} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -1 & 1 \\ 2 & 3 & 0 \end{vmatrix}$$

$$\vec{\tau} = \hat{i}\left(-3\right) - \hat{j}\left(-2\right) + \hat{k}\left(3+2\right)$$

$$\vec{\tau} = -3\hat{i} + 2\hat{j} + 5\hat{k}$$

(14) **Answer :** (2)
Solution:

$y = \overline{\overline{A} + B} = \overline{\overline{A}} \cdot \overline{B} = A \cdot \overline{B}$

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

(15) **Answer :** (3)
Solution:
The existence of threshold frequency in photelectric effect can be explained by particle nature of light.
While $E = \frac{hc}{\lambda}$
$\therefore \quad E \propto \frac{1}{\lambda}$

(16) **Answer :** (2)
Solution:
- Magnetic susceptibility of diamagnetic substance is negative
- Magnetic susceptibility of paramagnetic substance is small and positive.
- Magnetic susceptibility of ferromagnetic substance is large and positive.

(17) **Answer :** (2)
Solution:
For thin prism:
$\delta = (\mu - 1)A \Rightarrow \delta = 0.5 \times 4^{o} = 2^{\circ}$

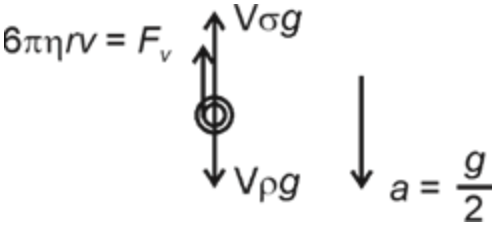
(18) **Answer :** (4)
Solution:

$\frac{1}{R} = \frac{1}{3} + \frac{1}{16} + \frac{1}{8}$

$\frac{1}{R} = \frac{16+3+6}{48} = \frac{25}{48} \Rightarrow R = \frac{48}{25}\Omega$

$V_{PQ} = 1.5 \times \frac{48}{25} = \frac{14.4}{5} = 2.88\ \text{V}$

(19) **Answer :** (1)
Solution:



$V\rho g - (F_V + V\sigma g) = ma$

$\Rightarrow \frac{4}{3}\pi r^3 \rho g - 6\pi\eta r v - \frac{4}{3}\pi r^3 \sigma g = \frac{4}{3}\pi r^3 \rho\left(\frac{g}{2}\right)$

$\Rightarrow 6\pi\eta r v = \frac{4}{3}\pi r^3 g\left(\rho - \sigma\right) - \frac{4}{3}\frac{\pi r^3 \rho g}{2}$

$\Rightarrow 6\pi\eta r v = \frac{4}{3}\pi r^3 g\left(\rho - \sigma - \frac{\rho}{2}\right)$

$\Rightarrow 6\pi\eta r v = \frac{4}{3}\pi r^3 g\left(\frac{\rho - 2\sigma}{2}\right)$

$\Rightarrow v = \frac{2\pi r^2 g\left(\rho - 2\sigma\right)}{18\eta\pi}$

$\Rightarrow v = \frac{r^2 g\left(\rho - 2\sigma\right)}{9\eta}$

(20) Answer : (4)
Solution:

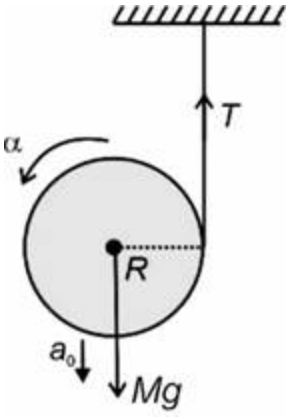
Magnetic flux, $\phi = \vec{B}.\vec{A} = BA\cos\theta$

and $\varepsilon = \frac{-d\phi}{dt} \Rightarrow \varepsilon = -\frac{d}{dt}(BA\cos\theta)$

Therefore, emf and current can be induced by varying *B*, *A* or θ.

(21) Answer : (4)
Solution:

$\tau_{net} = I\alpha \Rightarrow Mg \times \text{R} = \left(\frac{MR^2}{2} + MR^2\right)\alpha$



$\text{MgR} = \frac{3}{2}\text{MR}^2\alpha \quad \alpha = \frac{2g}{3R}$

(22) Answer : (3)
Solution:

For a cyclic process $\Delta u = 0$

$\therefore$ $Q = w$

w = Area under *P-V* graph

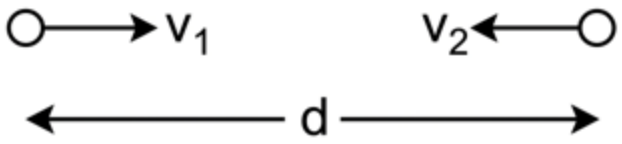
$w = \frac{1}{2} \times (3-2) \times \left(2 \times 10^3 - 10^3\right)$

$= \frac{1}{2} \times 1 \times 10^3 = 500\,\text{J}$

$\therefore$ $Q = 500$ J

(23) Answer : (1)
Solution:

No external force is acting on the system, hence $v_1 = v_2 = v$.



Only gravitational force is acting on the system, hence mechanical energy of the system remains conserved.

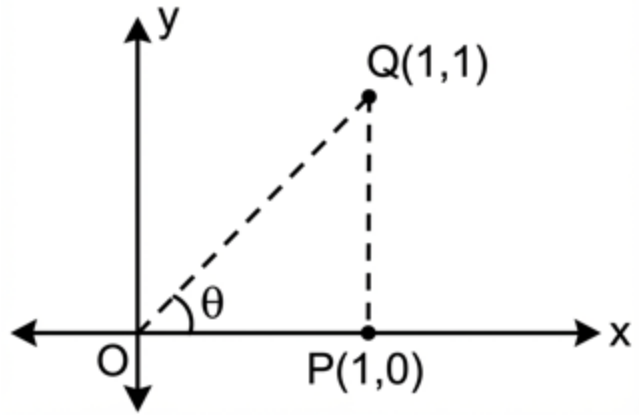
$TME_i = TME_f$

$O = -\frac{Gm^2}{d} + \frac{1}{2}mv^2 \times 2$

$mv^2 = \frac{Gm^2}{d} \Rightarrow v = \sqrt{\frac{Gm}{d}}$

Relative velocity $= 2v = 2\sqrt{\frac{Gm}{d}}$

(24) Answer : (4)
Solution:



Potential due to a dipole is given by $V = \frac{KP\cos\theta}{r^2}$

Potential at point *P*:

$V_0 = \frac{KP\cos 0^\circ}{1^2} \Rightarrow V_0 = KP$ ...(i)

Potential at point *Q*:

$V' = \frac{KP\cos\theta}{r^2} = KP \times \frac{\frac{1}{\sqrt{2}}}{(\sqrt{2})^2} = \frac{KP}{2\sqrt{2}}$ ...(ii)

$\therefore V' = \frac{V_0}{2\sqrt{2}}$

(25) **Answer :** (4)
Solution:

$V_d = \frac{eE\tau}{m},\ E = \frac{V}{L}$

$\therefore \quad V_d = \frac{eV\tau}{mL} \Rightarrow V_d \propto \frac{1}{L}$

$\frac{V_d}{V_d'} = \frac{L}{2L} \Rightarrow V_d' = \frac{V_d}{2}$

(26) **Answer :** (3)
Solution:
The aperture of the objective lens of a telescope determines the resolving power and brightness.

(27) **Answer :** (2)
Solution:

$g = \frac{GM}{R^2}$

At height $h = R,\ g' = \frac{GM}{(R+R)^2} = \frac{GM}{4R^2}$

$\therefore\ g' = \frac{g}{4}$

(28) **Answer :** (2)
Solution:
In semiconductors, increase in the number of charge carriers happens due to an increase in temperature which leads to the increase in the conductivity.

(29) **Answer :** (3)
Solution:
Initially the system is in equilibrium.
$Kx = PA$, $PV = nRT \Rightarrow P \times Ax = nRT$

$\therefore\ Kx = \frac{nRT}{x} \Rightarrow Kx^2 = nRT$ ...(i)

Work done by gas= Potential energy change of spring

$W = \frac{1}{2}K\left[(2x)^2 - x^2\right] = \frac{3}{2}Kx^2$ ...(ii)

Final compression in the spring is 2*x*,
$\therefore P'A = K(2x) \Rightarrow P' = 2P$
Similarly, $V' = 2V$
Hence using $PV = nRT$, final temperature will become $4T$

$\Delta U = nC_V\,\Delta T \Rightarrow \Delta U = n \times \frac{3}{2} R(4T - T)$

$\Delta U = \frac{9}{2}nRT$ ...(iii)

$Q = \Delta U + W$

$Q = \frac{9}{2}nRT + \frac{3}{2}Kx^2$

$Q = \frac{9}{2}nRT + \frac{3}{2}nRT$

$Q = 6nRT$

(30) Answer : (2)

Solution:

Beat frequency $= |f_A - f_B| = 5$ Hz

$\therefore$ f_A → 261 Hz

f_A → 251 Hz

When wax is added to a tuning fork, its frequency decreases.

Since loading tuning fork with wax decreased the beat frequency, the initial frequency of A must have been higher than B.

$\therefore$ $f_A = 261\,\text{Hz}$

(31) Answer : (2)

Solution:

There is no external force acting on the system, hence the centre of mass of the system remains at rest.

(32) Answer : (3)

Solution:

The motion of the charged particle is the combination of (a) uniform motion along the field and (b) circular motion perpendicular to the field, hence the resultant motion is helical.

(33) Answer : (1)

Solution:

Given $F = \frac{K}{r}$

This force is responsible for centripetal acceleration.

$\therefore$ $\frac{K}{r} = \frac{mv^2}{r} \Rightarrow mv^2 = K$ (constant) …(i)

Kinetic energy $= \frac{1}{2}mv^2 \Rightarrow$ constant.

Hence $T_n \propto n^0 \Rightarrow b = 0$.

Also, according to Bohr's atomic model

$mvr = \frac{nh}{2\pi}$

So, $r = \frac{nh}{2\pi mv}$ $\left\{v = \text{constant}\right\}$.

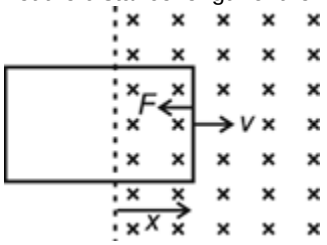
$\therefore$ $r \propto n \Rightarrow a = 1$

Hence $a + b = 1$

(34) Answer : (1)

Solution:

Let the distance length of the loop inside is *x* at some moment and its velocity is *v* at that moment. Then



$F = ilB$, $i = \frac{E}{R}$, $E = Blv$

$\therefore$ $F = \frac{1}{R} \times Blv \times lB = \frac{B^2l^2v}{R}$

$F = m \times a$

$-ma = \frac{B^2l^2v}{R}$

$-m\frac{vdv}{dx} = \frac{B^2l^2v}{R}$

$\int_{v_0}^{0} mdv = \int_0^d \frac{B^2l^2dx}{R}$

$-m\left(0 - v_0\right) = \frac{B^2l^2d}{R}$

$v_0 = \frac{B^2l^2d}{mR}$

(35) **Answer :** (2)
Solution:
Constant velocity implies zero acceleration, hence net force is zero.
Since the body is moving, frictional force is acting on it.
To counter friction, at least one horizontal force has to act on the body.

(36) **Answer :** (2)
Solution:

$\beta = \frac{-\Delta P \times V}{\Delta V}$

Here same pressure is acting everywhere but the sign would be negative.

$\therefore \ \Delta V = \frac{V\Delta P}{\beta}$, therefore volume increase but the shape remains same.

(37) **Answer :** (4)
Solution:

Velocity gradient $= \frac{\Delta \mathrm{V}}{\Delta \mathrm{y}} = \frac{18 \text{ cm } s^{-1}}{0.1 \text{ cm}} = 180 \text{ s}^{-1}$

(38) **Answer :** (4)
Solution:

$Q = \mathrm{mS}\,\Delta\, T \Rightarrow S \propto \frac{1}{\Delta T}$

Since $(\Delta T)_A = 2(\Delta T)_B$

$\therefore \ S_A : S_B = 1 : 2$

(39) **Answer :** (1)
Solution:
Using the right hand rule, magnetic field is along +*z* axis.

(40) **Answer :** (2)
Solution:

For single slit diffraction, angular width of central maximum (α) $= 2\theta = \frac{2\lambda}{a}$

$\therefore \ \alpha = \frac{2\times 500\times 10^{-9}}{0.25\times 10^{-3}} = 4\times 10^{-3} \text{ rad}$

(41) **Answer :** (1)
Solution:
If the zero of the circular scale lies below the reference line, the reading is more than the true value. Hence, the instrument shows a positive zero error.

(42) **Answer :** (3)
Solution:

In uniform field, length of the ring can be treated as $l = 2R\hat{i}$

(a) $\overrightarrow{F_1} = i\left(\overrightarrow{l} \times \overrightarrow{B}\right) = I\left(2R\hat{i}\right) \times \left(\hat{i} + \hat{j}\right) B_0$

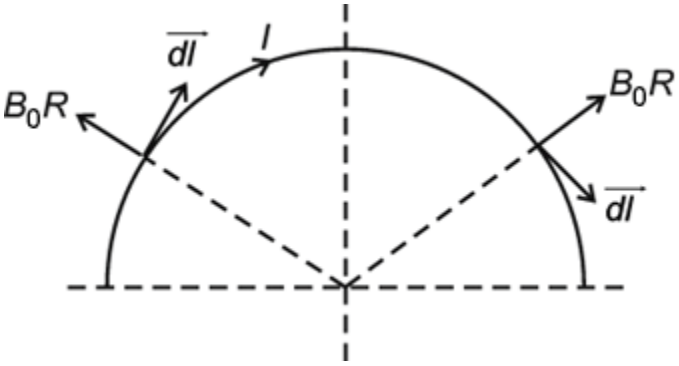
$\overrightarrow{F_1} = 2B_0 IR\left(\hat{k}\right)$

(b) $\overrightarrow{F_2} = I\left(2R\hat{i}\right) \times \left(2B_0\hat{j}\right) = 4B_0 IR\hat{k}$

(c) $\overrightarrow{F_3} = I\left(2R\hat{i}\right) \times 2B_0\hat{k} = 4B_0 IR\left(-\hat{j}\right)$

(d) $d\overrightarrow{F} = i\left(d\overrightarrow{l} \times \overrightarrow{B}\right)$

At every point $d\overrightarrow{l}$ and $\overrightarrow{B}$ are perpendicular to each other and the direction of $d\overrightarrow{F}$ is towards +ve z-axis.

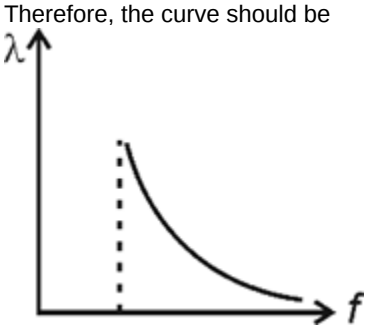


$\therefore \quad \overrightarrow{F_4} = \int d\overrightarrow{F} = I \int \left(dl \right) \times B_0 R \left(\hat{k} \right)$

$\overrightarrow{F_4} = I\, \pi R \times B_0 R \hat{k} = \pi B_0 I R^2 \hat{k}$

(43) **Answer :** (2)
Solution:
Wave velocity and particle velocity of a transverse wave are perpendicular.

(44) **Answer :** (3)
Solution:
Photoelectric equation:
$hf = \phi_0 + \frac{1}{2}mv^2 \quad$ ...(i)
de Broglie wavelength:
$\lambda = \frac{h}{mv} \qquad$ ...(ii)
Using (i) and (ii), we can write
$hf = \phi_0 + \frac{1}{2}m\left(\frac{h}{m\lambda}\right)^2$
$hf = \phi_0 + \frac{1}{2}\frac{h^2}{\mathrm{m}\lambda^2} \Rightarrow \frac{h^2}{2\mathrm{m}\lambda^2} = hf - \phi_0$
$\lambda = \sqrt{\frac{h^2}{2m(\mathrm{hf} - \phi_0)}}$
Defined for $hf - \phi_0 > 0 \Rightarrow f > \frac{\phi_0}{h}$
Also, if $f \uparrow$, then $\lambda \downarrow$
Nature of slope:
$\frac{\mathrm{d}\lambda}{\mathrm{df}} = \frac{h}{\sqrt{2m}} \times \left(-\frac{1}{2}\right) \frac{1}{(\mathrm{hf} - \phi_0)^{3/2}} \times h$
-ve sign indicates that slope is negative.
If $f \uparrow, \left|\frac{\mathrm{d}\lambda}{\mathrm{df}}\right| \downarrow$
Therefore, the curve should be



(45) **Answer :** (1)
Solution:
First law of thermodynamics is based on conservation of energy.

CHEMISTRY

(46) Answer : (4)
Hint:
In equal masses of O_2 and N_2, N_2 will have more number of atoms.
Solution:
Molality and mole fraction are temperature independent quantities.
Mole of $O_2 = \frac{w}{32}$
Number of atoms in O_2 = $\frac{w}{32} \times N_A \times 2 = \frac{w}{16} N_A$
Number of atoms in N_2 = $\frac{w}{28} \times N_A \times 2$
$= \frac{w}{14} \times N_A$

(47) Answer : (2)
Solution:
- For limiting line
  $n_2 \to \infty$
- Number of spectral lines
  $= n_2 - n_1$
  $= 5 - 2 = 3$

(48) Answer : (3)
Solution:

		μ(D)
A.	H_2O	1.85
	NH_3	1.47
	$CHCl_3$	1.04

B. XeF_4 : 2 lone pair of electrons
XeO_3 : 1 lone pair of electrons
XeF_2 : 3 lone pair of electrons
C. Order of Bond length :- N–O > C–H > O–H
D. N_2 Bond order is 3
H_2 Bond order is 1
O_2 Bond order is 2
Higher is the bond order, higher will be the bond enthalpy.

(49) Answer : (1)
Solution:
Suppose acid is H_2A
$H_2A + 2\,NaOH \to P$
Expected energy evolved = 2 × 13.7 = 27.4 kcal
Then ionisation energy = 27.4 – 26 = 1.4 kcal

(50) Answer : (3)
Solution:
$K_2Cr_2O_7 + Fe_2(C_2O_4)_3 \to Cr^{3+} + Fe^{3+} + CO_2$
$(n_{factor} \times \text{mole})_{K_2Cr_2O_7} = (n_{factor} \times \text{mole})_{Fe_2(C_2O_4)_3}$ ...eq(1)
$n_f\left(Cr_2O_7^{2-}\right) = 3 \times 2 = 6$ and $n_f\left(Fe_2\left(C_2O_4\right)_3\right) = 1 \times 6$
Putting eq^n(1), we get
n × 6 = 0.1 × 6
n = 0.1

(51) Answer : (4)
Solution:
Species of highest positive reduction potential will easily reduce and act as good oxidising agent.

(52) Answer : (2)
Solution:
0.6 M of 20 mL H_2SO_4 = 0.6 M of 40 mL NH_3

Percentage of nitrogen = $\frac{1.4\times20\times0.6\times2}{0.56}$

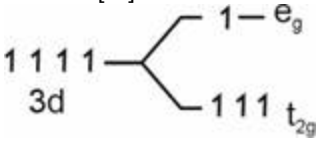
= 60%

(53) Answer : (1)

Hint:

In $[Mn(Cl)_6]^{3-}$

$Mn^{3+} \Rightarrow [Ar]4s^0 3d^4$



Crystal field stabilization energy (CFSE)

$= -0.4\ \Delta_0 \times 3 + 0.6\ \Delta_0 \times 1 = -0.6\ \Delta_0$

(54) Answer : (4)

Solution:

IUPAC name of $K_3[Al(C_2O_4)_3]$:

Potassium trioxalatoaluminate (III)

(55) Answer : (1)

Solution:

With increase in atomic number ionic radii decreases.

(56) Answer : (1)

Hint:

Manganese in Mn^{2+} state has half filled d^5 configuration.

Solution:

$Mn^{3+} = 3d^4$

$Mn^{2+} = 3d^5$

Conversion of Mn^{3+} to Mn^{2+} leads to a stable half filled configuration. So, Mn^{3+} acts as an oxidising agent.

(57) Answer : (3)

Hint:

$Y_A = \frac{P_A^o X_A}{P_A^o X_A + P_B^o X_B}$.

Solution:

$Y_A = \frac{400\times\frac{3}{8}}{400\times\frac{3}{8}+300\times\frac{5}{8}} = \frac{1200}{1200+1500}$

$= \frac{12}{27} = \frac{4}{9}$.

(58) Answer : (2)

Hint:

During charging and recharging of Lead storage battery, the terminal of anode and cathode remain same.

Solution:

Cathode reaction during recharging is

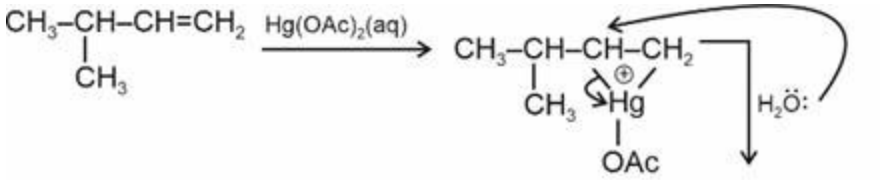
$PbSO_4(s) + 2H_2O \rightarrow PbO_2 + SO_4^{2-}(aq) + 4H^+(aq) + 2e^-$

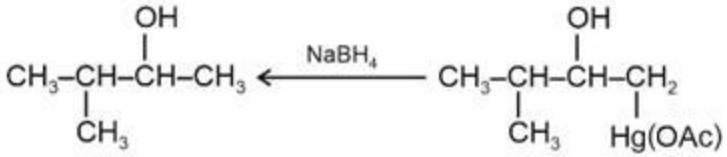
(59) Answer : (4)

Hint:

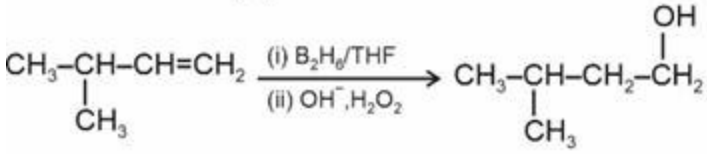
In hydroboration oxidation reaction, anti-Markovnikov addition product is the major product for unsymmetrical alkenes.

Solution:



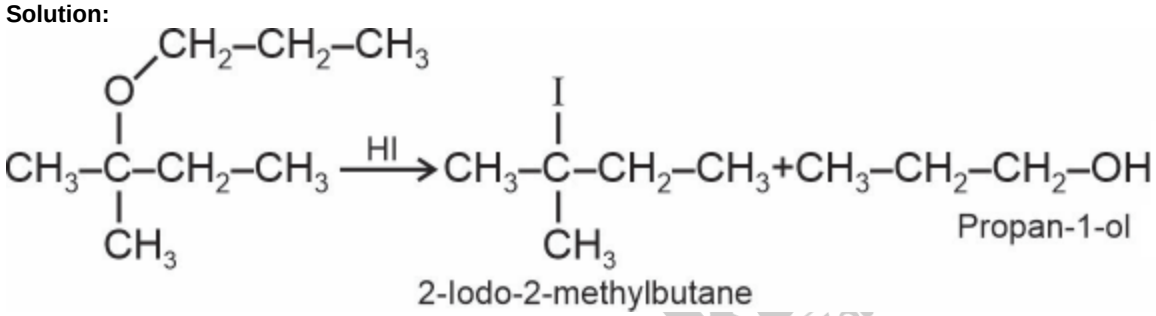


(A)



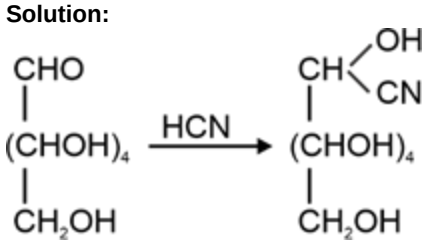
(B)

(60) Answer : (2)
Solution:

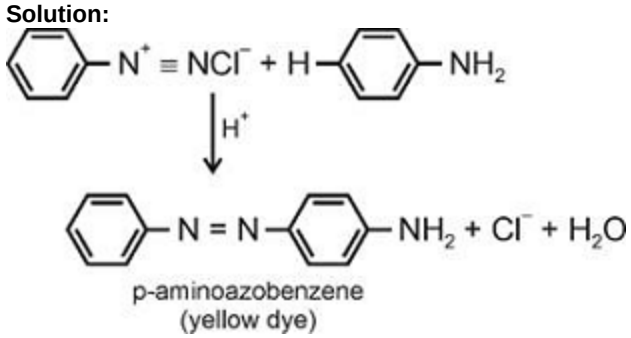


(61) Answer : (1)
Solution:
Saytzeff alkene is the major product in the given reaction.

(62) Answer : (2)
Solution:



(63) Answer : (1)
Solution:



The above reaction is an example of electrophilic substitution reaction.

(64) Answer : (4)
Solution:

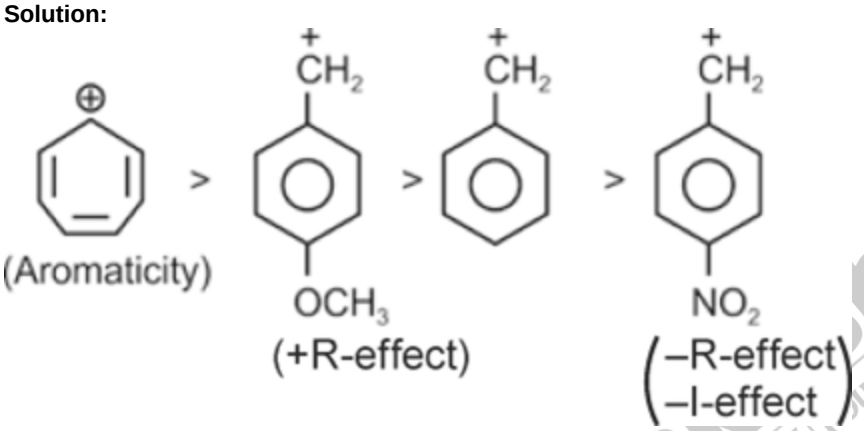
Mn^{2+} belongs to group-IV while Sr^{2+} belongs to group-V.

(65) **Answer :** (4)
Solution:
Sucrose is a non-reducing sugar. It does not reduce Tollens' reagent.

(66) **Answer :** (3)
Solution:
Heat of neutralisation $\propto$ acidity of acid
$\propto \frac{1}{pK_a}$
Acidity order → D > A > B > C
pK_a order → C > B > A > D

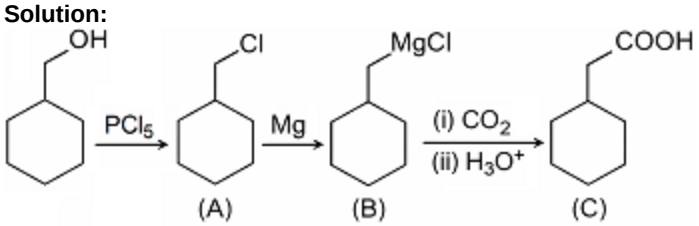
(67) **Answer :** (4)
Solution:
AS_2S_3 is negative charged sol

(68) **Answer :** (4)
Hint:
Aromatic compounds are most stable.
Solution:



(69) **Answer :** (2)
Solution:
Slowest step : $A + B_2 \rightarrow AB + B$
$r = k[A][B_2]$ … (1)
But, A is an intermediate
$A_2 \overset{K}{\rightleftharpoons} A + A$
$K = \frac{[A]^2}{[A_2]} \Rightarrow \left[A\right] = \sqrt{K}[A_2]^{1/2}$ …(2)
(1) and (2)
$r = k\sqrt{K}\,[A_2]^{1/2}\left[B_2\right]$
Order of reaction with respect to A_2 is $\frac{1}{2}$.

(70) **Answer :** (1)
Hint:
Reaction of Grignard reagent with CO_2 after hydrolysis gives carboxylic acid.
Solution:



(71) **Answer :** (1)
Solution:

$$\begin{array}{ccccc} N_2(g) & + & 3H_2(g) & \rightarrow & 2NH_3(g) \\ 10 & & 10 & & 0 \quad \text{(initially) } [\because v \propto n \text{ (at T and P)}] \\ \left(10-\frac{10}{3}\right) & & \left(10-\frac{10}{3}\times 3\right) & & \frac{2\times 10}{3} \quad (100\%\text{ yield}) \\ \frac{20}{3}\text{ L} & & 0 & & \frac{20}{3}\text{ L} \quad = 2\times\frac{10}{3}\text{ L} \\ \left(10-\frac{5}{6}\right) & & \left(10-3\times\frac{5}{6}\right) & & \frac{20}{3}\times\frac{1}{4}=\frac{5}{3} \quad = 2\times\frac{5}{6}\ \left(25\%\text{ yield}\right) \\ \frac{55}{6}\text{ L} & & \frac{15}{2}\text{ L} & & \frac{5}{3}\text{ L} \end{array}$$

Total volume of the gaseous mixture $= \frac{55}{6}+\frac{15}{2}+\frac{5}{3}$

$= \frac{110+90+20}{12} = \frac{220}{12}$

= 18.33 L

(72) Answer : (4)

Hint:

For one electron species, energy of subshell depends only on the value of n.

Solution:

Third shell of He^+ ion has 9 orbitals of same energy i.e. they are degenerate.

(73) Answer : (1)

Solution:

Amphoteric oxides : Al_2O_3, Cr_2O_3 and SnO_2

Neutral oxide: N_2O, CO and NO

Generally oxide of non-metals are acidic & oxides of metals are basic in nature.

(74) Answer : (4)

Solution:

In solid state PBr_5 exists as $\left[PBr_4\right]^{\oplus}Br^{\ominus}$

The hybridisation of central atom in PBr_5 is sp^3d in gaseous state but in solid state hybridisation of central atom is sp^3.

(75) Answer : (4)

Solution:

The reaction is:

$\frac{1}{2}X_2+\frac{3}{2}Y_2 \rightleftharpoons XY_3$

$\therefore \Delta S = \sum S^\circ_{Products} - \sum S^\circ_{reactants}$

$= 40-\left(\frac{1}{2}\times 80+\frac{3}{2}\times 30\right) = 40-\left[40+45\right]$ ($\because$ $\Delta G = \Delta H - T\Delta S$)

At equilibrium $\Delta G = 0$

$\Delta H = T\,\Delta S \Rightarrow T = \frac{\Delta H}{\Delta S} = \frac{-18\times 10^3 \text{ J mol}^{-1}}{-45 \text{ JK}^{-1}\text{ mol}^{-1}} = 400\text{ K}$

(76) Answer : (1)

Solution:

$BaCO_3(s) \rightleftharpoons BaO(s)+CO_2(g)$

$K_P = P_{CO_2} = 2\text{ atm}$

$\therefore PV = nRT \Rightarrow P_{CO_2}.V = \text{Constant}$

$\Rightarrow$ $P_1V_1 = P_2V_2$

$\Rightarrow 0.2\times 40 = 2\times V_2 \quad \begin{pmatrix} P_1 = 0.2\text{ atm},\ P_2 = 2\text{ atm} \\ V_1 = 40\text{L}, V_2 = ? \end{pmatrix}$

$\Rightarrow V_2 = \frac{0.2\times 40}{2}$

$= 4\ L$

(77) Answer : (4)

Solution:

$$\begin{array}{ccccc} 2SO_2^{(8)} & + & O_2^{(8)} & \rightleftharpoons & 2SO_3(8) \\ 6 & & 3 & & 0 \quad \text{initially (moles)} \\ 6-2x & & 3-x & & 2x \quad (\text{at equil}^m) \end{array}$$

No. of g. eq. of SO_2 = No. of g. eq. of $K_2Cr_2O_7$

$\left(6-2x\right) \times 2 = \frac{2}{3} \times 6$ [n-factor of $K_2Cr_2O_7$ = 6]

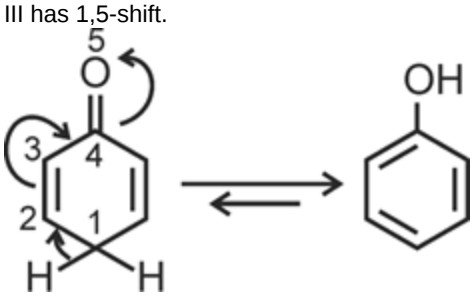
$\Rightarrow$ 6 – 2x = 4/2 = +2 [n-factor of SO_2 = +4]

2x = 6 – 2 = 4 $\because \left(\overset{+4}{SO_2} \rightarrow \overset{+6}{SO_3}\right)$

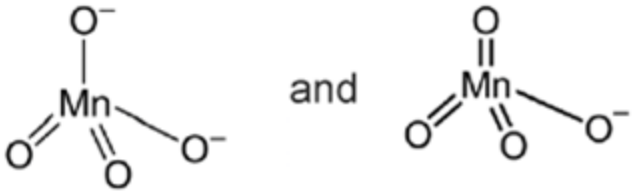
x = +2

Total moles at equilibrium = 6 – 2x + 3 – x + 2x
= 9 – x = 9 – 2 = 7

(78) **Answer :** (4)
Solution:
I, II and IV having (1,2-shift)
III has 1,5-shift.



(79) **Answer :** (1)
Solution:

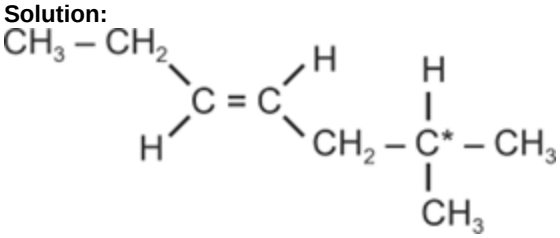


(tetrahedral) Tetrahedral

In manganate and permanganate ions, π-bonding takes place by overlap of p-orbitals of oxygen with d-orbitals of manganese.

(80) **Answer :** (2)
Solution:
Ostwald process – Pt/Rh Catalyst
Wilkinson Catalyst – $[(PPh_3)_3\ RhCl]$
Zeise salt – $K[PtCl_3(\eta^2 - C_2H_4)]$
Ferrocene $[Fe(\eta^5 - C_5H_5)_2]$

(81) **Answer :** (2)
Solution:



Both geometrical & optical isomerism are possible in the given compound.
Total stereoisomerism = 2 + 2 = 4.
Geometrical: cis-& trans-
Optical: d-& l-

(82) **Answer :** (1)
Solution:
Experimental values at STP,
V_1 = 50 mL, V_2 = ?

T_1 = 300 K, T_2 = 273 K

P_1 = 720 – 20 = 700 mmHg, P_2 = 760 mmHg

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \Rightarrow V_2 = \frac{P_1V_1T_2}{T_1P_2} = \frac{700\times50\times273}{300\times760} = 41.9\,\text{mL}$

$\%\ \text{of nitrogen} = \frac{1}{8} \times \frac{\text{Volume of } N_2 \text{ at S.T.P}}{\text{Weight of unknown compound}}$

$= \frac{1}{8} \times \frac{41.9}{0.5} = 10.47\%$

(83) Answer : (4)
Solution:

$$\underset{1}{CaCl_2} \rightarrow \underset{0}{Ca^{2\oplus}} + \underset{0}{2Cl^{\ominus}} \quad \text{(initially)}$$

$$\underset{1-\alpha}{} \qquad \underset{\alpha}{} \qquad \underset{2\alpha}{} \quad \text{(after dissociation)}$$

$i = 1-\alpha+\alpha+2\alpha = 1+2\alpha = 1+2\times\frac{40}{100} = 1.8$

$\Delta T_b = iK_b\,m = 1.8\times0.52\times0.2 = 0.1872^\circ C$

$T_b = 100 + 0.187 = 100.187^\circ C$

$\Delta T_f = iK_f\,m = 1.8\times1.86\times0.2 = 0.669 \approx 0.67^\circ C$

$T_f = -0.67^\circ C$

Then $T_b - T_f = 100.187 - (-0.67) \approx 100.85^\circ C$

(84) Answer : (1)
Solution:
c = 0.002 M

$\lambda_m^c = \frac{k\times1000}{C} = \frac{5\times10^{-5}\times1000}{0.002} = \frac{5}{2} \times 10^{-5}\times10^6$

$= \frac{50}{2} = 25\ S\ cm^2\,mol^{-1}$

$\because\ \alpha = \frac{\lambda_m^c}{\lambda_m^\infty} \Rightarrow 0.2 = \frac{25}{\Lambda_m^\circ}$

$\Lambda_m^\circ = \frac{25}{0.2}$ = 125 S cm^2mol^{-1}

(85) Answer : (3)
Solution:
Rate of reaction increases with rise in the temperature.

(86) Answer : (3)
Solution:
In white phosphorous bond angle is 60°

(87) Answer : (2)
Solution:

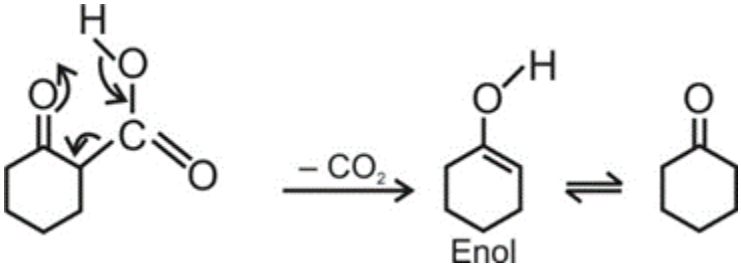
$NH_4NO_3 \xrightarrow{\Delta} N_2O + 2H_2O$

$(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} N_2 + Cr_2O_3 + 4H_2O$

$NH_4Cl \xrightarrow{\Delta} NH_3 + HCl$

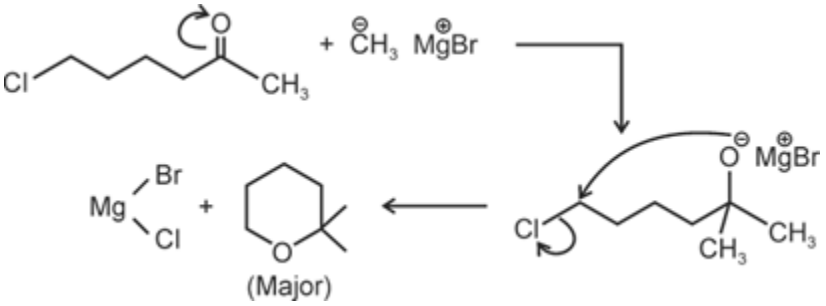
$(NH_4)_2SO_4 \xrightarrow{\Delta} 2NH_3 + H_2SO_4$

(88) Answer : (3)
Hint:
β-keto acid readily decarboxylates on heating.
Solution:



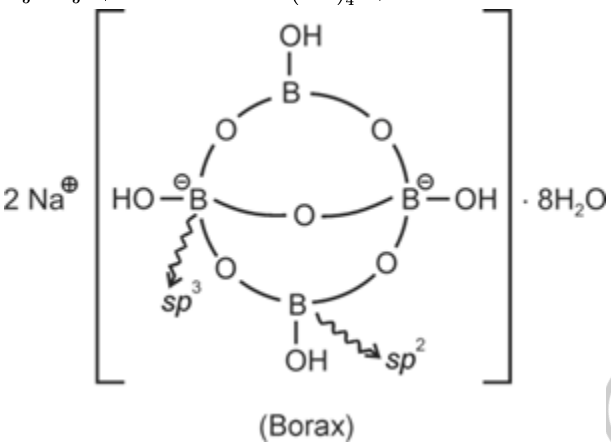
(89) Answer : (3)

Solution:



(90) **Answer :** (2)
Solution:
H_3BO_3 is a weak monobasic lewis acid.

$$H_3BO_3 + H - OH \rightleftharpoons B(OH)_4^{\ominus} + H^{\oplus}$$



(Borax)

i.e. two boron atoms are in the same plane.

- * Aq. solution of Borax is alkaline in nature.
- * $B_2H_6 + H_2O \rightarrow B(OH)_3 + H_2$

BIOLOGY

(91) **Answer :** (3)
Solution:
Seed coat of pea, scutellum of maize, radicle of *Petunia* – Diploid
Embryo sac of *Hibiscus* – Haploid
Endosperm of castor, aleurone layer of maize – Triploid

(92) **Answer :** (4)
Hint:
Rudolf Virchow first explained *Omnis cellula-e cellula*.
Solution:
Omnis cellula-e cellula means that cells divide and new cells are formed from the pre-existing cells.

(93) **Answer :** (3)
Solution:
Fimbriae present in bacteria are small bristle-like fibres sprouting out of the cell and help in attachment.

(94) **Answer :** (4)
Solution:
Nucleolus is a site for active ribosomal RNA synthesis.
In both plant and animal cells, the cytoplasm is the main arena of cellular activities.
Oxidative phosphorylation takes place in mitochondria.

(95) **Answer :** (3)
Solution:

$$NADP + \underset{(Stroma)}{2H^+} \rightarrow NADPH + H^+$$

(96) Answer : (3)
Solution:

$$\underset{\text{(pink)}}{\text{Rr}} \times \underset{\text{(red)}}{\text{RR}} \rightarrow \underset{\text{(pink)}}{\text{Rr}} : \underset{\text{(red)}}{\text{RR}} \quad \text{Ratio } \boxed{1:1}$$

(97) Answer : (1)
Solution:
Dominance is not an autonomous feature of a gene.
F_2 dihybrid test cross ratio is not 1 : 1 : 1 : 1, because no recombinant will be obtained. Only parental type individuals are obtained, *i.e.,* ratio will be 1 : 1.

(98) Answer : (4)
Solution:
In monocot stems, there is the absence of cambium in vascular bundles. Hence, they are called closed vascular bundles and do not show secondary growth. Conjoint type of vascular bundles are found in stems.

(99) Answer : (2)
Solution:
The size of the vascular bundles is dependent on the size of the veins in a dorsiventral leaf.

(100) Answer : (2)
Solution:
Lac z codes for the enzyme, β-galactosidase.

(101) Answer : (4)
Hint:
Lower the taxa, more are the characteristics that the members within a taxon share.
Solution:
Wheat, Monocots and Plants represent different taxa of different category.

(102) Answer : (2)
Solution:
The criteria for classification under the two kingdom classification, given by Linnaeus, includes cell wall, locomotion, mode of nutrition, response to external stimuli and contractile system.

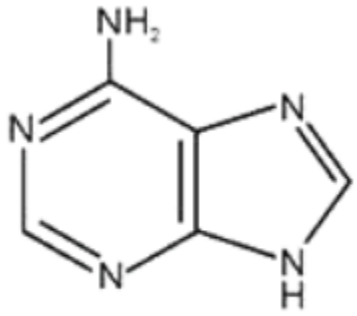
(103) Answer : (1)
Solution:
The given figure is of *Aspergillus*. It belongs to Ascomycetes, and reproduces asexually via conidia.

(104) Answer : (3)
Solution:
Both statements A and B are correct. Algae exhibit a wide range of forms and sizes, from microscopic unicellular forms to large multicellular forms like seaweeds. Additionally, algae can reproduce through vegetative, asexual, and sexual methods.

(105) Answer : (4)
Solution:
Protonema is the haploid gametophyte of a bryophyte.

(106) Answer : (1)
Solution:
Trachea is lined by pseudostratified ciliated epithelium to push the mucus towards pharynx.

(107) Answer : (3)
Solution:
Trypsin and collagen are proteins (heteropolymers of amino acids).
• Adenine and guanine are substituted purines. They contain two heterocyclic rings in their structure.



Adenine (nitrogenous base)

• Oils have lower melting point (*e.g.*, Gingelly oil) and hence remain as oil in winters. Lipids are also called fats and oils based on their melting points.
• Exoskeleton of arthropods have a complex polysaccharide called chitin. The monomeric unit of chitin is N-acetyl glucosamine (NAG).

(108) Answer : (3)
Solution:
The AV valves remain linked to papillary muscles by chordae tendineae to prevent the bulging of AV valves into atria during ventricular contraction.

(109) Answer : (3)
Solution:
During muscle contraction, actin filaments slide over the myosin filaments which results in shortening of muscle. Myosin is the thick filament and a polymer of meromyosin.
Collagen fibres are proteinaceous fibres found in connective tissues.

(110) Answer : (2)
Solution:
Most of the porifers are marine and asymmetrical. Digestion is intracellular in them. Water enters through ostia into a central cavity, called spongocoel, from where it goes out through osculum.
Larva is morphologically distinct from the adult.

(111) Answer : (2)
Solution:
• Tail is not present in all amphibians. The members of the order Anura are without tail, for example, *Bufo* (Toad), *Rana* (Frog).
• Excretion occurs by mesonephric kidneys in amphibians.
• Alimentary canal, urinary and reproductive tracts open into a common chamber called cloaca.
• Heart is three-chambered in amphibians, with two auricles and one ventricle.

(112) Answer : (3)
Solution:
In frogs, a triangular structure called sinus venosus joins the right atrium. It receives blood through the major veins called vena cavae.
The ventricle opens into a sac-like conus arteriosus on the ventral side of the heart.

(113) Answer : (3)
Solution:
The respiratory system of cockroach consists of a network of trachea, that open through 10 pairs of small holes called spiracles present on the lateral sides of the body. Thin branching tubes carry oxygen from the air to all the parts. The opening of the spiracles is regulated by sphincters. Exchange of gases takes place at the level of tracheoles by diffusion.

(114) Answer : (4)
Solution:
Hypothalamus starts secreting the hormone GnRH in a pulsatile manner at a certain age (puberty). GnRH is responsible for changes observed during puberty. So, GnRH is the 'switch on' hormone for puberty.

(115) Answer : (1)
Solution:
Oxytocin acts on the uterine muscle and causes stronger uterine contractions, which in turn stimulates further secretion of oxytocin. The stimulatory reflex between uterine contraction and oxytocin secretion continues resulting in stronger and stronger contraction. This leads to expulsion of the baby.

(116) Answer : (3)
Solution:
Leafy stage of moss develops from the secondary protonema as lateral bud.

(117) Answer : (2)
Solution:
Bacteriophages are usually double stranded DNA viruses.
Viroids are free RNA particles and are smaller than viruses.

(118) Answer : (3)
Solution:
The number of glycosidic bonds associated with dsDNA of λ-phage is equal to the number of nucleotides. Thus, number of glycosidic bonds = 2 X 48502 = 97004

(119) Answer : (3)
Solution:
MMC forms in the micropylar region of the nucellus.

(120) Answer : (3)
Solution:
Embryo sac development is a pre-fertilisation event.

(121) Answer : (1)
Solution:
The food chain 'Tree → Herbivorous birds → Hawk', forms a spindle-shaped ecological pyramid of number.

(122) Answer : (2)
Solution:
Flowers of mustard are hypogynous.

(123) Answer : (2)
Hint:
Chromosomes are not reformed during the telophase stage.
Solution:
In S-phase, number of chromosomes remains same.
Cell division is a progressive process.

(124) Answer : (4)
Solution:
Meiosis II is initiated after cytokinesis, usually before the chromosomes have fully elongated.

(125) Answer : (2)
Solution:
Cell plate acts as the precursor for the formation of new cell wall during cell division.

(126) Answer : (3)
Solution:
The correct sequence is as follows:
Leptotene → Zygotene → Pachytene → Telophase I → Anaphase II

(127) Answer : (2)
Solution:
Joseph Priestley performed experiments to reveal the role of air in the growth of green plants. Julius von Sachs showed that green substance (chlorophyll) is located in special bodies within plant cells.

(128) Answer : (4)
Solution:
Only glucose is being respired – no other alternative substrates are entering in the pathway at any of the intermediary stages.

(129) Answer : (2)
Solution:
In 1900, three Scientists (de Vries, Correns and von Tschermak) independently rediscovered Mendel's results on the inheritance of characters.

(130) Answer : (1)
Solution:
Acetic acid is obtained from the bacterium, *Acetobacter aceti*.

(131) Answer : (2)
Solution:
Pons region in hindbrain contains pneumotaxic centre that can moderate the functions of respiratory rhythm centre. Neural signals from this centre can reduce the duration of inspiration, resulting in the alteration of respiratory rate.

(132) Answer : (1)
Solution:

Triceratops – Three-horned face, herbivore
Tyrannosaurus – Carnivore with bipedal locomotion

(133) Answer : (3)
Solution:
With repeated use of drugs, the tolerance level of the receptors present in our body increases. Consequently, the receptors respond only to high dosage of drugs leading to greater intake and addition.

(134) Answer : (4)
Solution:
In order to force bacteria to take up the plasmid, the bacterial cells must first be made 'competent' to take up DNA. This is done by treating them with a specific concentration of a divalent cation, such as Ca^{++}, which increases the efficiency with which DNA enters the bacterium through pores in its cell wall. Recombinant DNA can then be forced into such cells by incubating the cells with recombinant DNA on ice, followed by placing them briefly at 42ºC (heat shock), and then putting them back on ice. This enables the bacteria to take up the recombinant DNA.

(135) Answer : (3)
Solution:
In a polymerase chain reaction, the number of DNA strands doubles with each cycle, following the formula:
Number of copies of DNA strands = 2^n.
Here 'n' is the number of cycles of PCR.
Thus, to generate 256 DNA strands from a single dsDNA piece, 8 PCR cycles are required.

(136) Answer : (1)
Solution:
In the given figure, *Bam* HI should be used to cut and isolate the gene 'B' from the DNA fragment.

(137) Answer : (3)
Solution:
Due to insertional inactivation, tet^R gene will get inactivated. Thus, recombinants won't survive on tetracycline containing medium. Transformants will grow only on the ampicillin containing medium. Non-transformants will be susceptible to antibiotics as natural *E.coli* does not carry any antibiotic resistance gene.

(138) Answer : (2)
Solution:
Disarmed *Agrobacterium tumefaciens* vector is used to introduce nematode specific genes into the host plant to initiate RNAi.

(139) Answer : (1)
Solution:
The main challenge in the production of insulin using rDNA techniques was getting insulin assembled into mature form.

(140) Answer : (1)
Solution:
In nearly all animal tissues, specialised junctions provide both structural and functional links between its individual cells. Three types of cell junctions are found in the epithelial tissues.
Cell junctions present in some smooth muscle fibres hold them together and they are bundled together in a connective tissue sheath.
Cell junctions fuse the plasma membranes of cardiac muscle cells and make them stick together.

(141) Answer : (2)
Hint:
Plays an important role during summer sleep
Solution:
In frogs, mucous glands are present in the skin which helps in respiration in water and on land.

(142) Answer : (3)
Solution:
Cyclostomes – Scaleless body with unpaired fins
Chondrichthyes – Tough skin with placoid scales
Osteichthyes – Dioecious, swim bladder present
Protochordates – Cranium and vertebral column absent.

(143) Answer : (2)
Solution:
HCO_3^- and Na^+ are reabsorbed while H^+ and NH_3 are secreted into the filtrate.

(144) Answer : (4)
Solution:

An excessive loss of fluid from the body can activate osmoreceptors which stimulate the hypothalamus to release ADH. An increase in body fluid volume can switch off the osmoreceptors and suppress the ADH release. Angiotensin-II activates adrenal cortex to release aldosterone.

(145) Answer : (3)

Solution:

The maximum volume of air a person can breathe in after a forced expiration is called vital capacity. This includes ERV, TV and IRV. It is also calculated by TLC – RV.

IC = TV + IRV

FRC = RV + ERV

(146) Answer : (3)

Solution:

As the solubility of CO_2 is 20-25 times higher than that of O_2, the amount of CO_2 that can diffuse through the diffusion membrane per unit difference in partial pressure is much higher compared to that of O_2.

(147) Answer : (2)

Solution:

Lymph is a colourless fluid containing specialised lymphocytes. It lacks fibres and erythrocytes. It is an important carrier for nutrients, hormones, *etc*. It has the same mineral distribution as that of blood plasma.

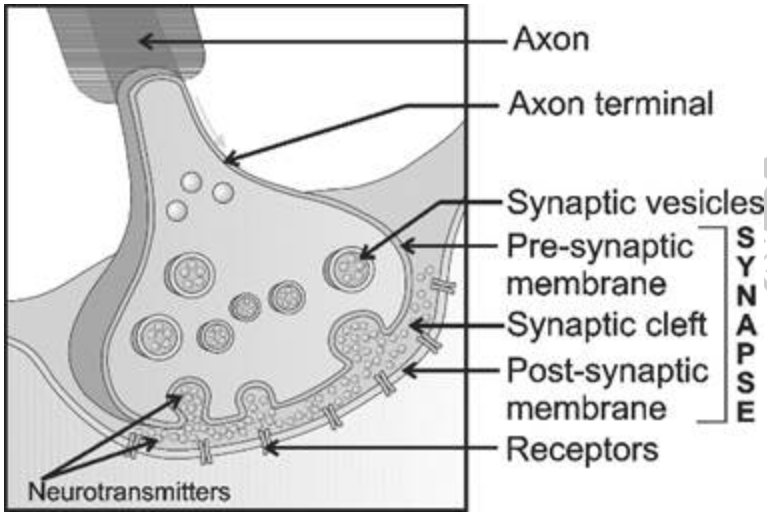
(148) Answer : (1)

Solution:

To obtain a standard ECG, a patient is connected to the machine with three electrical leads (one to each wrist and to the left ankle) that continuously monitor the heart activity.

(149) Answer : (1)

Solution:



(150) Answer : (4)

Solution:

Steroidal oral contraceptive pills, implants and hormone releasing IUDs contain progestogen alone or in combination with estrogen. They inhibit ovulation and implantation as well as alter the quality of cervical mucus.

In barrier method of contraception, ovum and sperms are prevented from physically meeting with the help of barriers. Surgical intervention blocks gamete transport and CuT inhibits sperm motility.

(151) Answer : (2)

Solution:

World population in 2000 was 6 billion while in 1900, it was 2 billion. In 2011, the world population was approximately 7.2 billion. The population of India was 350 million at the time of our independence, while in 2000 it reached close to the 1 billion mark and in 2011, it was 1.2 billion.

(152) Answer : (2)

Solution:

Only three types of macromolecules, *i.e.*, proteins, nucleic acids and polysaccharides are found in the living system. Lipids, because of their association with membranes, separate in the macromolecular fraction. Lipids are not polymers.

(153) Answer : (3)

Solution:

Enzymes lower the activation energy required for a reaction and enhance the rate of reaction.

(154) Answer : (2)

Solution:

Dominant allelic frequency = p

$$= \frac{2\left(\text{No. of homozygous dominant individuals}\right) + \text{No. of heterozygous individuals}}{2\left(\text{Total no. of individuals in the population}\right)}$$

$$= \frac{2(114)+76}{2(200)} = \frac{228+76}{400} = \frac{304}{400} = 0.76$$

Recessive allelic frequency = q

$$= \frac{2\left(\text{No. of homozygous recessive individuals}\right) + \text{No. of heterozygous individuals}}{2\left(\text{Total no. of individuals in the population}\right)}$$

$$= \frac{2(10)+76}{2(200)} = \frac{20+76}{400} = \frac{96}{400} = 0.24$$

Hence, p = 0.76 and q = 0.24

(155) Answer : (4)

Solution:

Frontal and ethmoid are unpaired cranial bones. Nasal is a paired facial bone while mandible is an unpaired facial bone. These are bones of axial skeleton. Clavicle is a bone of pectoral girdle and humerus is the upper arm bone. Both bones are a part of the appendicular skeleton.

(156) Answer : (4)

Solution:

Flocs obtained in the secondary sewage treatment are digested by anaerobic bacteria which leads to the formation of biogas.

(157) Answer : (2)

Solution:

The energy that is stored and fixed at a trophic level, is the energy that is passed to the organism at the next trophic level.
In the given food chain:
1% of 100 kJ (Solar energy) = 1 kJ
Plants receive 1 kJ energy
10% of 1 J = 0.1 kJ
Grasshopper receives 0.1 kJ energy
10% of 0.1 kJ = 0.01 kJ
Frog receives 0.01 kJ energy
10% of 0.01 kJ = 0.001 kJ = 1 J
Snake receives 1 J of energy.

(158) Answer : (4)

Solution:

Copepods, growing on the body of marine fishes, is an example of parasitism.

(159) Answer : (2)

Solution:

Geometric / exponential growth of a population can be observed when the resources are unlimited, due to which, species has the ability to fully realise its innate potential.

(160) Answer : (3)

Solution:

Twisted aestivation of petals is seen in cotton.

(161) Answer : (3)

Solution:

The technique of DNA fingerprinting was initially developed by Alec Jeffreys

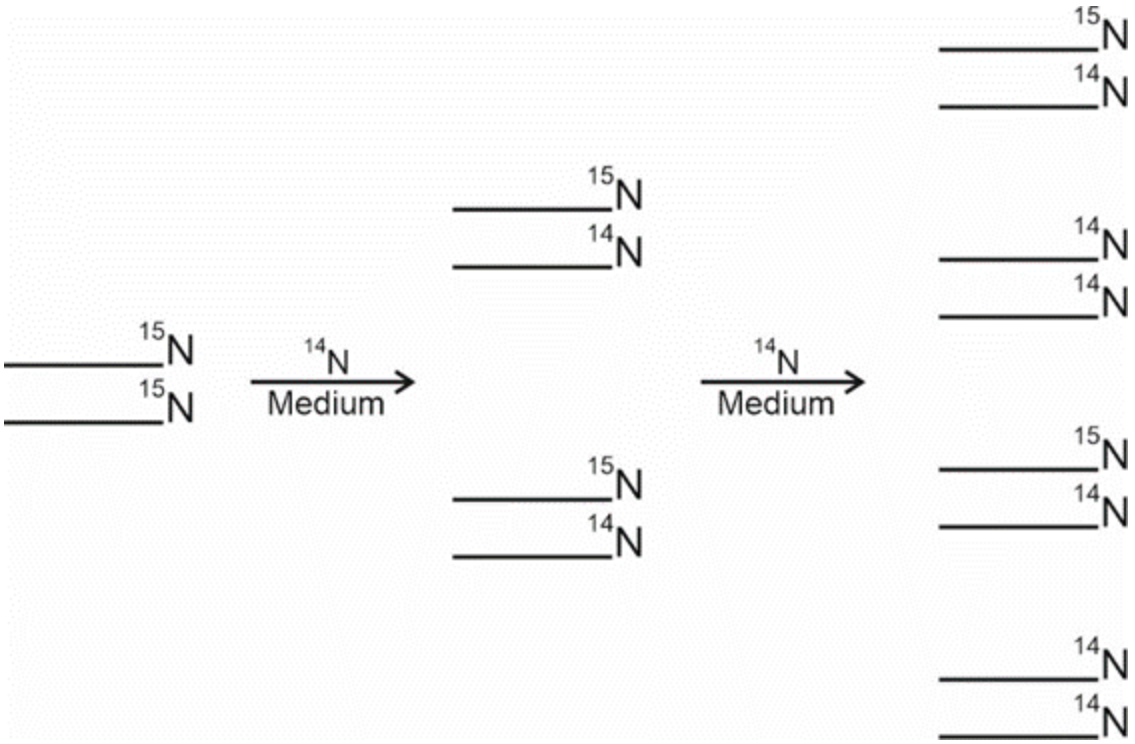
(162) Answer : (4)

Solution:

In seagrasses, female flowers remain submerged in water and the pollen grains are released inside the water. Pollen grains in many such species are long ribbon-like and they are carried passively inside the water. In most of the water pollinated species, pollen grains are protected from wetting by a mucilaginous covering.

(163) Answer : (2)

Solution:



The isolated DNA will show two types of bands in CsCl density based centrifugation.

(164) Answer : (2)
Solution:
During the conversion of malic acid into oxaloacetic acid, $NADH + H^+$ is formed but CO_2 is not released. In rest of the conversions both $NADH + H^+$ and CO_2 are formed.

(165) Answer : (4)
Hint:
3' end of tRNA attaches with an amino acid.
Solution:
This tRNA has UAC in anticodon loop, which means it will bind to the codon AUG of mRNA.

(166) Answer : (4)
Solution:
Globally most species diversity amongst vertebrates is of fishes followed by that of birds.
A-Reptiles , B-Birds.

(167) Answer : (2)
Solution:
Quagga is an example of recent extinction in Africa.

(168) Answer : (2)
Solution:
Given physiological responses are seen as a result of treating the plants with gibberellins.

(169) Answer : (4)
Solution:
F.W. Went first isolated auxin from the tips of coleoptile of oat seedlings.

(170) Answer : (2)
Solution:
Wolf, birds and snake are carnivores.

(171) Answer : (3)
Solution:
Hydra – Mesoglea present, radial symmetry seen – Colenterata
Planaria – Triploblastic, acoelomate – Platyhelminthes
Ascaris – Complete digestive system, dioecious – Aschelminthes
Pheretima – Closed circulation, monoecious – Annelida

(172) Answer : (3)

Solution:

Liver, the largest gland in our body, secretes bile containing substances like bilirubin, biliverdin, cholesterol, degraded steroid hormones, vitamins and drugs. Sebaceous glands eliminate certain substances like sterols, hydrocarbons, and waxes through sebum.

(173) Answer : (4)

Solution:

Implantation of the blastocyst begins with the loss of zona pellucida about 1-3 days after the morula enters the uterine cavity. Progesterone prepares the endometrium for implantation and early embryonic nutrition.

(174) Answer : (4)

Solution:

Ringworms are generally acquired from soil or by using clothes of infected individuals. Typhoid and pneumonia are not vector-borne diseases.

(175) Answer : (3)

Solution:

After the fusion of male and female gametes, the zygote would carry either XX or XY chromosomes depending on whether sperm carrying X or Y chromosome fertilised the ovum. Scientifically, it is correct to say that the sex of the baby is determined by the father and not by the mother.

(176) Answer : (2)

Solution:

The two halves of the pelvic girdle meet ventrally to form the pubic symphysis, containing fibrous cartilage.

(177) Answer : (2)

Solution:

Depression, aggression, mood swings are common side effects seen in both human males and females. Breast enlargement is observed in males as one of the side effects.

(178) Answer : (3)

Solution:

Insulin and glucagon, secreted from β and α-cells of Islets of Langerhans, respectively, have opposite effects on blood glucose, *i.e.*, insulin lowers the blood glucose level while glucagon raises the blood glucose level. Hence, they are antagonistic to each other.

(179) Answer : (4)

Solution:

Gastrin and GIP are antagonistic pair of hormones secreted by the GI tract. Adrenaline and nor-adrenaline are synergistic.
PTH – Parathyroid; Thyrocalcitonin – Thyroid; Aldosterone – Adrenal cortex; ANF – Heart
PTH and thyrocalcitonin are antagonistic w.r.t. the blood calcium level.
Aldosterone and ANF are antagonistic w.r.t the blood pressure.

(180) Answer : (4)

Solution:

Ginkgos and ferns evolved directly from Psilophyton.