14/04/2026

Code-A Phase-1

Aakash
Medical | IIT-JEE | Foundations

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

PHYSICS

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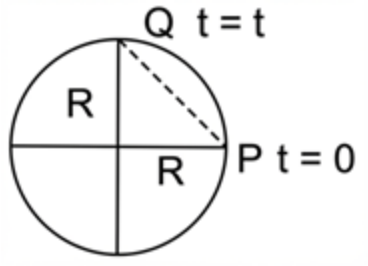
Hints and Solutions

PHYSICS

(1) **Answer :** (4)
Solution:
Time constant in $C-R$ circuit $t=RC$
Time constant in $L-R$ circuit $t=\frac{L}{R}$
$RC=\frac{L}{R}$
i.e units of $CR^2=L$ are same.
Therefore, units of L or CR^2 are henry

Henry $=\frac{\text{Volt}-\text{second}}{\text{ampere}}=\frac{\text{Joule}}{\text{ampere}^2}$

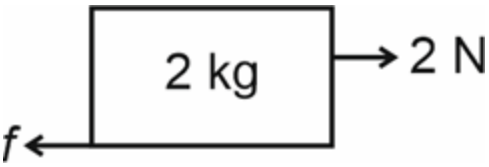
(2) **Answer :** (3)
Solution:



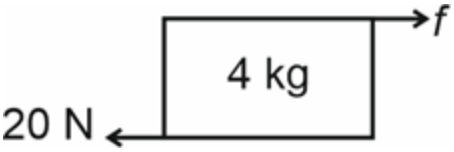
$\left|\overrightarrow{v_{av}}\right|=\frac{|\text{displacement}|}{\text{time}}$
$=\frac{PQ}{t}=\frac{\sqrt{2}R}{t}=\frac{\sqrt{2}\cdot\sqrt{2}}{t}$
Using $\theta=\frac{1}{2}\alpha t^2$
$t=\sqrt{\frac{2\theta}{\alpha}}=\sqrt{\frac{2\times\frac{\pi}{2}}{\frac{\pi}{4}}}=2\text{ s}$
$\left|\overrightarrow{v_{av}}\right|=\frac{2}{2}=1\text{ m/s}$

(3) **Answer :** (3)
Solution:
Acceleration-velocity equation from the graph is $a=Kv$(K= slope of given line).
$v\frac{dv}{ds}=Kv$
$\frac{dv}{ds}=K=\text{constant}$

(4) **Answer :** (1)
Solution:
FBD



Assuming acceleration of both the blocks towards left is *a*.
$\frac{f-2}{2}=a \Rightarrow f-2=2a$ (i)



$= \frac{20-f}{4} = a$
$\Rightarrow$ 20 – f = 4a (ii)
Solving equations (i) and (ii), we get
18 = 6a
a = 3
$\therefore f = 2a + 2$
f = 8 N
Maximum friction between two blocks can be $f_{\max} = \mu mg = 0.5 \text{ x } 2 \text{ x } 10 = 10 \text{ N}$
Since $f < f_{\max}$
$\therefore$ friction between the two blocks is 8 N.

(5) **Answer :** (3)
Solution:
The ice point in Fahrenheit scale is 32°F, while steam point in Fahrenheit scale is 212°F

(6) **Answer :** (4)
Solution:
$\hat{j}$ component of velocity parallel to wall remains unchanged while $\hat{i}$ component will become $\left(-\frac{1}{2}\right)\left(2\hat{i}\right) = -\hat{i}$
$\therefore$ Velocity vector after collision $= -\hat{i} + 2\hat{j}$

(7) **Answer :** (2)
Solution:
In case of perfectly inelastic collision, the velocity of combined mass will be
$mv + m(0) = 2mv$'
$v' = v/2$
$\therefore \text{ K.E} = \frac{1}{2}\left(2m\right)\left(\frac{v}{2}\right)^2$
$0.2 = \frac{1}{2}2\left(0.1\right)\ \frac{v^2}{4}$
$v = 2\sqrt{2}$ m/s

(8) **Answer :** (3)
Solution:
$\Delta E = \frac{GMm}{r}\left(\frac{1}{2} - \frac{1}{3}\right) = \frac{GMm}{6r}$
$\therefore \ \% \text{ increase} = \frac{\frac{GMm}{6r}}{\frac{GMm}{2r}} \times 100 = 33.33\%.$

(9) **Answer :** (2)
Solution:
$X = A\sin wt$
$= A\sin\frac{2\pi}{T}\left(\frac{T}{12}\right)$
$X = \frac{A}{2}\left(\text{at } \frac{T}{12}\right)$
$\text{K.E.} = \frac{1}{2}mw^2\left(A^2 - x^2\right) = \frac{1}{2}mw^2\ \left(A^2 - \frac{A^2}{4}\right) = \frac{1}{2}mw^2\frac{3}{4}A^2$
$P.E = \frac{1}{2}mw^2x^2 = \frac{1}{2}mw^2\frac{A^2}{4}$
$\therefore \ \frac{\text{K.E}}{\text{P.E}} = \frac{3}{1}$

(10) **Answer :** (3)
Solution:
$\Delta L = \frac{FL}{AY}$
$\frac{\Delta L_S}{\Delta L_B} = \frac{F_S}{F_B}\frac{L_S}{L_B}\frac{A_B}{A_S}\frac{Y_B}{Y_S}$
$= \left(\frac{3M}{2M}\right)\left(a\right)\left(\frac{1}{b^2}\right)\left(\frac{1}{c}\right) = \frac{3a}{2b^2c}$

(11) **Answer :** (3)
Solution:
The pressure difference = pressure due to h metre of air
$\left(75 - 50\right) \times 10^{-2} \times \rho_{Hg}g = h\rho_{\text{air}}g.$

$h = 25 \times 10^{-2} \frac{\rho_{Hg}}{\rho_{air}}$

$= 25 \times 10^{-2} \times 10^4 = 25 \times 10^2$ m

$= 2.5$ km

(12) Answer : (4)

Solution:

For small extensions, tension follows Hooke's law.

$T \propto$ extension

$v \propto \sqrt{T}$ or $v \propto \sqrt{\Delta l}$

$\frac{v_2}{v_1} = \sqrt{\frac{\Delta l_2}{\Delta l_1}} = \sqrt{\frac{L/10}{L/20}} = \sqrt{2}$

$v_2 = \sqrt{2} v_1$

$= \sqrt{2} v$

(13) Answer : (4)

Solution:

$R = \frac{u^2 \sin 2\theta}{g}$ ...(1)

In first case, $R = \frac{u^2}{g} \sin 2\alpha + x$ ...(2)

In second case $R = \frac{u^2}{g} \sin 2\beta - y$ ...(3)

Solving (2) and (3),

$\frac{u^2}{g}\left(\sin 2\beta - \sin 2\alpha\right) = x + y$

$\frac{u^2}{g} = \frac{x+y}{\sin 2\beta - \sin 2\alpha}$

Put in (1)

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

$\Rightarrow \left(\frac{x+y}{\sin 2\beta - \sin 2\alpha}\right) \sin 2\theta = \frac{u^2}{g} \sin 2\alpha + x$

$\left(\frac{x+y}{\sin 2\beta - \sin 2\alpha}\right) \sin 2\theta = \left(\frac{x+y}{\sin 2\beta - \sin 2\alpha}\right) \sin 2\alpha + x$

$\left(\frac{x+y}{\sin 2\beta - \sin 2\alpha}\right) \sin 2\theta = \frac{x \sin 2\alpha + y \sin 2\alpha + x \sin 2\beta - x \sin 2\alpha}{\sin 2\beta - \sin 2\alpha}$

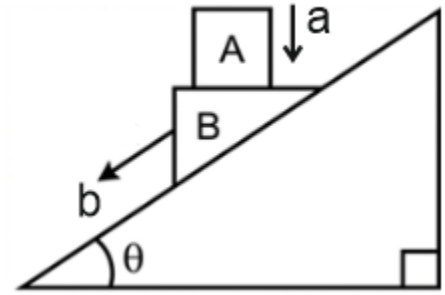
$\sin 2\alpha = \frac{y \sin 2\alpha + x \sin 2\beta}{x+y}$

$\alpha = \frac{1}{2} \sin^{-1}\left(\frac{y \sin 2\alpha + x \sin 2\beta}{x+y}\right)$

(14) Answer : (3)

Solution:

Let a be acceleration of block A vertically down.



Let 'b' be the accelecration of block 'B' down the incline.

a = bsin θ ...(1)

on the system (A + B), along the incline

2mgsin θ = mb + masin θ ...(2)

Solving (1) and (2)

$a = \frac{2g \sin^2 \theta}{1 + \sin^2 \theta}$

s = ut + $\frac{1}{2}$at^2

= $\frac{a}{2}$(1)^2

$= \frac{g\sin^2\theta}{1+\sin^2\theta}$

(15) Answer : (1)
Solution:

$B = \frac{\mu_0 I}{2\pi R^2} r$

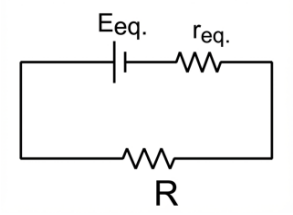
$B = \frac{4\pi\times10^{-7}\times\pi\times0.1}{2\pi\times\left(\frac{2}{10}\right)^2}$

$B = \frac{2\pi\times10^{-6}}{4}$

$B = 0.5\pi \times 10^{-6}$

$B = 5\pi \times 10^{-7}\ \mathrm{T}$

(16) Answer : (2)
Solution:



$E_{eq} = \frac{E_1 r_2 + E_2 r_1}{r_1 + r_2} = \frac{10(1)+10(1)}{2} = 10\ \mathrm{V}$

$R_{eq} = \frac{r_1 r_2}{r_1 + r_2} = \frac{(1)(1)}{2} = \frac{1}{2}$

Maximum power will be developed when $r_{eq} = R = \frac{1}{2}$

$I = \frac{E_{eq}}{R + r_{eq}} = \frac{10}{\frac{1}{2}+\frac{1}{2}} = 10\ \mathrm{A}$

$P_{\max} = I^2 R = \left(10\right)^2\left(\frac{1}{2}\right) = 50$ watt

(17) Answer : (4)
Solution:

$B_c = \frac{\mu_0 I}{2r} = B$

$\mathrm{Area}\left(A\right) = \pi r^2 \Rightarrow r = \sqrt{\frac{A}{\pi}}$

Magnetic moment of the loop $M = IA$

$M = \frac{2Br}{\mu_0} A = \frac{2BA}{\mu_0}\sqrt{\frac{A}{\pi}}$

(18) Answer : (1)
Solution:

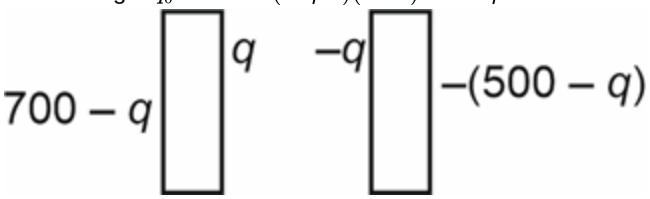
$\frac{A\epsilon_0}{d - \frac{d}{2} + \frac{d}{2K}} = \frac{4}{3}\frac{A\epsilon_0}{d}$

$\frac{1}{\frac{d}{2}\left(1+\frac{1}{K}\right)} = \frac{4}{3d}$

$1 + \frac{1}{K} = \frac{3}{2} \Rightarrow K = 2$

(19) Answer : (2)
Solution:

Initial charge $q_0 = CV = (10\ \mu\mathrm{F})(50\ \mathrm{V}) = 500\ \mu\mathrm{C}$



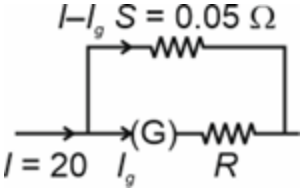
Total charge on positive plate becomes $700\mu\mathrm{C}$ while on negative plate it is still $-500\ \mu\mathrm{C}$

$700 - q = -500 + q$

$q = 600\ \mu\mathrm{C}$

$\therefore$ potential difference between the plates $= \frac{q}{C} = \frac{600\,\mu\text{C}}{10\,\mu\text{F}} = 60\text{ V}$

(20) **Answer :** (1)
Solution:



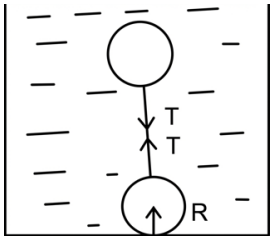
$(I - I_g)S = I_g(G + R)$

$\left[\frac{(I-I_g)S}{I_g}\right] - G = R$

$= \left[\frac{20-0.04}{0.04}\right] \times 0.05 - 20 = R$

R = 4.95 Ω

(21) **Answer :** (4)
Solution:



Upthrust on heavier sphere $= V\rho g$
Weight of heavier sphere $= V(2\rho_w)g$
For heavier sphere
$T + R + V\rho_w g = 2V\rho_w g$ ...(1)
(R is reaction at the bottom)
For lighter sphere :
$T + V(0.5\,\rho_w)g = V\rho_w g$ ...(2)
Use (2) and (1)
$R + 0.5\,V\rho_w g = V\rho_w g$
$R = 0.5\,V\rho_w g$
Using (2) $T = 0.5\,V\rho_w g$
Upthrust on heavier sphere $= V\rho g$

(22) **Answer :** (4)
Solution:
Kinetic energy of photoelectrons is independent of intensity and depends on frequency of incident light.

(23) **Answer :** (2)
Solution:
According to the equation of continuity, speed $\propto \frac{1}{\text{Area of cross}-\text{section}}$
Hence, at the point of smallest cross-section, the speed will be maximum
According to Bernoulli's theorem : $P + \rho g h + \frac{1}{2}\rho v^2 = \text{constant}$
Higher velocity will result in reduction of pressure, hence at the point of maximum speed, pressure will be minimum for the horizontal tube.

(24) **Answer :** (4)
Solution:

Capacitance in air $= \frac{A\varepsilon_0}{d} = 80 \quad \ldots\left(\text{i}\right)$

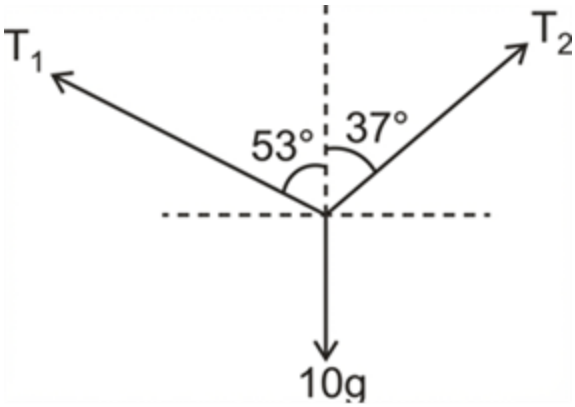
Capacitance in oil $= \frac{A\varepsilon_0 k}{d} = 140 \quad \ldots\left(\text{ii}\right)$

$\frac{\text{(i)}}{\text{(ii)}} \Rightarrow \frac{1}{k} = \frac{80}{140}$

$k = \frac{7}{4} = 1.75$

(25) **Answer :** (2)

Solution:



$T_1 \cos 53^\circ + T_2 \cos 37^\circ = 10\ g$

$T_1 \times \frac{3}{5} + T_2 \times \frac{4}{5} = 10 \times 10 \quad \ldots$ (i)

Also, $T_1 \sin 53^\circ = T_2 \sin 37^\circ$

$T_1 \times \frac{4}{5} = T_2 \times \frac{3}{5} \quad \ldots$ (ii)

Solving equation (i) and (ii), we get

$T_1 = 60$ N

(26) Answer : (1)

Solution:

$\phi = 3t^2 + 4t + 1$

$\varepsilon = \frac{-d\phi}{dt} = -\frac{d}{dt}\left[3t^2 + 4t + 1\right]$

$\varepsilon = -(6t + 4)$

At $t = 2$ s

$|\varepsilon| = -(6 \times 2 + 4) = |-16\ \text{V}| = 16\ \text{V}$

(27) Answer : (2)

Solution:

Given, $\frac{R_1 R_2}{R_1 + R_2} = \frac{10}{7} \quad \ldots$ (i)

Also, $R_1 = 2\ \Omega \quad \ldots$ (ii)

$\therefore \frac{2 \times R_2}{2 + R_2} = \frac{10}{7} \Rightarrow 7R_2 = 10 + 5R_2$

$2R_2 = 10 \Rightarrow R_2 = 5\ \Omega$

(28) Answer : (4)

Solution:

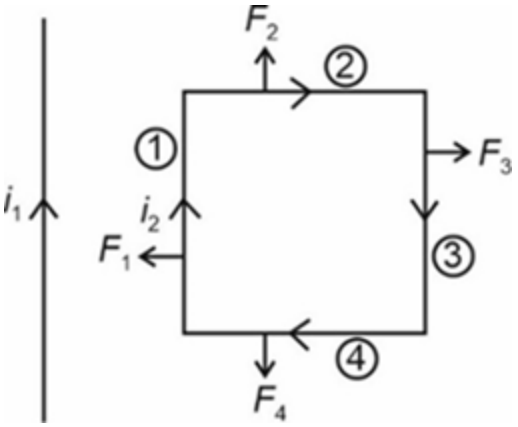
In steady state, the inductors will act as wires of zero resistance.

$\therefore \quad i = \frac{V}{R} \Rightarrow i = \frac{10}{5} = 2\ \text{A}$

$U = \frac{1}{2}Li^2 \Rightarrow U = \frac{1}{2} \times 5 \times 2 \times 2 = 10\ \text{mJ}$

(29) Answer : (3)

Solution:



Magnetic field due to infinite wire:

$F = \frac{\mu_0 i_1}{2\pi r} \Rightarrow F \propto \frac{1}{r}$

$\therefore F_1 > F_3$ and $F_2 = F_4$

Hence, the net force will be towards $\left(-\hat{i}\right)$

(30) Answer : (1)
Solution:

$p = \sqrt{2m(K.E)}$ and $\lambda = \frac{h}{p} \Rightarrow \lambda \propto \frac{1}{\sqrt{m}}$ for same kinetic energy

$\therefore$ Electron will have maximum de-Broglie wavelength

(31) Answer : (2)
Solution:
Frequency of radiation in the transition

$f = RcZ^2\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$

$f \propto Z^2$

$\frac{f_2}{f_1} = \frac{Z_2^2}{Z_1^2} = \left[\frac{3}{1}\right]^2 = 9$

$\therefore \quad f_2 = 9f$

(32) Answer : (4)
Solution:

$P = \frac{1}{f} = \left(\mu - 1\right)\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$

$P = \frac{1}{f} = \left(\frac{3}{2} - 1\right)\left[\frac{1}{0.1} + \frac{1}{0.15}\right] = 8.33\ \mathrm{D}$

(33) Answer : (4)
Solution:
Energy of reactant nuclei is less than that of the product nuclei.
Energy released $Q = K_2 - 4K_1$

(34) Answer : (3)
Solution:

$K_{\max.} = E - \phi_0$

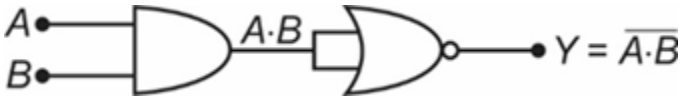
$K_{\max.} = \frac{hc}{\lambda} - \phi_0$

$K_{\max.} = \frac{12400}{5000}\left(\mathrm{eV}\right) - 2\left(\mathrm{eV}\right)$

$K_{\max.} = 2.48\ \mathrm{eV} - 2\ \mathrm{eV}$

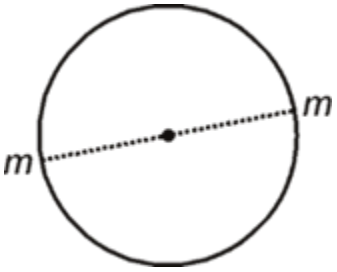
$K_{\max.} = 0.48\ \mathrm{eV}$

(35) Answer : (4)
Solution:



The output of the logic circuit is like NAND gate.

(36) Answer : (3)
Solution:



$F_g = \frac{mv^2}{R}$

For the given problem $\frac{Gmm}{(4r)^2} = \frac{mv^2}{2r}$

$v^2 = \frac{Gm}{8r}$

$v = \sqrt{\frac{Gm}{8r}}$

$v = \frac{1}{2}\sqrt{\frac{Gm}{2r}}$

(37) Answer : (1)
Solution:
$d \sin\ \theta = n\lambda$
$d = \frac{\lambda}{\sin\ \theta}$
$d = \frac{6000}{(1/2)}$
$d = 12000\ \mathring{\text{A}}$
$d = 1.2 \times 10^{-6}\ \text{m}$

(38) Answer : (4)
Solution:
$T_1 = 546 + 273 = 819\ \text{K}$
$T_2 = 273\ \text{K}$
$\frac{T_1}{T_2} = 3$
$\frac{E_1}{E_2} = \left(\frac{T_1}{T_2}\right)^4 \Rightarrow 3^4 \Rightarrow E' = \frac{E}{81}$

(39) Answer : (4)
Solution:
$R = 10\ \Omega$
$X_L = 0.2 \times 200 = 40\ \Omega$
$\cos\left(\theta\right) = \frac{1}{\sqrt{2}} = \frac{R}{Z}$
$\Rightarrow |X_L - X_C| = R$
If $X_C < 40$
$\Rightarrow (40 - X_C) = 10 \Rightarrow X_C = 30\ \Omega$
If $X_C > 40$
$\Rightarrow X_C - 40 = 10 \Rightarrow X_C = 50\ \Omega$

(40) Answer : (3)
Solution:
Magnifying power
$m = \frac{f_o}{f_e}$
For maximum magnification
$f_o > f_e$ and $f_o > 0,\ f_e > 0$
Hence $f_o = 100\ \text{cm}$

(41) Answer : (3)
Solution:
$S = \frac{G}{(n-1)}$
$n = \frac{20\ \text{mA}}{4\ \text{mA}} = 5$
$S = \frac{60}{(5-1)} = 15\ \Omega$

(42) Answer : (2)
Solution:
On emitting one positive β-particle, atomic number is decreased by one unit and mass number remains same.

(43) Answer : (3)
Solution:
Amplitude (A) = $\frac{30}{2+(x-20t)^2}$
Denominator should be minimum
$\therefore$for $x - 20t = 0$
$A = \frac{30}{2} = 15\ \text{m}$

(44) **Answer :** (1)
Solution:

$n_i^2 = n_e n_h$

$n_e = \frac{(1.5\times10^{16})^2}{4.5\times10^{22}}$

$n_e = 5\times10^9 \mathrm{m}^{-3}$

(45) **Answer :** (4)
Solution:

Moment of inertia of ring about its axis = MR^2

Moment of inertia of a solid cylinder about its axis = $\frac{MR^2}{2}$

Moment of inertia of a hollow sphere about tangent

= $\frac{2}{3}MR^2 + MR^2$

= $\frac{5}{3}MR^2$

Moment of inertia of a solid sphere about its diameter = $\frac{2}{5}MR^2$

CHEMISTRY

(46) **Answer :** (2)
Hint:

The electronic configuration of Au is [Xe] $4f^{14}$ $5d^{10}$ $6s^1$.
Solution:

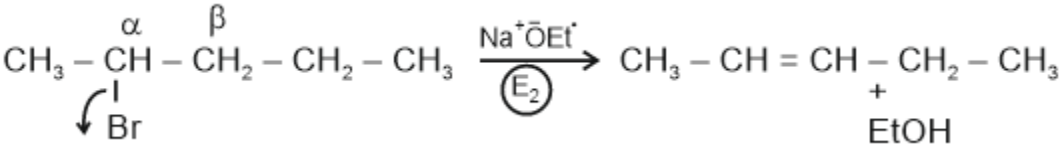
Since last electron is present in 6*s* orbital, so, period number : 6
Group number : 10 + 1 = 11.

(47) **Answer :** (1)
Hint:

According to Heisenberg's uncertainty principle, it is impossible to determine simultaneously, the exact position and exact momentum of an electron
Solution:

$\Delta x \cdot \Delta p \geq \frac{h}{4\pi}$

(48) **Answer :** (3)
Solution:



Pent-2-ene is major product known as Zaitsev product hydrogen is removed from β-carbon and halogen from α-carbon hence, β-elimination and dehydrohalogenation reaction.

(49) **Answer :** (4)
Solution:

$A_2B_3(s) \rightleftharpoons 2AB(g) + B(g)$

2P atm P atm

P_{Total} = 2 P + P = 3 P = 3 atm

P = 1 atm

$K_p = \frac{(p_{AB})^2(p_B)}{1}$ = $(2)^2$ (1) = 4

$[\because \ P_{A_2B_3(s)} = 1]$

(50) **Answer :** (3)
Hint:

The relative stability of +1 oxidation state increases for heavier elements (Inert pair effect)

(51) **Answer :** (3)
Solution:

Giant crystalline structure of SiO_2 has eight membered rings of alternate silicon and oxygen atoms.

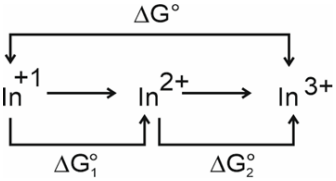
(52) Answer : (4)
Solution:
0.1 m(aq)$AgNO_3$ and 0.1 m(aq) KNO_3 will have similar boiling point on complete ionisation as K_b depends on solvent which is same in both cases.

(53) Answer : (2)
Solution:
As $\Delta G^\circ = -nFE^\circ_{cell}$

$Cu^{2+} + e^- \rightarrow Cu^+$, $\Delta G^\circ = -0.15\ F$

$In^{2+} + e^- \rightarrow In^+$, $\Delta G^\circ = +0.40\ F$

$In^+ \rightarrow In^{3+} + 2e^-$, $\Delta G^\circ = -0.84\ F$



$\Delta G^\circ = \Delta G^\circ_1 + \Delta G^\circ_2$
$\Rightarrow -2 \times 0.42\ F = -F \times 0.40 - F.\ E^o_{In^{2+}/In^{3+}}$
$E^o_{In^{2+}/In^{3+}} = 0.84 - 0.40 = 0.44\ V$

On adding, $Cu^{2+} + In^{2+} \rightarrow In^{3+} + Cu^+$
$E^\circ_{cell} = E^\circ_{ox} + E^\circ_{red}$
$= E^\circ_{Cu^{2+}/Cu^+} + E^\circ_{In^{2+}/In^{3+}}$
$= (0.15 + 0.44)V = 0.59\ V$
$\therefore E^\circ_{cell} = \frac{0.059}{1} \log K_c$
$\log K_c = \frac{0.59}{0.059} = 10$
$K_c = 10^{10}$

(54) Answer : (1)
Solution:
$6XeF_4 + 12H_2O \rightarrow 4Xe + 2XeO_3 + 24HF + 3O_2$

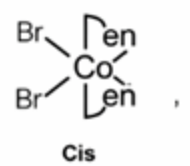
(55) Answer : (4)
Solution:
Higher the positive oxidation state, higher will be the oxidising power.
Stability of Cu^{2+}(aq) rather than Cu^+(aq) is due to much more negative enthalpy of hydration of Cu^{2+}(aq).

(56) Answer : (1)
Solution:

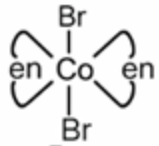
$$MnO_2 \xrightarrow[\text{oxisided with air or } KNO_3]{\text{Fused with KOH,}} MnO_4^{2-}$$

(57) Answer : (3)
Hint:
Ionization isomers can be formed by exchange of anions from one sphere to another.
Solution:

$[Co(en)_2Br_2]Cl \Rightarrow$

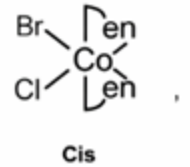


Cis
(Optically active)
(d-/ form)

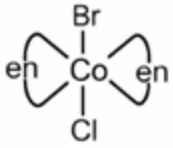


Trans
(Optically inactive)

$[Co(en)_2BrCl]Br \Rightarrow$

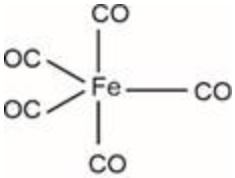


Cis
(Optically active)
(d-/ form)



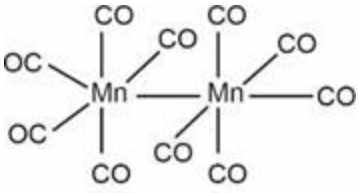
Trans
(Optically inactive)

(58) Answer : (2)
Hint:

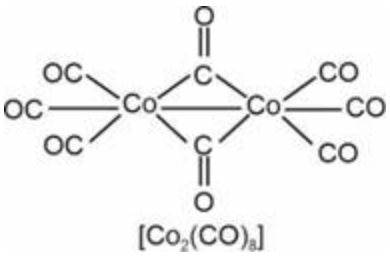


$[Fe(CO)_5]$

Solution:



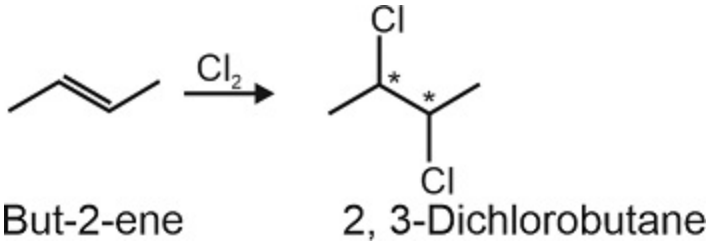
$[Mn_2(CO)_{10}]$



$[Co_2(CO)_8]$

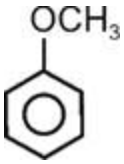
(59) Answer : (3)
Solution:
$t_{2g}^3 e_g^1$(for high spin octahedral complex)
Crystal field stabilisation energy $= (-0.4 \times 3 + 0.6 \times 1)\Delta_o$
$= [-1.2 + 0.6]\Delta_o = -0.6\Delta_o$

(60) Answer : (1)
Solution:

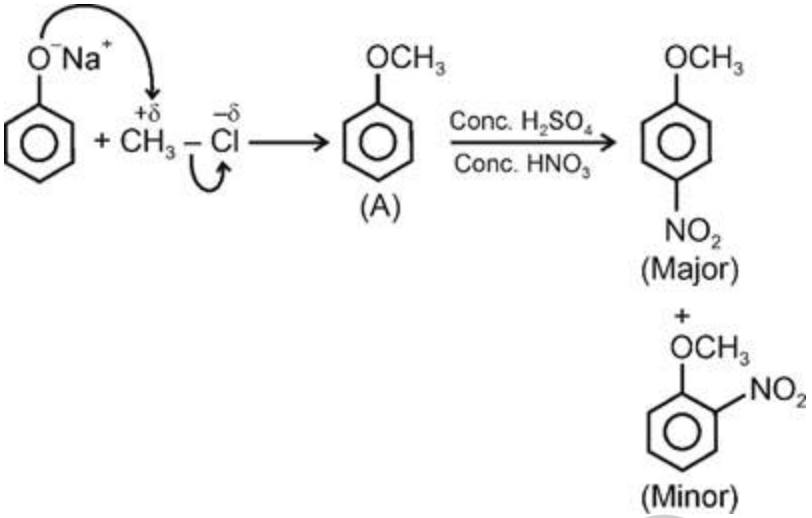


But-2-ene 2, 3-Dichlorobutane

(61) Answer : (4)
Hint:
In

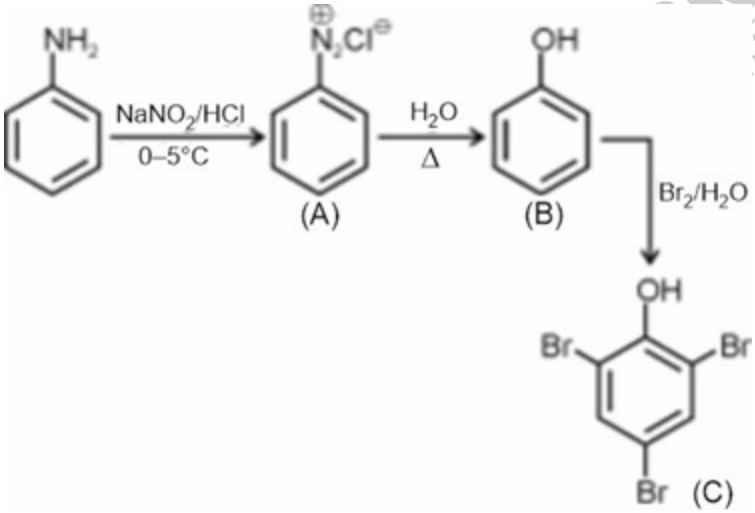


– OCH_3 is ortho para directing group.
Solution:

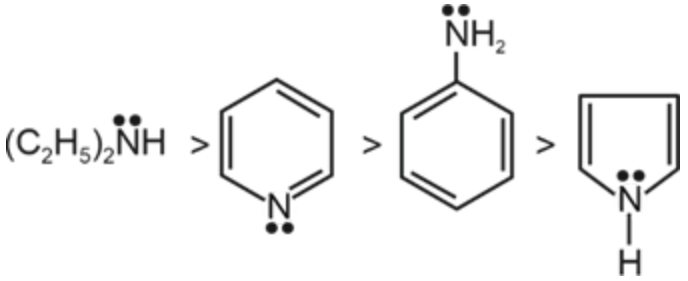


(62) Answer : (4)
Solution:

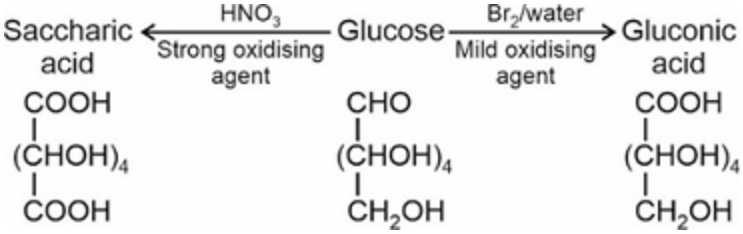
(63) Answer : (2)
Solution:



(64) Answer : (1)
Solution:
⇒ As electron density increases on nitrogen atom, its basic strength increases.
⇒ Due to delocalisation of electron pair of nitrogen, its basic strength decreases.
∴ Correct order of basic strength in water is



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



(66) **Answer :** (4)
Solution:

$Sr(OH)_2 \rightleftharpoons Sr^{2+}(aq) + 2OH^-(aq)$

$2s = 10^{-2}$, $s = 5 \times 10^{-3}$

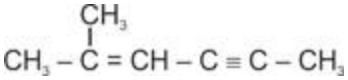
$K_{sp} = s(2s)^2 = 4s^3$

$= 4 \times (5 \times 10^{-3})^3 = 4 \times 125 \times 10^{-9}$

$= 500 \times 10^{-9}$

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

(67) **Answer :** (2)
Hint:
Double bond contains 1π bond and triple bond contains 2π bond
Solution:



Total no. of σ bonds = 16
Total no. of π bonds = 3

(68) **Answer :** (3)
Solution:

Co^{2+}, Ni^{2+}, Mn^{2+} and Zn^{2+} are group – IV cations. Pb^{2+} belongs to both group-I and II cation.

(69) **Answer :** (3)
Solution:

$[Cr(H_2O)_5\,Cl]\,Cl_2(aq) + 2\,AgNO_3(aq) \rightarrow [Cr(H_2O)_5\,Cl](NO_3)_2(aq) + 2\,AgCl(aq)$

According to Law of equivalence,

$g.eq.$ of $[Cr(H_2O)_5\,Cl]\,Cl_2 = g.eq.$ of $AgNO_3$

$N_1V_1 = N_2V_2$

$\Rightarrow M_1 \times n-\text{factor} \times V_1 = M_2 \times V_2 \times n-\text{factor}$ of $AgNO_3$

$0.02 \times 2 \times 10 = 0.2 \times V_2 \times 1$

$V_2 = \frac{0.02 \times 2 \times 10}{0.2 \times 1} = 2\ mL$

(70) **Answer :** (3)
Solution:

$NH_4NO_2 \xrightarrow{\triangle} N_2 + 2H_2O$

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

$2\,KMnO_4 + KI + H_2O \rightarrow 2\,MnO_2(s) + 2KOH + KIO_3$

$3\,BaCl_2 + 2\,Na_3\,PO_4 \rightarrow Ba_3(PO_4)_2 + 6\,NaCl$

5	2	0	0
$(5-3)$	$(2-1\times2)$	1	$6\ \times\ 1\ =\ 6$

mole of $Ba_3(PO_4)_2$ = 1

(71) Answer : (1)
Solution:

$Cr_2\,O_7^{2-} + 14H^{\oplus} + 6e^{\oplus} \rightarrow 2\,Cr^{3\oplus} + 7H_2O$

$\therefore$ 2 mole $Cr^{3\oplus}$ ion $= 6F$ electricity

$\therefore$ 1 mole $Cr^{3\oplus}$ ion $= 3F$ electricity

$Q = It = 3F \Rightarrow I = \frac{3F}{t} = \frac{3\times96500}{24.125\times60} = 200A$

(72) Answer : (3)
Solution:

Most stable
(Aromatic)

(73) Answer : (1)
Solution:

$Ag_2\,CrO_4(s) \rightleftharpoons 2\,Ag^{\oplus}(aq) + CrO_4^{2\ominus}(aq)$

(Where S′ =0.2 M)

$K_{sp} = \left[Ag^{+}\right]^2\left[CrO_4^{2\ominus}\right]$

$1.1\times10^{-12} = \left(2s + s'\right)^2.s\ \simeq (s')^2\ \times\ s$

$1.1\times10^{-12} = 0.04\ \times\ s$

$s = \frac{1.1\times10^{-12}}{0.04} = 27.5\times10^{-12}$

$= 2.75\times10^{-11}M$

(74) Answer : (3)
Solution:

$E = \frac{hc}{\lambda} = \frac{1240\ eV.nm}{102.56\ nm} = 12.09\ eV$

The energy of the level to which the electron transitions can be

$E_n = \frac{-13.6}{n^2}eV \quad \because \quad E_n - E_1 = 12.09$

$n^2 = \frac{-13.6}{-1.51} = 9 \qquad E_n = 12.09 + E_1$

$= 12.09 - 13.6$

$n = 3 \qquad = -1.51\ eV$

Number of spectral lines emitted when transition from $n = 3$ to $n = 1$ (ground state)

Number of spectral lines $= \frac{n(n-1)}{2} = \frac{3(3-1)}{2}$

$= \frac{3\times2}{2} = 3$

(75) Answer : (4)
Solution:

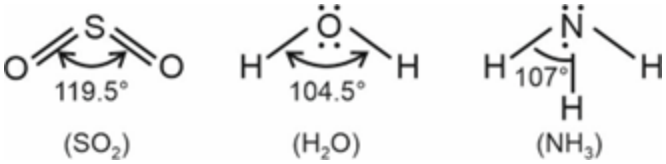
for $n = 3$

$r_n = r_0n^2 = \left(52.9\times3^2\right)\ pm$

As $n\lambda = 2\pi r_n$

$\therefore \lambda = \frac{2\pi r_n}{n} = \frac{2\times52.9\times3\times3\times\pi}{3} = 317.4\pi$

(76) Answer : (1)
Solution:



Molecule	Bond enthalpy/kJ mol^{-1}
N_2	: 946
O_2	: 498
H_2	: 435.8

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

$C_xH_y + \left(x + \frac{y}{4}\right)O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O$

$10\ ml \qquad 50\ ml \quad 60\ ml$

$1\ ml \qquad 5\ ml \quad 6\ ml$

$\because$ 1 mole C_xH_y produces x mole $CO_2(g)$

$\therefore$ 22400 ml produces $x \times 22400$ ml CO_2 at S.T.P.

$\therefore$ 1 ml produces $\frac{x \times 22400}{22400} = 5$ ml at S.T.P.

$x = 5$

1 ml C_xH_y produces $\frac{y}{2}$ml H_2O

$i.e.\ \frac{y}{2} = 6 \Rightarrow y = 6 \times 2 = 12$

$x + y = 5 + 12 = 17$

then hydrocarbon is $C_5H_{12}(\text{Pentane})$

(78) **Answer :** (4)
Solution:

$|W_{isothermal}| = +2.303nRT \log\left(\frac{V_2}{V_1}\right)$

$= +P_1V_1 \ln\left(\frac{V_2}{V_1}\right)$

$= +3 \times 200 \ln\left(\frac{3}{2}\right)$ Joule

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

$Fe(s) + 2HCl \rightarrow FeCl_2(s) + H_2\uparrow$

1 mole 1 mole

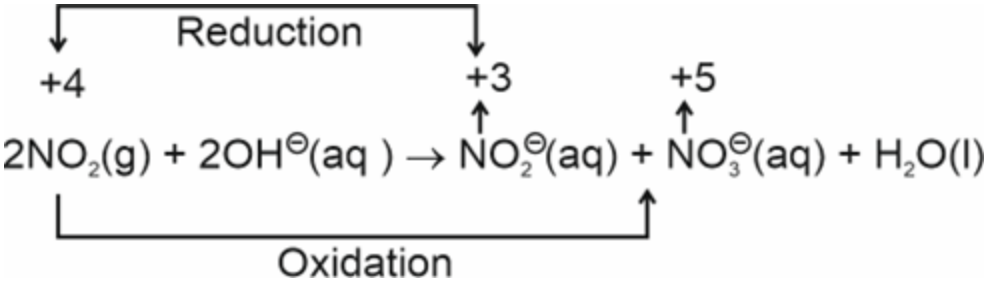
$\Rightarrow \frac{0.56}{56} = 10^{-2}$ mole 10^{-2} mole

PV = work done = ΔnRT

$= 10^{-2} \times 2 \times 400$

= 8 cal

(80) **Answer :** (3)
Solution:

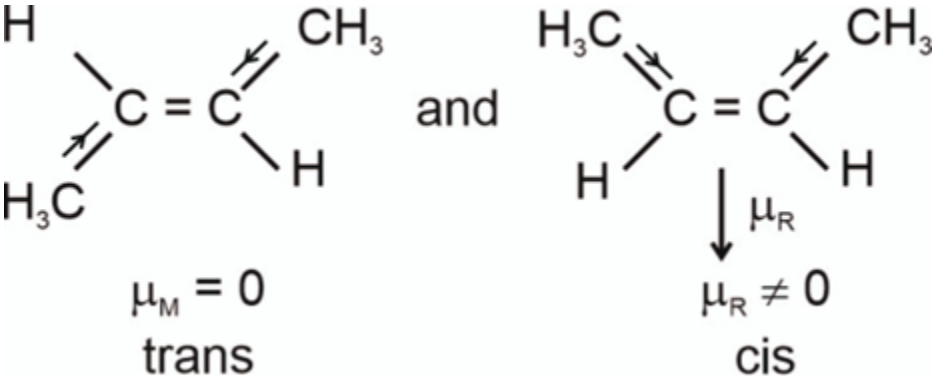


(81) **Answer :** (4)
Solution:
Correct order of dipole moments : $CH_3Cl > CH_3F > CH_3Br > CH_3I$.

(82) **Answer :** (1)
Solution:
Benedict's reagent $\Rightarrow$alkaline $CuSO_4$ complexed with sodium potassium citrate

(83) **Answer :** (4)
Solution:
For ideal solution
$\Delta H_{mix} = 0,\ \Delta V_{mix} = 0,$
$\Delta_{mix} S > 0,\ \Delta_{mix} G < 0$

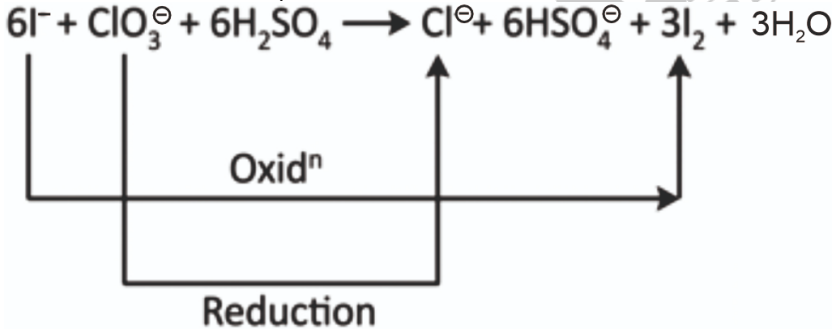
(84) **Answer :** (4)
Solution:



cis-But-2-ene is a slightly polar molecule while trans-But-2-ene is a non-polar molecule, hence molecular association in cis-But-2-ene is more leading to higher boiling point of the compound.

(85) **Answer :** (1)
Solution:
Since S_8 contains only one type of atom so the oxidation number is zero.
$S_2F_2 \Rightarrow 2x - 1 \times 2 = 0 \Rightarrow x = +1$
$Na_2\,S_4O_6 \Rightarrow 4x - 2 \times 6 + 1 \times 2 = 0$
$\Rightarrow 4x = 10 \Rightarrow x = 2.5$

(86) **Answer :** (2)
Solution:
The balanced chemical equation is:



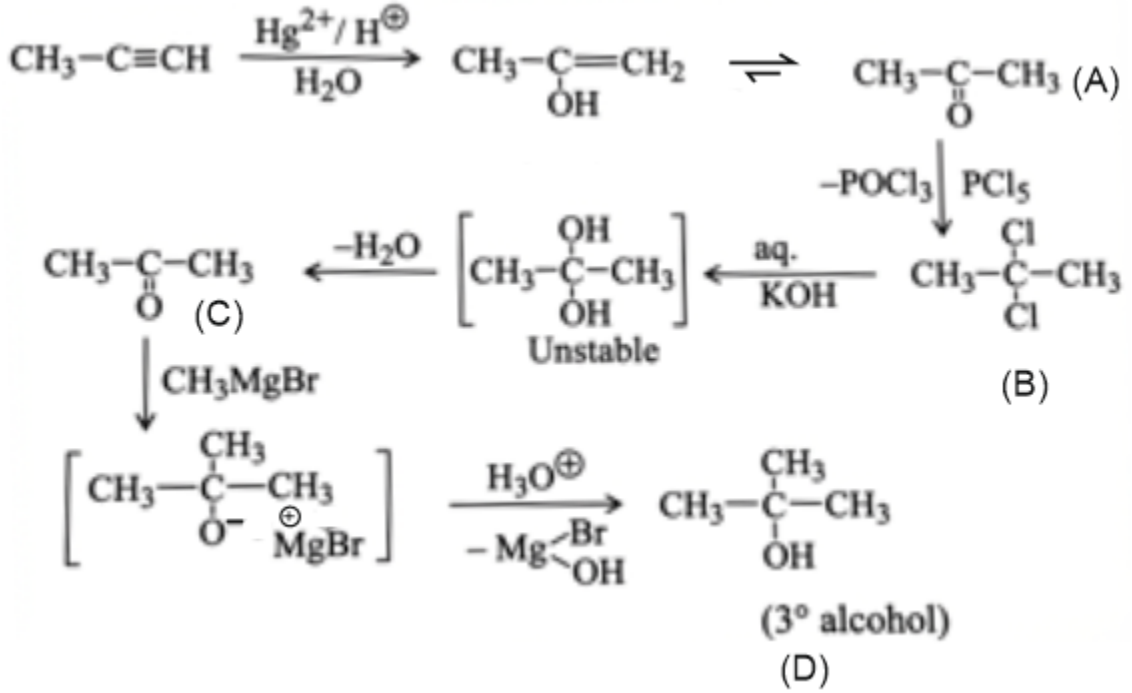
(87) **Answer :** (1)
Solution:
(C) and (D) are aromatic
(A) and (B) are non-aromatic.

(88) **Answer :** (3)
Solution:
Rate Constant $k = 0.04\ s^{-1}$
For 1^{st} order reaction,
$k = \frac{2.303}{t}\log\left(\frac{a}{a-x}\right)$
$t = \frac{2.303}{0.04}\log\left(\frac{8.1}{0.9}\right) = \frac{2.303}{0.04}\log\ 9 = \frac{2.303}{0.04} \times 2\ \log 3$
$= \frac{2.303}{0.04} \times 2 \times 0.477 = \frac{2.197}{0.04} = 54.92\ s$

(89) **Answer :** (3)

Solution:
Hydrogenation of ethene is an example of first order reaction.

(90) **Answer :** (1)
Solution:



BIOLOGY

(91) **Answer :** (4)
Solution:
Albugo causes white rust disease in mustard.

(92) **Answer :** (2)
Solution:
Fungi $\rightarrow$ Nuclear membrane is present in all members.
Animalia $\rightarrow$ Organ system level of body organisation.
Monera $\rightarrow$ Non-cellulosic cell wall.

(93) **Answer :** (3)
Solution:
Fusion of two gametes which are dissimilar in size is termed as anisogamous. Anisogamous type of sexual reproduction is seen in *Eudorina*.

(94) **Answer :** (1)
Solution:
Mosses have haploid main plant body, jacketed sex organs, multicellular rhizoids but their zygote does not undergo meiosis.

(95) **Answer :** (2)
Solution:
Most common asexual spores in algae are flagellated zoospores. Agar is obtained from certain red algae.

(96) **Answer :** (2)
Solution:
Perigynous flowers are found in Plum.
Zygomorphic flowers are found in *Cassia*.
Hypogynous flowers are found in Mustard.
Epigynous flowers are found in Cucumber.

(97) **Answer :** (3)
Solution:
Sunflower and marigold show basal placentation.

(98) **Answer :** (3)
Solution:
Bulliform cells are adaxial epidermal cells of monocot leaves which modify themselves into large, empty and colourless cells.
Companion cells are specialised parenchymatous cells of phloem.
Endodermal cell - Cells of endodermis

(99) **Answer :** (3)
Solution:
In dicot stems, the innermost layer of the cortex, known as endodermis, is composed of cells that are rich in starch grains and thus, it is termed as starch sheath.

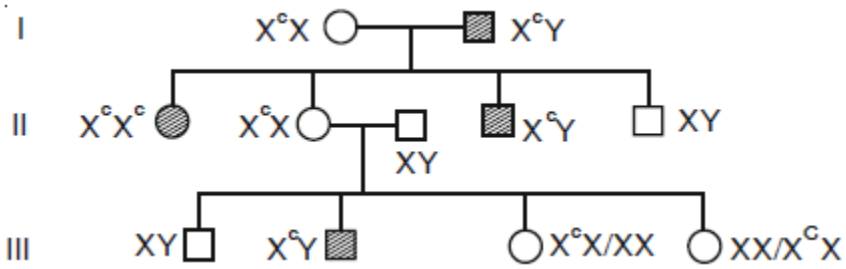
(100) **Answer :** (2)
Hint:
Chromosomes acquire different shapes during anaphase.
Solution:
Acrocentric chromosome – J shaped
Telocentric chromosome – I shaped
In telocentric chromosomes, position of centromere is terminal.

(101) **Answer :** (3)
Hint:
Eukaryotic flagella have microtubule doublets at periphery and a pair of microtubules in center.
Solution:
Central tubules are covered by central sheath and the entire axoneme is covered by plasma membrane.
Formation of spindle fibres during cell division is a function of centrioles.

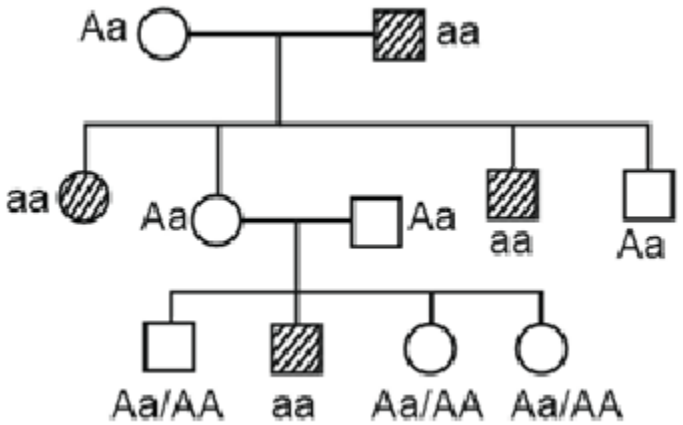
(102) **Answer :** (4)
Solution:
Amyloplasts store starch, whereas, aleuroplasts store proteins.

(103) **Answer :** (4)
Solution:
Diakinesis represents transition to metaphase. Condensation of chromosomes continues throughout the leptotene stage.

(104) **Answer :** (2)
Hint:
The given pedigree is applicable for an autosomal as well as for an X-linked inheritance, but it does not show Y-linked inheritance as the female is also affected in second generation.
Solution:
If pedigree is showing X-linked inheritance–



If pedigree is showing an autosomal disorder–



So the given pedigree is applicable for an autosomal as well as X-linked recessive disorders.

(105) Answer : (4)
Solution:
The first action spectrum of photosynthesis was described through the experiment conducted by T.W. Engelmann on *Cladophora* by using a prism.

(106) Answer : (4)
Solution:
Compound epithelium does not have large intercellular spaces and is usually not involved in transport. Areolar tissue is a loose connective tissue. Dense packing of collagen is observed in dense connective tissues like ligaments. Alveoli have squamous epithelium, not cuboidal epithelium.

(107) Answer : (2)
Solution:
The palindromes in DNA are base pair sequences that are same when read forward (left to right) or backward (right to left) on the two strands in 5′ → 3′ direction or 3′ → 5′ direction.

(108) Answer : (2)
Hint:
Insertional inactivation
Solution:
β-galactosidase produces blue colour in the presence of chromogenic substrate. Now, if foreign DNA is inserted within β-galactosidase coding sequence, it will lead to insertional inactivation due to which recombinants will produce white coloured colonies and non-recombinants will produce blue coloured colonies in the presence of chromogenic substrate.

(109) Answer : (1)
Solution:
RNAi involves silencing of a specific mRNA due to the formation of dsRNA molecule formed by binding of complementary RNA molecule to the original mRNA.

(110) Answer : (3)
Solution:
Fish-like reptiles *(Ichthyosaurs)* → Evolved around 200 million years ago.

(111) Answer : (4)
Solution:
Some phenomena like habitat fragmentation and genetic drift accentuate variation leading to appearance of new species and hence evolution. So, it will disturb the Hardy-Weinberg equilibrium. Random mating does not affect Hardy-Weinberg equilibrium.

(112) Answer : (2)
Solution:
In GIFT, Al and IUI, fertilisation takes place *in-vivo*.

(113) Answer : (4)
Hint:
First menstruation is called menarche.
Solution:
All the events of menstrual cycle stops during pregnancy due to the increase in the levels of oestrogen, progestogen and prolactin which inhibit GnRH and thus inhibits gonadotropins. The menstrual phase is followed by follicular phase. The first menstruation begins at puberty which is called menarche.

(114) Answer : (4)
Solution:
During first trimester, major organ systems are formed.

(115) Answer : (3)
Solution:
Total volume of air accommodated in the lungs at the end of a forced inspiration is calld TLC. This includes $\mathrm{RV},\ \mathrm{ERV},\ \mathrm{TV}\ \text{and}\ \mathrm{IRV}$or Vital capacity $+$ Residual volume $i.e.,\ \mathrm{VC}+\mathrm{RV}$. Functional residual capacity includes ERV+RV.

(116) Answer : (3)
Solution:
Capsule type of fruit is a characteristic of the members of the family Solanaceae.

(117) Answer : (3)
Solution:
Synthesis/duplication of genetic material occurs during the S-phase of cell cycle.

(118) Answer : (2)
Solution:
Sister chromatids are held together by the centromere. Centrosome, which had undergone duplication during interphase, begins to move towards the opposite poles during the prophase.

(119) Answer : (3)
Solution:
In cyclic photophosphorylation, the excited electron does not pass on to $NADP^+$, but is cycled back to the PS I complex.

(120) Answer : (2)
Solution:
Oxidative phosphorylation occurs in the inner mitochondrial membrane. Fermentation occurs in the cytoplasm in eukaryotes.

(121) Answer : (2)
Solution:
To obtain the given phenotypic ratio:
Parent A should be with genotype $\mathrm{A\ a^B}$
Parent B should be with genotype $\mathrm{a^G\ a^B}$
Offsprings:

Genotype	Phenotype
$\mathrm{Aa^G}$	Yellow
$\mathrm{Aa^B}$	Yellow
$\mathrm{a^Ba^G}$	Green
$\mathrm{a^Ba^B}$	Blue

(122) Answer : (2)
Solution:
Myotonic dystrophy is an autosomal dominant disorder.

(123) Answer : (3)
Solution:
Kinetin is not found naturally in plants.

(124) Answer : (2)
Solution:
Arithmetic growth can be represented by the equation, '$\mathrm{L_t = L_0 + rt}$'.

(125) Answer : (2)
Solution:
In angiosperms, triple fusion leads to the formation of endosperm.

(126) Answer : (1)
Solution:
Energy transfer follows the 10 per cent law, which limits the energy available for the higher trophic levels and hence the top carnivores.

(127) Answer : (3)
Solution:
Mycoplasma lack cell wall. Diatoms float passively. Euglenoids also possess two flagella.

(128) Answer : (2)
Solution:
Mutagens – Artificially produce mutations like UV rays
Polyploidy – Often seen in plants
Aneuploidy – Arises due to non-disjunction of chromosomes
Frame-shift mutation – Deletions and insertions of base pairs of DNA

(129) Answer : (2)
Solution:
Biocontrol methods are adopted, based on the ability of predators to regulate the prey population.

(130) Answer : (3)
Solution:
Phenylketonuria is a genetic disease and cannot be treated with antibiotics.

(131) Answer : (4)
Hint:

Interstitial cells secrete androgens.
Solution:
Leydig cells synthesize and secrete testicular hormones. Sertoli cells secrete inhibin.

(132) Answer : (3)
Solution:
Catecholamines act as emergency hormones because they increase blood flow to vital organs. They increase the heart rate, respiration rate and cardiac output.

(133) Answer : (3)
Hint:
Electrical potential difference across the resting membrane
Solution:
Ionic gradients across the resting membrane are maintained by the active transport of ions by the sodium-potassium pump which transports $3Na^+$ outwards for $2K^+$ into the cell.

(134) Answer : (2)
Hint:
It is a part of axial skeleton.
Solution:
Cranial bones are 8 in number. Frontal, sphenoid, ethmoid and occipital bones are unpaired cranial bones.

(135) Answer : (2)
Solution:
Fibrous joints do not allow any movement. This type of joint is shown by the flat skull bones which are fused end-to-end with the help of dense fibrous connective tissue in the form of sutures. Pivot joint is present in between atlas and axis. Parietal and occipital bones are cranial bones.

(136) Answer : (2)
Solution:
Osmolarity of the filtrate at the hair pin bend of loop of Henle is 1200 $mOsmolL^{-1}$.

(137) Answer : (4)
Solution:
The Malpighian corpuscle, PCT and DCT of the nephron are present in the cortical region of the kidney. In majority of the nephrons, the loop of Henle is too short and extends only very little into the medulla. Such nephrons are called cortical nephrons. In some of the nephrons, the loop of Henle is very long and runs deep into the medulla. These nephrons are called juxta-medullary nephrons.

(138) Answer : (1)
Solution:
Erythroblastosis foetalis can be avoided by administering anti-Rh antibodies to the Rh–ve mother immediately after the delivery of the first Rh+ve child.

(139) Answer : (4)
Hint:
70% of CO_2 is transported by bicarbonate ions.
Solution:
In people working in stone-breaking industries, the body cannot fully cope with the situation. Long exposure to dust particles can give rise to inflammation leading to fibrosis and thus, causing serious lung damage. At tissue surface, CO_2 produced in catabolism, enters RBCs and forms H^+ and HCO_3^-. Every 100 mL of deoxygenated blood delivers 4 mL of CO_2 to the lungs.

(140) Answer : (1)
Hint:
Select the toxins
Solution:

Pigments	Carotenoids, Anthocyanins, *etc.*
Alkaloids	Morphine, Codeine, *etc*.
Terpenoides	Monoterpenes, Diterpenes, *etc.*
Essential oils	Lemon grass oil, *etc.*
Toxins	Abrin, Ricin
Lectins	Concanavalin A
Drugs	Vinblastin, curcumin, *etc.*

Polymeric substances	Rubber, gums, cellulose

(141) Answer : (3)

Hint:

Equal to the number of external nostrils in human

Solution:

• Single unit smooth muscle fibres possess gap junctions.

• Cardiac muscles have communication junctions (gap junctions) at some fusion points that allow the cells to contract as a unit.

• In epithelial tissues, the cells are compactly packed with little intercellular matrix.

• The wall of stomach contains smooth muscle fibres. Cell junctions hold them together and they are bundled together in a connective tissue sheath.

(142) Answer : (3)

Solution:

Thyrocalcitonin (TCT) is a peptide hormone secreted from thyroid gland. Adrenal cortical hormones, progesterone and androgens are steroid hormones. Steroid hormones interact with intracellular receptors while peptide hormones interact with membrane-bound receptors.

(143) Answer : (1)

Solution:

The large regions in the cerebral cortex which are neither clearly sensory nor motor in function, are called association areas. These are present in forebrain.

(144) Answer : (3)

Solution:

Red muscle fibres have high myoglobin content and plenty of mitochondria but the amount of sarcoplasmic reticulum is low. White muscle fibres have less myoglobin and few mitochondria but the amount of sarcoplasmic reticulum is high. White muscle fibres depend on anaerobic process for energy.

(145) Answer : (2)

Solution:

The proximity between the Henle's loop and vasa recta, as well as the counter current in them helps in maintaining an increasing osmolarity towards the inner medullary interstitium. This gradient is mainly caused by NaCl and urea.

(146) Answer : (3)

Solution:

The image represents a ribonucleotide named adenylic acid. It has adenine which is a double-ringed nitrogenous base. Adenine joins with ribose by glycosidic bond to form adenosine which further joins with phosphoric acid by phosphoester bond to form adenylic acid. Adenylic acid possesses 3 heterocyclic rings.

(147) Answer : (4)

Solution:

Heart failure - Heart is not pumping blood effectively enough to meet the needs of the body.
Heart attack - Heart muscle is suddenly damaged by an inadequate blood supply
Cardiac arrest - Heart stops beating
Angina - Acute chest pain when no enough oxygen is reaching the heart muscle

(148) Answer : (4)

Solution:

Adult echinoderms are true coelomates but they exhibit radial symmetry in the adult form. Platyhelminths are bilaterians but they lack any body cavity. Aschelminths are also bilaterians but they are pseudocoelomates.

(149) Answer : (1)

Solution:

DNA is a hydrophilic molecule and therefore, bacteria are forced to take up the recombinant DNA by making them competent.

(150) Answer : (3)

Solution:

Pterophyllum (Angel fish) is a bony fish under the super class Pisces, division Gnathostomata and sub-phylum Vertebrata.

(151) Answer : (3)

Solution:

Genetic modification has made crops tolerant to abiotic stresses (cold, drought, salt, heat) and reduced reliance on chemical pesticides.

(152) Answer : (4)

Solution:

In pBR322, no antibiotic resistance gene is present in *Hin*d III restriction site. Hence, ligation of foreign DNA at this site causes no insertional inactivation of any antibiotic resistance gene. Thus, the recombinant transformants will not lose resistance.

(153) Answer : (4)

Solution:

Due to genetic and other unknown reasons, the body attacks self-cells. This results in damage to the body and leads to auto-immune diseases. The use of drugs like anti-histamine and steroids quickly reduce the symptoms of allergy.

(154) Answer : (4)

Solution:

An ideal contraceptive should be user-friendly, easily available, effective and reversible with no or least side-effects. It should in no way interfere with the sexual drive, desire or the sexual act of the users.

(155) Answer : (4)

Solution:

Frequency of recessive genotype $\left(q^2\right)$

$= \frac{\text{No. of recessive individuals}}{\text{Total no. of individuals in the population}} = \frac{256}{1600} = 0.16$

$\therefore \quad q = \sqrt{0.16} = 0.4$

Since, $\mathrm{p}+\mathrm{q}=1$, hence, $\mathrm{p} \Rightarrow 1-\mathrm{q} \Rightarrow 1-0.4 \Rightarrow 0.6$

Heterozygous individuals are represented by $2\ \mathrm{pq}$

$= 2 \times 0.6 \times 0.4 = 0.48$

Hence, total number of heterozygous individuals $= 0.48 \times 1600 = 768$

(156) Answer : (4)

Solution:

In first generation only hybrid DNA is obtained. When the hybrid DNA is replicated in ^{14}N medium, one light and one hybrid DNA will be synthesised from each hybrid DNA. There will be no synthesis of heavy DNA. In this way, only 50 % of DNA would be hybrid and 50 % would be light.

(157) Answer : (2)

Solution:

Plants capture only 2-10 percent of PAR. Energy flow in ecosystem is unidirectional. Of the incident solar radiation, less than 50% is photosynthetically active radiation (PAR). Sun is the only source of energy for all ecosystems on earth, except for the deep sea hydrothermal ecosystem.

(158) Answer : (4)

Solution:

Generative cell is small spindle shaped.

In angiosperm, male gametes are formed by the generative cell which is spindle-shaped.

(159) Answer : (4)

Hint:

This set carries the taxa that depicts the taxonomical category, order.

Solution:

Diptera, Sapindales and Poales are the orders of housefly, mango and wheat respectively.

(160) Answer : (2)

Solution:

UTRs are found at 5' before start codon and at 3' after stop codon in mRNA.

(161) Answer : (4)

Solution:

RNA polymerase II transcribes hnRNA (also known as heterogenous nuclear RNA or pre-mRNA) which will further produce processed mRNA.

(162) Answer : (2)

Hint:

The innermost wall layer of anther is tapetum.

Solution:

Tapetal cells can be polyploid and provide nourishment to the developing pollen grains.

(163) Answer : (2)

Solution:

Blood cholesterol lowering agents are statins that are obtained from fungus, *Monascus purpureus*.

(164) Answer : (2)

Solution:
According to the IUCN red list (2004), 338 species of vertebrates and 87 species of plants have undergone extinction in last 500 years.

(165) Answer : (3)
Solution:
Species with restricted distribution are usually more likely to face extinction.

(166) Answer : (3)
Solution:
Under a particular set of selection pressures, organisms evolve towards the most efficient reproductive strategies.

(167) Answer : (3)
Solution:
Polycistronic structural gene in *lac* operon is regulated by promoter and three regulatory genes.
i gene is the inhibitor gene, which gives rise to repressor protein.

(168) Answer : (2)
Solution:
ATP from light reaction is used in the Calvin cycle, not in mitochondria.
$\mathrm{O_2}$ released during photosynthesis can be used as a final electron acceptor in the mitochondrial ETS.
$\mathrm{CO_2}$ fixation occurs in the stroma of chloroplast.

(169) Answer : (4)
Solution:
After fertilization, antipodals degenerate and multinucleate structure forms in the central cell, which leads to the formation of endosperm.

(170) Answer : (3)
Solution:
Transcription, unlike replication, occurs only on a segment of DNA and hence, it necessitates defining the boundaries that would demarcate the region and the strand of DNA to be transcribed.

(171) Answer : (3)
Solution:
Morphine - Poppy plant - Binds to receptors in GI tract
Marijuana - *Cannabis* - Affects cardio-vascular system
Cocaine - Coca plant - Interferes with transport of dopamine
Nicotine - Tobacco - Stimulates adrenaline release.

(172) Answer : (2)
Solution:
Biology is the youngest of the formalised disciplines of natural science. Progress in physics and chemistry proceeded much faster than in biology. Application of physics and chemistry in our daily life also have a higher visibility than those of biology.

(173) Answer : (3)
Solution:
Smooth muscle fibres/cells are spindle-shaped with tapered ends, uninucleate condition, non-striated appearance; they are involuntary and do not undergo fatigue easily.

(174) Answer : (2)
Solution:
To initiate carbohydrate digestion in the buccal cavity, salivary amylase is needed and salivary amalyse is not present in frogs due to the absence of salivary gland.
In frogs, the stomach is located on the left side of the body cavity.

(175) Answer : (3)
Solution:
Pulmonary vein carries oxygenated blood from lungs to left atrium in frogs.

(176) Answer : (3)
Solution:
In cockroach, tegmina are modified forewings and they are mainly associated with providing protection. Hindwings are adapted for flight. Forewings are opaque, dark and leathery. The hindwings are transparent, membranous and are used in flight.

(177) Answer : (4)
Solution:
An enzyme specificity is determine as the range of substrates on which it will perform its function, based on complementary shapes and chemical interactions at the active site.

(178) Answer : (2)

Solution:

Semilunar valves open during the ventricular systole. First heart sound occurs due to the closure of AV valves. Second heart sound occurs due to closure of semilunar valves.

(179) Answer : (4)

Solution:

All chordates possess a dorsal, hollow and tubular nerve cord, a notochord, and pharyngeal gill slits at some stage of their life. Other mentioned features are found in many non-chordates too.

(180) Answer : (3)

Solution:

Maintenance of hygiene and sanitation during menstruation is very important. One should not throw the used napkins in the drain pipe of toilets or in the open area.