NEET 2020
FULL TEST-4 SOLUTIONS

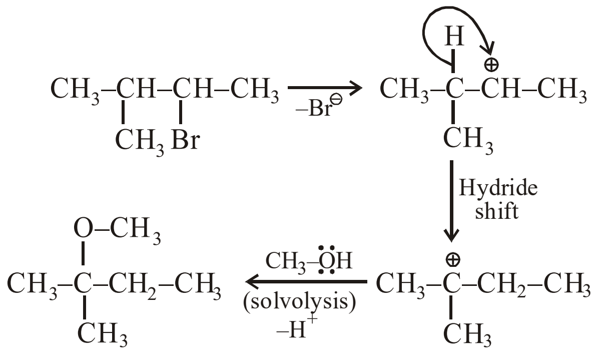
STANDARD ANSWER KEY

Q	1	2	3	4	5	6	7	8	9	10	11
A	3	3	1	4	2	1	4	2	1	1	3
Q	12	13	14	15	16	17	18	19	20	21	22
A	3	3	2	4	2	1	4	2	3	4	3
Q	23	24	25	26	27	28	29	30	31	32	33
A	2	3	1	2	1	2	2	1	4	2	2
Q	34	35	36	37	38	39	40	41	42	43	44
A	4	2	2	1	3	2	4	4	3	2	1
Q	45	46	47	48	49	50	51	52	53	54	55
A	4	4	3	3	2	3	3	4	2	1	3
Q	56	57	58	59	60	61	62	63	64	65	66
A	4	4	1	3	1	2	4	3	3	4	4
Q	67	68	69	70	71	72	73	74	75	76	77
A	2	4	3	2	2	3	1	4	2	3	2
Q	78	79	80	81	82	83	84	85	86	87	88
A	4	1	4	3	3	4	3	2	4	3	2
Q	89	90	91	92	93	94	95	96	97	98	99
A	1	3	4	2	3	3	2	2	1	1	2
Q	100	101	102	103	104	105	106	107	108	109	110
A	1	1	4	4	4	4	2	2	4	2	2
Q	111	112	113	114	115	116	117	118	119	120	121
A	4	2	3	4	3	2	2	1	4	1	2
Q	122	123	124	125	126	127	128	129	130	131	132
A	2	3	3	1	1	2	4	4	2	3	3
Q	133	134	135	136	137	138	139	140	141	142	143
A	4	2	2	3	2	2	4	3	3	2	3
Q	144	145	146	147	148	149	150	151	152	153	154
A	2	2	3	3	3	2	3	2	2	1	2
Q	155	156	157	158	159	160	161	162	163	164	165
A	2	4	2	4	1	3	2	3	4	3	3
Q	166	167	168	169	170	171	172	173	174	175	176
A	3	3	2	2	3	2	2	1	2	2	3
Q	177	178	179	180							
A	2	2	3	3							

(1) **(3).**

(2) **(3).** $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3 \xrightarrow{CH_3OH}$?

In polar protic solvent S_N1 mechanism is favourable hence reaction complete via S_N1 mechanism.



(3) **(1).** $N_2^+ \Rightarrow BO = 2.5$

$\therefore$ [π bond = 2 & σ bond = 1/2]

$N_2 \Rightarrow BO = 3.0$

$\therefore$ [π bond = 2 & σ bond = 1]

$O_2^+ \Rightarrow BO = 2.5$

$\therefore$ [π bond = 1.5 & σ bond = 1]

$O_2 \Rightarrow BO = 2$

$\therefore$ [π bond = 1 & σ bond = 1]

(4) **(4).** PHBV is a polymer of 3-hydroxybutanoic acid and 3-Hydroxy pentanoic acid.

(5) **(2).** More is the electrophilic character of carbonyl group of ester faster is the alkaline hydrolysis.

(6) **(1).** According to question all the complexes are low spin.

Complex	Configuration	No. of unpaired electrons
$[V(CN_6)]^{4-}$	$t_{2g}^2e_g^0$	3
$[Cr(NH_3)_6]^{2+}$	$t_{2g}^4e_g^0$	2
$[Ru(NH_3)_6]^{3+}$	$t_{2g}^5e_g^0$	1
$[Fe(CN_6)]^{4-}$	$t_{2g}^6e_g^0$	0

(7) **(4).**

Symbol	**Atomic number**
unh	106
uun	110
une	109
uue	119

(8) **(2).** $Ag_2CO_3\,(s) \rightleftharpoons 2Ag^+\,(aq.) + CO_3^{2-}\,(aq)$

$(0.1+2S)$ M $\quad$ S M

$K_{sp} = [Ag^+]^2\,[CO_3^{-2}]$

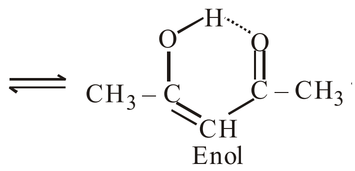
$8 \times 10^{-12} = (0.1 + 2S)^2\,(S)$

$S = 8 \times 10^{-10}$ M

(9) **(1).** All the three statements are correct.

(10) **(1).** $CH_3-\overset{\displaystyle O}{\overset{||}{C}}-CH_2-\overset{\displaystyle O}{\overset{||}{C}}-CH_3$

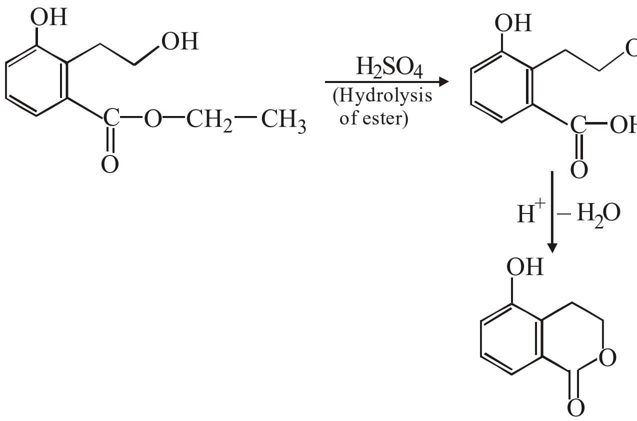
Keto



Due to intramolecular H-bonding and resonance stabilisation enol content is maximum.

(11) **(3).** Statement of limitations of VBT, I & III are correct.

(12) **(3).**



(13) **(3).** $E = W + \frac{1}{2}mv^2$

K.E. = $h\nu + (-h\nu_0)$

$y = mx + C$

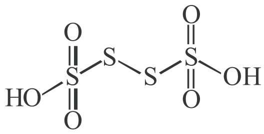
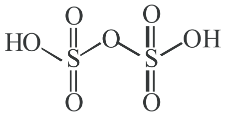
(14) **(2).** $E_{cell} = E^\circ_{cell} - \frac{0.059}{n}\log Q$

At equilibrium,

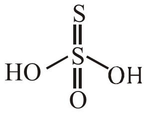
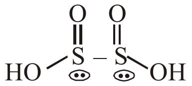
$$E^\circ_{cell} = \frac{0.059}{2}\log 10^{16} = 0.059 \times 8 = 0.472\text{ V}$$

(15) **(4).** In Triclinic unit cell

$a \neq b \neq c$ & $\alpha \neq \beta \neq \gamma \neq 90^\circ$

(16) **(2).**  

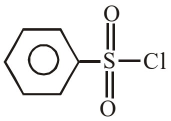
$H_2S_4O_6$ $H_2S_2O_7$

$H_2S_2O_3$ $H_2S_2O_4$

$H_2S_2O_7$ does not contain bond between sulphur atoms.

(17) **(1).** Hinsberg Reagent



[Benzene Sulphonyl chloride]

(18) **(4).** $2H_2O = H_3O^+ + OH^-$; $K = 10^{-14}$

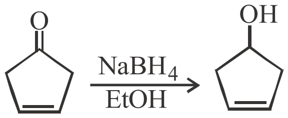
$\Delta G^\circ = -RT \ln K$

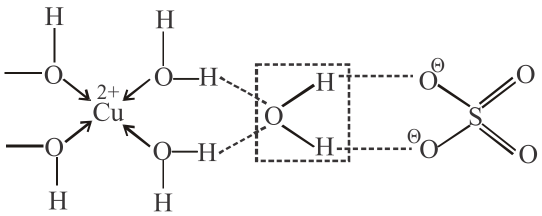
$$= -\frac{8.314}{1000} \times 298 \times \ln 10^{-14} = 80 \text{ KJ/Mole}$$

(19) **(2).** Mond's process is used for the purification of Nickel.

(20) **(3).** Water gas = $CO + H_2$ is also called syn gas because it is used for synthesis of methanol.

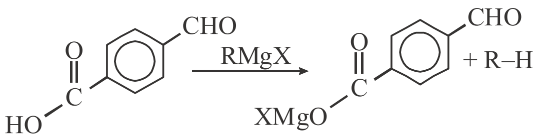
(21) **(4).** $NaBH_4$ cannot reduce C = C but can reduce $-\underset{\underset{O}{\|}}{C}-$ into OH.

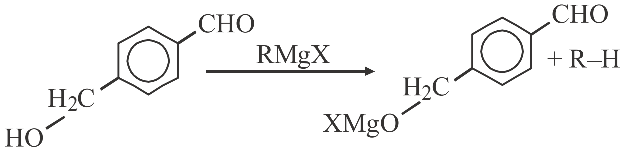


(22) **(3).** 

One water molecule as shown in the diagram, is not coordinated to copper ion directly.

(23) **(2).** Acid-base reaction of G.R are fast.

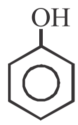
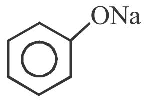


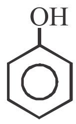
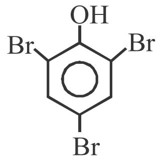


(24) **(3).** $\frac{x}{m} = K \cdot p^{1/n}$

$$\therefore \quad \log\frac{x}{m} = \log K + \frac{1}{n}\log P$$

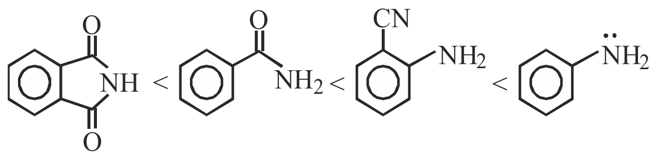
$$\text{Slope} = \frac{1}{n} = \frac{2}{3} \; ; \quad \frac{x}{m} = K \cdot p^{2/3}$$

(25) **(1).**  is insoluble in dil. HCl but soluble in NaOH to form .

 decolorise Br_2 water to give 

2,4,6-tribromophenol

(26) **(2).** Nucleophilicity order



(27) **(1).** (i) $\ln [R] = \ln [R]_0 - Kt$ (I[st] order)

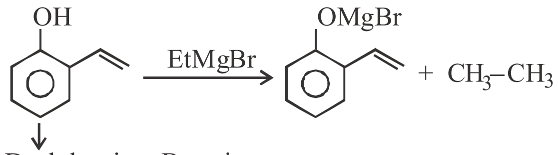
$[R] = [R]_0 - Kt$ (zero order)

(28) **(2).** In the Hall-Heroult process the cathode is made of carbon.

(29) **(2).** $CH_3-CH=CH-\underset{\underset{O}{\|}}{C}-OCH_3 \xrightarrow{LiAlH_4} CH_3-CH=CH-CH_2OH$

(30) **(1).** Due to Lanthanoid contraction both atomic radii and ionic radii decreases gradually in the lanthanoid series.

(31) (4).



Declolourizes Bromine water

(32) (2). Serine :

$$HO-\underset{\underset{O}{\|}}{C}-\underset{\underset{NH_2}{|}}{CH}-CH_2-OH$$

Lysine :

$$H_2N-CH_2-CH_2-CH_2-CH_2-\underset{\underset{NH_2}{|}}{CH}-\overset{\overset{O}{\|}}{C}-OH$$

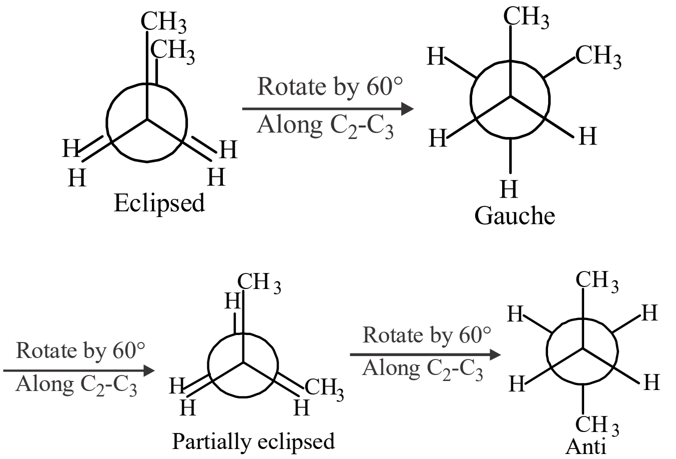
Lysine has $-NH_2$ group hence gives +ve carbyl amine test and serine has –OH group hence gives +ve serric ammonium nitrate test.

(33) (2). Bayer's process: Used for leaching of red bauxite : $Al_2O_3.2H_2O + 2NaOH \xrightarrow[8\ atm]{190°C} \underset{(Soluble)}{2NaAlO_2} + 3H_2O$

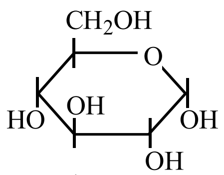
$2NaAlO_2 + H_2O \rightarrow NaOH + Al(OH)_3 \downarrow$

$2Al(OH)_3 \rightarrow Al_2O_3 + 3H_2O$

(34) (4).



(35) (2).



α-D-gluco-pyranose

(36) (2). Term $\frac{ab}{v^2}$ represent energy permole of gases.

Unit of a (Vander wal's constant) = $\frac{\text{atm litre}^2}{\text{mole}^2}$

Unit of b (Vander wals's constant) = $\frac{\text{litre}}{\text{mole}}$

V = volume of gas per mole = $\frac{\text{litre}}{\text{mole}}$

$$\frac{ab}{v^2}(\text{Unit}) = \frac{\frac{\text{atm litre}^2}{\text{mole}^2} \times \frac{\text{litre}}{\text{mole}}}{\left(\frac{\text{litre}}{\text{mole}}\right)^2} = \frac{\text{atm litre}}{\text{mole}}$$

It is unit of energy per mole.

(37) (1). At S.T.P weight of 5.6 L gas = 7.5 gm

At S.T.P weight of 22.4 L gas = $\frac{7.5}{5.6} \times 22.4$

mol Mass of gas gas is (NO) = 30.0 gm/mole

(38) (3). Equilibrium constant not depend on concentration of reactant it is depended only on temperature.

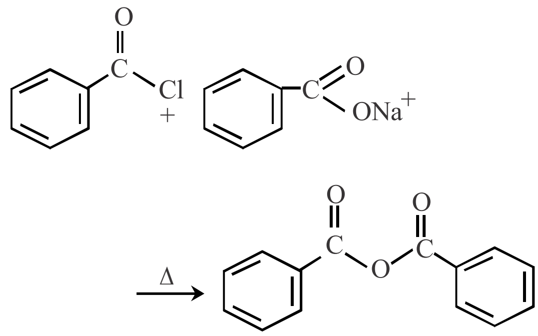
(39) (2). Melting point order $HgCl_2 < BeCl_2 < CaCl_2$
(iii) < (i) < (ii)

Melting points = 276°C 399°C 775°C

According to covalent character

Melting points $\propto \frac{1}{\text{Covalent character}}$

(40) (4).



(41) (4). $H_4P_2O_7$ and H_3PO_3

(42) (3). $CH_3COOH + CH_3COONa$

0.1 N 5ml   0.05 N, 10ml

mili eq. (0.5)   (0.5)

It is acidic buffer solution

$$pH = pKa + \log \frac{CH_3COO^-}{CH_3COOH}$$

(pH = pKa) only

This solution will have lowest pH.

(1) $CH_3COOH + NH_4OH \rightarrow CH_3COONH_4$

0.05 N	0.1 N	↓
10 ml	5 ml	(WAWB Salt)
(0.5)	(0.5)	

$$[pH = 7 - \frac{1}{2}\ pK_b + \frac{1}{2}\ pK_a] \approx 7\ [pK_a = pK_b]$$

(2) $(NH_4Cl + NH_4OH)$ Basic buffer solution

$$pOH = pK_b + \log\left(\frac{CA}{B}\right)$$

pH > 7

(4) $CH_3COOH + NaOH \rightarrow CH_3COONa$ (WASB Salt)

$$(pH = 7 + \frac{1}{2}\ PK_b = \frac{1}{2}\ \log C)$$

pH > 7

(43) (2). If these coins are heated, the zinc will diffuse into the copper layer, producing a surface alloy of zinc and copper. These alloys are brasses. Copper also oxidizes when heated in air, producing a black layer of copper-oxide (CuO).

(44) (1). $\Delta T_b = K_b m$ or $0.16 = K_b \times 0.05$

(45) (4). $_{82}A^{210} \xrightarrow{\beta} {}_{83}B^{210} \xrightarrow{\beta} {}_{84}C^{210} \xrightarrow{\alpha} {}_{82}C^{206}$

$$_Z X^A \longrightarrow {}_{Z+1}Y^A + \beta\text{-particle}$$

$$_Z X^A \longrightarrow {}_{Z-2}Y^{A-4} + \alpha\text{-particle}$$

(46) (4). $P = \overline{x} + y$

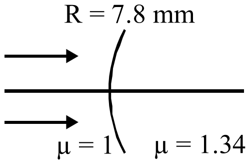
$Q = \overline{\overline{y}.x} = y + \overline{x}$

$O/P = \overline{P + Q}$

To make O/P

P + Q must be 'O'. So, y = 0, x = 1

(47) (3).



$$\frac{1.34}{V} - \frac{1}{\infty} = \frac{1.34 - 1}{7.8} \quad \therefore \quad V = 30.7\text{ mm}$$

(48) (3). $k = \frac{1}{2} m\omega^2 A^2 \cos^2 \omega t$

$$U = \frac{1}{2} m\omega^2 A^2 \sin^2 \omega t$$

$$\frac{k}{U} = \frac{\cos^2 \omega t}{\sin^2 \omega t} = \frac{1}{3}$$

(49) (2). $F = \alpha\beta e^{\left(-\frac{x^2}{\alpha k t}\right)}$

$$\left[\frac{x^2}{\alpha k t}\right] = M^0 L^0 T^0$$

$$\frac{L^2}{[\alpha]\, ML^2T^{-2}} = M^0 L^0 T^0$$

$\Rightarrow [\alpha] = M^{-1}T^2$

$[F] = [\alpha]\,[\beta]$

$MLT^{-2} = M^{-1}T^2\,[\beta]$

$\Rightarrow [\beta] = M^2LT^{-4}$

(50) (3). Loudness of sound is given by

$dB = 10 \log (I / I_0)$

where, I is intensity of sound,

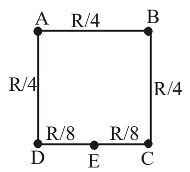
I_0 is reference intensity of sound

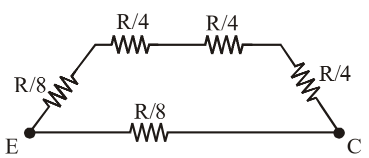
$\therefore\ 120 = 10 \log (I / I_0) \Rightarrow I = 1\ W/m^2$

Also $I = \frac{P}{4\pi r^2} = \frac{2}{4\pi r^2}$

$$r = \sqrt{\frac{2}{4\pi}} = \sqrt{\frac{1}{2\pi}} m = 0.399\ m \approx 40\ cm$$

(51) (3).





$$\frac{1}{R_{eq}} = \frac{8}{7R} + \frac{8}{R} = \frac{8 + 56}{7R}\ ;\ R_{eq} = \frac{7R}{64}$$

(52) **(4).** $^{232}_{90}Th \longrightarrow ^{208}_{78}Y + 6\,^{4}_{2}He$

$^{208}_{78}Y \longrightarrow ^{208}_{82}X + 4\beta$ particle

(53) **(2).** $U = -\vec{P}\cdot\vec{E} = -PE\cos\theta$
$= -(10^{-29})(10^{3})\cos 45^o$
$= -0.707 \times 10^{-26}$ J $= -7 \times 10^{-27}$ J.

(54) **(1).** $\vec{S} = (5\hat{i}+4\hat{j})\,2 + \frac{1}{2}(4\hat{i}+4\hat{j})\,4$

$= 10\hat{i}+8\hat{j}+8\hat{i}+8\hat{j}$

$\vec{r}_f - \vec{r}_i = 18\hat{i}+16\hat{j}$; $\vec{r}_f = 20\hat{i}+20\hat{j}$

$|\vec{r}_f| = 20\sqrt{2}$

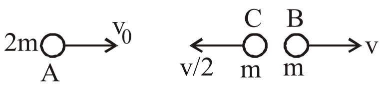
(55) **(3).** $\Delta x = \frac{\lambda}{8}$; $\Delta\phi = \frac{(2\pi)}{\lambda}\frac{\lambda}{8} = \frac{\pi}{4}$

$I^2 = 2I_0^2\left(1+\cos^2\frac{\pi}{4}\right) = 3I_0^2$

$I_{centre}^2 = 4I_0^2$

$\frac{I}{I_{centre}} = \frac{\sqrt{3}}{2}$

(56) **(4).**



Let mass of B and C is m each.
By momentum conservation

$2mv_0 = mv - \frac{mv}{2}$; $v = 4v_0$

$p_A = 2mv_0$; $p_B = 4mv_0$; $p_c = 2mv_0$

De-Broglie wavelength $\lambda = \frac{h}{p}$

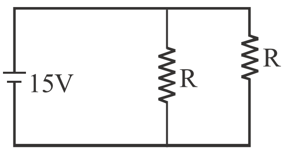
$\lambda_A = \frac{h}{2mv_0}, \lambda_B = \frac{h}{4mv_0}, \lambda_C = \frac{h}{2mv_0}$

(57) **(4).** Input current $= 15 \times 10^{-6}$
Output current $= 3 \times 10^{-3}$
Resistance output $= 1000$
$V_{input} = 10 \times 10^{-3}$
Now, $V_{input} = r_{input} \times i_{input}$
$10 \times 10^{-3} = r_{input} \times 15 \times 10^{-6}$

$r_{input} = \frac{2000}{3} = 0.67\ K\Omega$

Voltage gain $= \frac{V_{output}}{V_{input}} = \frac{1000 \times 3 \times 10^{-3}}{10 \times 10^{-3}}$
$= 300$

(58) **(1).** Ideal inductor will behave like zero resistance long time after switch is closed.



$I = \frac{2\varepsilon}{R} = \frac{2\times 15}{5} = 6A$

(59) **(3).** Potential gradient with $R_h = 2\Omega$

is $\left(\frac{6}{2+4}\right)\times\frac{4}{L} = \frac{dV}{dL}$; L = 100 cm

Let null point be at ℓ cm

thus $\varepsilon_1 = 0.5V = \left(\frac{6}{2+4}\right)\times\frac{4}{L}\times\ell$ ..... (1)

Now with $R_h = 6\Omega$ new potential gradient is

$\left(\frac{6}{4+6}\right)\times\frac{4}{L}$ and at null point

$\left(\frac{6}{4+6}\right)\times\left(\frac{4}{L}\right)\times\ell = \varepsilon_2$ ..... (2)

Dividing equation (1) by (2) we get

$\frac{0.5}{\varepsilon_2} = \frac{10}{6}$ thus $\varepsilon_2 = 0.3$

(60) **(1).** $\eta = 1 - \frac{T_2}{T_1} = 1 - \frac{T_2}{T_3} = 1 - \frac{T_4}{T_3}$

$\Rightarrow \frac{T_2}{T_1} = \frac{T_3}{T_4} = \frac{T_4}{T_3}$

$\Rightarrow T_2 = \sqrt{T_1T_3} = \sqrt{T_1\sqrt{T_2T_4}}$

$T_3 = \sqrt{T_2T_4}$

$T_2^{3/4} = \sqrt{T_1^{1/2}T_4^{1/4}}$; $T_2 = T_1^{2/3}T_4^{1/3}$

(61) **(2).** $y = 0.03\sin(450\,t - 9x)$

$v = \frac{\omega}{k} = \frac{450}{9} = 50\ m/s$

$$v = \sqrt{\frac{T}{\mu}} \Rightarrow \frac{T}{\mu} = 2500$$

$\Rightarrow$ $T = 2500 \times 5 \times 10^{-3} = 12.5$ N

(62) **(4).** $E_i = \frac{1}{2} I_1 \times \omega_1^2 + \frac{1}{2}\frac{I_1}{2} \times \frac{\omega_1^2}{4}$

$$= \frac{I_1\omega_1^2}{2}\left(\frac{9}{8}\right) = \frac{9}{16} I_1\omega_1^2$$

$$I_1\omega_1 + \frac{I_1\omega_1}{4} = \frac{3I_1}{2}\omega$$

$$\frac{5}{4} I_1\omega_1 = \frac{3I_1}{2}\omega \Rightarrow \omega = \frac{5}{6}\omega_1$$

$$E_f = \frac{1}{2} \times \frac{3I_1}{2} \times \frac{25}{36}\omega_1^2 = \frac{25}{48} I_1\omega_1^2$$

$$E_f - E_i = I_1\omega_1^2\left(\frac{25}{48} - \frac{9}{16}\right) = \frac{-2}{48} I_1\omega_1^2$$

$$= \frac{-I_1\omega_1^2}{24}$$

(63) **(3).** $x \propto \frac{1}{T_C}$.

Curie law for paramagnetic substance

$$\frac{x_1}{x_2} = \frac{T_{C_2}}{T_{C_1}} \; ; \; \frac{2.8 \times 10^{-4}}{x_2} = \frac{300}{350}$$

$$x_2 = \frac{2.8 \times 350 \times 10^{-4}}{300} = 3.266 \times 10^{-4}$$

(64) **(3).** Reynolds Number $= \frac{\rho v d}{\eta}$

Volume flow rate $= v \times \pi r^2$

$$v = \frac{100 \times 10^{-3}}{60} \times \frac{1}{\pi \times 25 \times 10^{-4}} = \frac{2}{3\pi} \text{ m/s}$$

$$\text{Reynolds Number} = \frac{10^3 \times 2 \times 10 \times 10^{-2}}{10^{-3} \times 3\pi}$$

$= 2 \times 10^4$

Order $= 10^4$

(65) **(4).** By energy conservation between 0 & ∞

$$-\frac{GMm}{r} + \frac{-GMm}{r} + \frac{1}{2} mV^2 = 0 + 0$$

[M is mass of star m is mass of meteroite)

$$v = \sqrt{\frac{4GM}{r}} = 2.8 \times 10^5 \text{ m/s}$$

(66) **(4).** Given phase difference $= \pi/4$

and $\omega = 100$ rad/s

$\Rightarrow$ Reactance (X) = Resistance (R)

Now by checking options

Option (1)

$R = 1000\,\Omega$ and $X_C = \frac{1}{10^{-6} \times 100} = 10^4\,\Omega$

Option (2)

$R = 10^3\,\Omega$ and $X_L = 10^{-3} \times 100 = 10^{-1}\,\Omega$

Option (3)

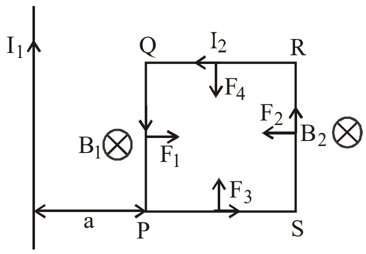
$R = 10^3\,\Omega$ and $X_L = 10 \times 10^{-3} \times 100 = 1\Omega$

Option (4)

$R = 10^3\,\Omega\ \&\ X_C = \frac{1}{10 \times 10^{-6} \times 100} = 10^3\,\Omega$

Clear option (4) matches the given condition.

(67) **(2).**



F_3 & F_4 cancel each other

Force on PQ will be $F_1 = I_2 B_1 a$

$$= I_2 \frac{\mu_0 I_1}{2\pi} a = \frac{\mu_0 I_1 I_2}{2\pi}$$

Force on RS will be

$$F_2 = I_2 B_2 a = I_2 \frac{\mu_0 I_1}{2\pi\, 2a} a = \frac{\mu_0 I_1 I_2}{4\pi}$$

Net force $= F_1 - F_2 = \frac{\mu_0 I_1 I_2}{4\pi}$ repulsion.

(68) **(4).** $\mu = \frac{V_d}{E}$; $E = \rho J$

$$\mu = \frac{1.1 \times 10^{-3}}{1.7 \times 10^{-8} \times \frac{5}{\pi \times 25 \times 10^{-6}}}$$

$$= \frac{1.1 \times 10^{-3} \times \pi \times 25 \times 10^{-6}}{1.7 \times 10^{-8} \times 5} \approx 1.01 \text{ m}^2/\text{Vs}$$

(69) **(3).** Limit of resolution $= \frac{1.22\lambda}{d}$

$$= \frac{1.22 \times 600 \times 10^{-9}}{250 \times 10^{-2}} = 2.9 \times 10^{-7} \text{ rad}$$

(70) **(2).** $\frac{hc}{\lambda_1} = \phi_1 + eV_1$ ..... (i)

$\frac{hc}{\lambda_2} = \phi_2 + eV_2$ ..... (ii)

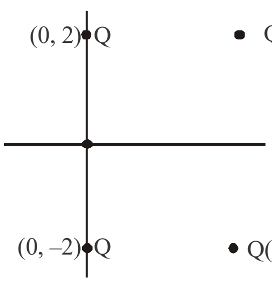
Eq. (i) – (ii)

$$hc\left(\frac{1}{\lambda_1} - \frac{1}{\lambda_2}\right) = e(V_1 - V_2)$$

$$V_1 - V_2 = \frac{hc}{e}\left(\frac{\lambda_2 - \lambda_1}{\lambda_1 - \lambda_2}\right)$$

$$(1240\text{nm} - V)\ \frac{100 \text{ nm}}{300 \text{ nm} \times 400 \text{ nm}} = 1 \text{ V}$$

(71) **(2).**



Potential at origin $= \frac{KQ}{2} + \frac{KQ}{2} + \frac{KQ}{\sqrt{20}} + \frac{KQ}{\sqrt{20}}$

(Potential at $\infty = 0$)

$$= KQ\left(1 + \frac{1}{\sqrt{5}}\right)$$

$\therefore$ Work required to put a fifth charge Q at origin is equal to $\frac{Q^2}{4\pi\varepsilon_0}\left(1 + \frac{1}{\sqrt{5}}\right)$

(72) **(3).** Intensity of EM wave is given by

$$I = \frac{\text{Power}}{\text{Area}} = \frac{1}{2}\varepsilon_0 E_0^2 C = \frac{27 \times 10^{-3}}{10 \times 10^{-6}}$$

$$= \frac{1}{2} \times 9 \times 10^{-12} \times E^2 \times 3 \times 10^8$$

$$E = \sqrt{2} \times 10^3 \text{ kv/m} = 1.4 \text{ kv/m}$$

(73) **(1).** Mass densities of all nuclei are same so their ratio is 1.

(74) **(4).** Tensile stress in wire will be

$$= \frac{\text{Tensile force}}{\text{Cross section Area}}$$

$$= \frac{mg}{\pi R^2} = \frac{4 \times 3.1\,\pi}{\pi \times 4 \times 10^{-6}} \text{ Nm}^{-2}$$

$= 3.1 \times 10^6 \text{ Nm}^{-2}$

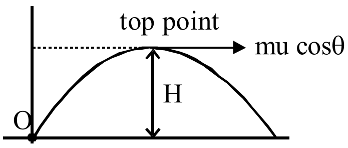
(75) **(2).** f = 5 for diatomic gas

$$\therefore \quad C_V = \frac{f}{2}R = \frac{5}{2}R$$

(76) **(3).** $I_1 = \frac{2}{5}mr_1^2, \ I_2 = \frac{2}{3}mr_2^2$

$$I_1 = I_2 = \frac{r_1^2}{5} = \frac{r_2^2}{3} \Rightarrow \frac{r_1}{r_2} = \sqrt{\frac{5}{3}}$$

(77) **(2).**



Angular momentum about O is

$L = (mu \cos\theta) H$

(78) **(4).** Velocity of first body after collision is :

$$v_1 = \left(\frac{m_1 - m_2}{m_1 + m_2}\right)u_1 + \frac{2m_2u_2}{m_1 + m_2}$$

$$= \left(\frac{m - 2m}{m + 2m}\right)v + \frac{2 \times (2m) \times 0}{m + 2m} = \frac{-v}{3}$$

$$KE_i = \frac{1}{2}mv^2,\ KE_f = \frac{1}{2}m\left(\frac{-v}{3}\right)^2 = \frac{1}{2}\frac{mv^2}{9}$$

$$\frac{KE_i}{KE_f} = \frac{\frac{1}{2}mv^2}{\frac{1}{2}\frac{mv^2}{9}} = 9$$

(79) **(1).** $\frac{K_1}{K_2} = \frac{5}{4}$

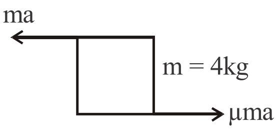
$$\frac{R_1}{R_2} = \frac{\ell_1 / K_1 A}{\ell_2 / K_2 A} \Rightarrow \frac{\ell_1}{\ell_2} \times \frac{K_2}{K_1} = 1$$

$$\frac{\ell_1}{\ell_2} = \frac{K_1}{K_2} = \frac{5}{4}$$

(80) **(4).** $R_{cm} = \frac{A_1 r_1 - A_2 r_2}{A_1 - A_2} = \frac{\pi R^2 \sigma \times 0 - \frac{\pi R^2}{4}\sigma \times \frac{R}{2}}{\pi R^2 \sigma - \frac{\pi R^2}{4}\sigma}$

$$= \frac{-\frac{\pi R^2}{4}\sigma \times \frac{R}{2}}{\frac{3\pi R^2}{4}\sigma} = \frac{-R}{6}$$

(81) **(3).**



Pseudo force on 4 kg block = ma

∴ $ma = \mu\, mg \Rightarrow a = 0.4 \times 10 = 4\ m/s^2$

as both the blocks will move with same acc"a"

$F = (4 + 8)\, a = 12 \times 4 = 48$ N

(82) **(3).** $\theta = \frac{2\lambda}{d}$ or $\Delta\theta = \frac{2\Delta\lambda}{d}$ or $d = \frac{2\Delta\lambda}{\Delta\theta}$

$$\Delta\lambda = \frac{3 \times 10^8}{4 \times 10^{14}} - \frac{3 \times 10^8}{5 \times 10^{14}}$$

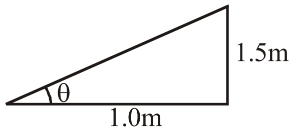
$= 10^6\,(0.75 - 0.6) = 0.15 \times 10^{-6}$

$= 1.5 \times 10^{-7}$

$$d = \frac{2 \times 1.5 \times 10^{-7}}{0.6} = \frac{2 \times 15 \times 10^{-7}}{6}$$

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

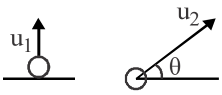
(83) **(4).** $\tan\theta = \frac{1.5}{10} = 0.15$



$$\tan\theta = \frac{v^2}{rg} \Rightarrow v = \sqrt{rg \tan\theta}$$

$$= \sqrt{50 \times 9.8 \times 0.15} = 8.57 m/s$$

(84) **(3).**



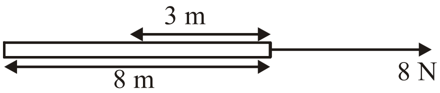
Time of flight $T_1 = \frac{2u_1}{g}, T_2 = \frac{2u_2 \sin 60°}{g}$

Time of flights are equal, so $T_2 = T_1$

$$\frac{2u_2\sqrt{3}}{2g} = \frac{2u_1}{g} = u_2\sqrt{3} = 2u_1$$

$$\Rightarrow \frac{u_1}{u_2} = \frac{\sqrt{3}}{2}$$

(85) **(2).** Let the mass of the string is M



Acceleration of the string = 8 / M

$$8 - T = \left(\frac{3M}{8}\right) \times \frac{8}{M} \Rightarrow T = 5N$$

(86) **(4).** Potential difference across AB will be equal to battery equivalent across CD

$$V_{AB} = V_{CD} = \frac{\frac{E_1}{r_1} + \frac{E_2}{r_2} + \frac{E_3}{r_3}}{\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}} = \frac{\frac{1}{1} + \frac{2}{1} + \frac{3}{1}}{\frac{1}{1} + \frac{1}{1} + \frac{1}{1}}$$

$$= \frac{6}{3} = 2V$$

(87) **(3).** $E = B\ell v$

$$P = \frac{E^2}{R} = \frac{B^2\ell^2v^2}{R}$$

$$P' = \frac{B^2\ell^2(2v)^2}{R} = 4P$$

(88) **(2).** The resulting sound wave has a frequency equal to half the sum of the individual frequencies. Note that the resulting intensity varies at the beat frequency equal to difference of the individual frequencies.

(89) **(1).**

(90) **(3).** In pure translational motion, at any instant of time all particles of the body have the same velocity but in rolling motion (combination of translational and rotational motion) all its particles are not moving with the same velocity at any instant. Hence, $|\vec{v}_1| \neq |\vec{v}_2|$

(91) (4) **(92)** (2) **(93)** (3)

(94) **(3).** Decrease concentration of estrogen in female causes osteoporosis.
Increase concentration of PTH in human causes osteoporosis.

(95) (2) **(96)** (2) **(97)** (1)
(98) (1) **(99)** (2) **(100)** (1)
(101) (1) **(102)** (4) **(103)** (4)
(104) (4) **(105)** (4) **(106)** (2)

(107) **(2).** Erythropoietin, Growth hormone, thyroxine and cortisol help in increasing RBC count.

(108) (4) **(109)** (2) **(110)** (2)
(111) (4) **(112)** (2) **(113)** (3)
(114) (4) **(115)** (3) **(116)** (2)
(117) (2) **(118)** (1) **(119)** (4)
(120) (1) **(121)** (2) **(122)** (2)
(123) (3) **(124)** (3) **(125)** (1)
(126) (1) **(127)** (2) **(128)** (4)
(129) (4) **(130)** (2) **(131)** (3)
(132) (3) **(133)** (4) **(134)** (2)
(135) (2) **(136)** (3) **(137)** (2)
(138) (2) **(139)** (4) **(140)** (3)
(141) (3) **(142)** (2) **(143)** (3)
(144) (2) **145)** (2) **(146)** (3)
(147) (3) **(148)** (3) **(149)** (2)
(150) (3) **(151)** (2) **(152)** (2)
(153) (1) **(154)** (2) **(155)** (2)
(156) (4) **(157)** (2) **(158)** (4)
(159) (1) **(160)** (3) **(161)** (2)
(162) (3) **(163)** (4) **(164)** (3)
(165) (3) **(166)** (3) **(167)** (3)
(168) (2) **(169)** (2) **(170)** (3)
(171) (2) **(172)** (2) **(173)** (1)
(174) (2) **(175)** (2) **(176)** (3)
(177) (2) **(178)** (2) **(179)** (3)
(180) (3)