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ANSWER KEY

DATE: 24-12-2018

COURSE
NUCLEUS

JEE-MAIN MOCK TEST-14
XII

TEST CODE				
1	1	3	0	4

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	2	4	2	2	2	1	3	3	4	4	4	2	2	4	4
Q.No.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans	4	3	2	1	3	3	2	3	1	2	1	2	1	2	1
	IOC	OC	PC	IOC	OC	PC	IOC	OC	PC	IOC	OC	PC	IOC	OC	PC
Q.No.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans	3	4	3	2	2	3	4	1	2	3	4	4	1	3	3
	IOC	OC	PC	IOC	OC	PC	IOC	OC	PC	IOC	OC	PC	IOC	OC	PC
Q.No.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	2	3	4	4	3	3	3	3	3	3	3	3	3	3	4
Q.No.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans	4	1	3	2	3	1	4	3	4	3	2	2	2	1	1
Q.No.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans	4	2	3	4	2	4	1	2	4	3	3	4	4	3	1

HINTS & SOLUTIONS

PHYSICS

Q.1 $a_A = -t + 10$

$a_B = t - 10$

$\therefore a_{AB} = -2t + 20$

$$\frac{dv_{AB}}{dt} = -2t + 20$$

$\Rightarrow V_{AB} = -t^2 + 20t$

$\Rightarrow -21 = t^2 + 20t$

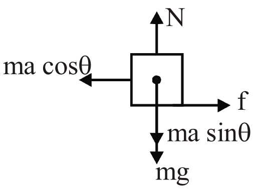
$\Rightarrow t^2 - 20t - 21 = 0$

$\Rightarrow t = 21$ sec

Q.2 As there is no relative motion between A and B hence static friction acts between

$$a = \left[\frac{F-(M+m)g\sin\theta}{m+M}\right]$$

FBD of B



$f = ma \cdot \cos\theta$

$$f = \left[\frac{F-(M+m)g\sin\theta}{(M+m)}\right]\cdot m\cdot\cos\theta$$

Q.3 $W_{net} = \Delta KE$

$W_{sp} + W_{ext} = K_F - K_T$

$$\left[\frac{1}{2}\times k\times(1)^2 - \frac{1}{2}\times k\times(5)^2\right] + 50\times 2$$

$$= \frac{1}{2}\times mv^2$$

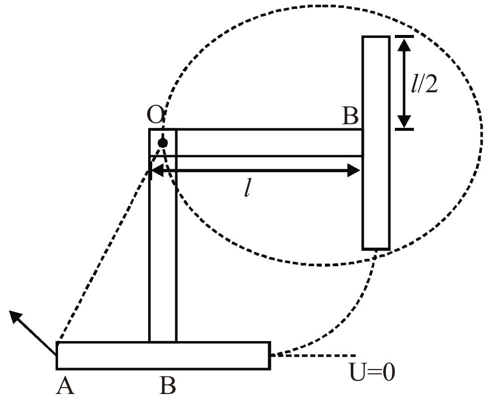
$v = 2$ m/s

Q.4 $\vec{F}_{Net} = \vec{F}_{Thrust} + \vec{F}_{gravity}$

$$F_{Net} = \frac{M}{L}\cdot(L-h)\,g + \left(\sqrt{2g(L-h)}\right)^2\times\frac{m}{L}$$

$$F_{Net} = \frac{2mg}{L}\,(L-h)$$

Q.5 From conservation of mechanical energy at initial and final position. Considering horizontal line OB as the reference for PE.



$$\frac{I\omega^2}{2} - 0 = 3mg\,\frac{1}{2}$$

$$\Rightarrow \frac{17}{12}\, ml^2\,\omega^2 = 3mgl$$

$$\Rightarrow \frac{17}{12}\, l\omega^2 = 3g$$

$$\Rightarrow \omega = \sqrt{\frac{36g}{17l}}$$

$v_A = \omega \times OA$

$$\Rightarrow v_A = 3\sqrt{\frac{5gl}{17}}$$

Q.6 Velocity head = Pressure head

$$\frac{v^2}{2g} = \frac{\rho}{\rho_w g}$$

$$v = \sqrt{\frac{2\rho}{\rho_w}} = \sqrt{\frac{2(H\rho_{Hg}g)}{\rho_w}}$$

$$= \sqrt{\frac{2\times 40\times 13.6\times 1000}{1}}$$

$= 10.3 \times 10^2$ cm/s $= 10.3$ m/s

Q.7 Under steady state, $\sigma A[(2T)^4 - T_1{}^4]$
$= \sigma A[T_1{}^4 - (3T)^4]$
$(2T)^4 - T_1{}^4 = T_1{}^4 - 3^4T^4$
$2T_1{}^4 = (2^4 + 3^4)\,T^4$; $2T_1{}^4 = (16 + 81)\,T^4$

$$T_1 = \left(\frac{97}{2}\right)^{1/4} T$$

Q.8 $\tau = pE\sin\theta$
$\tau \propto \sin\theta$
Hence, graph will be curve marked "C" in graph.

Q.9 $T = 2\pi\sqrt{\dfrac{I}{MB}}$

$$\therefore\ I = \frac{MBT^2}{4\pi^2} = \frac{5\times10^{-5}\times 8\pi\times10^{-4}\times(15)^2}{4\pi^2}$$

$= 7.16 \times 10^{-7}$ kgm^2

Q.10 For good demodulation of AM signal

$$RC >> \frac{1}{f}$$

Q.11 $(C_p)_{mix}$

$$= \frac{n_1(C_p)_{He} + n_2(C_p)_{H_2} + n_3(C_p)_{vapour}}{n_1+n_2+n_3}$$

$$= \frac{2\left(\frac{5}{2}R\right) + 4\left(\frac{7}{2}R\right) + 1(4R)}{2+4+1} = \frac{23}{7}R$$

Q.12 $mgR = [3mR^2 + 3mR^2 + m(\sqrt{2}\,R)^2]\,\alpha$
$mgR = 8mR^2 \cdot \alpha$

$$\alpha = \frac{g}{8R}$$

Q.13 y_1 4 sin (500πt) $\Rightarrow a_1 = 4$ and $n_1 = 250$ Hz
y_2 2 sin (506πt) $\Rightarrow a_2 = 2$ and $n_2 = 253$ Hz
$\therefore$ Beat frequency, $b = n_2 - n_1$
$= 253 - 250 = 3$

$$\frac{I_{max}}{I_{min}} = \left(\frac{a_1+a_2}{a_1-a_2}\right)^2 = \left(\frac{4+2}{4-2}\right)^2 = 9$$

Q.14 $U(x) = k[1 - \exp(-x^2)]$

$$F = -\frac{dU}{dx} = -2kx\,e^{-x^2} \qquad ...(i)$$

For small value of x,

$$F = -2kx\left[1 - \frac{x^4}{2} + ...\right] \simeq 2kx$$

$\Rightarrow F \propto -x$
$\therefore$ Motion is SHM and option (4) is correct.
From equation (i), F = 0 (equilibrium) when x = 0. Thus, the origin is the position of equilibrium (and not away from the origin).
$\therefore$ Option (1) is wrong.
At x = 0, U (x) = 0
$\therefore$ K.E. is maximum and option (3) is wrong

Q.15 $\dfrac{v_p}{v_a} = \dfrac{a(1+e)}{a(1-e)}$ $\qquad \therefore\ e = \dfrac{v_p - v_a}{v_p + v_a}$

Q.16 Let height of liquid in the jar decreases at rate dy/dt and $A = \pi x^2$ be the cross-sectional area of liquid at time t. Then

$$A\left(\frac{-dy}{dt}\right) = av$$

$$\pi r^2\left(-\frac{dy}{dt}\right) = a\sqrt{2gy}$$

$$\pi r^2\left(-\frac{dy}{dt}\right) = a\sqrt{2gkx^n}$$

$(\because\ y = kx^n)$

(dy/dt) will be independent of x, if tern containing x gets concelled out. Thus,

$$2 = \frac{n}{2} \Rightarrow n = 4$$

Q.17 $PT^2 = k$

$$\left(\frac{RT}{V}\right) T^2 = k$$

$T^3 \propto V$ ...(i)

Differentiation,

$3T^2\,\Delta T \propto \Delta V$ ...(ii)

Dividing equation (ii) by equaiton (i).

$$\frac{3\Delta T}{T} = \frac{\Delta V}{V}$$

$$\frac{3}{T} = \frac{\Delta V}{V\Delta T} \quad \Rightarrow \quad \frac{3}{T} = \gamma$$

$\therefore$ A = 3

Q.18 Information based

Q.19 Let 'x' and (1 – x) be the amount of ${}^{10}_{5}B$ and ${}^{11}_{5}B$. Then

$10\,x + (1 - x) = 10.81$

$10x - 11x = 10.81 - 11.00$

$x = 19$

$\therefore$ $1 - x = 100 - 19 = 81$

$\therefore$ Ratio of ${}^{10}_{5}B : {}^{11}_{5}B = 19 : 81$

Q.20 Displacement current is equal to conduction current.

$$\therefore I = \frac{dq}{dt} = \frac{dq}{dt}(CV) = C\frac{dV}{dt} = \frac{\varepsilon_0 A}{d}\frac{dV}{dt}$$

$$= \frac{8.854\times10^{-12}\times\pi\times(2\times10^{-2})^2}{0.1\times10^{-3}}\ 5\times10^{13}$$

$= 5.56 \times 10^3$ A

Q.21 Using Brewster's law,

$$\mu = \tan\theta_p = \tan 60^\circ = \sqrt{3}$$

But, $\mu = \dfrac{\sin i}{\sin r}$

$$\sqrt{3} = \frac{\sin 45^\circ}{\sin r}$$

$$r = \sin^{-1}\left(\frac{1}{\sqrt{6}}\right)$$

Q.22 P is any point on the screen. For D >> d rays 1 and 2 are approximately parallel and path difference is ΔS_2L.

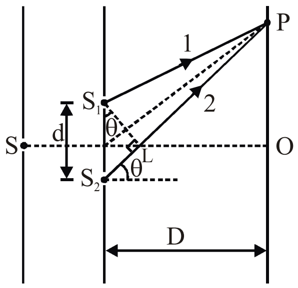
In ΔS_1S_2L,

$$\sin\theta = \frac{S_2L}{d}$$

$\therefore$ $S_2L = d\sin\theta$

or $\Delta = d\sin\theta$

Here θ is the angle that S_1 P or O'P or S_2P (these are almost parallel for D >>d) makes with the central axis or any line parallel to central axis.



For intensity to be minimum,

$\Delta = d\sin\theta = (2n - 1)\,\lambda/2$,

n = 1, 2, 3, ...

For third minimum, n = 3

$\therefore$ $d\sin q = \dfrac{5\lambda}{2}$

Given $\lambda = 420\text{ nm} = 420 \times 10^{-9}$ m

$\theta = 30^\circ$

$\therefore$ $d\sin 30^\circ = \dfrac{5}{2} \times 420 \times 10^{-9}$

or $d = 2.1 \times 10^{-6}$ m

Q.23 When $R_3 \to 0$

$$I_0 = \frac{36}{R_1 + R_2}$$

$$9 = \frac{36}{R_1 + R_2} = R_1 + R_2 = 4 \quad .....(1)$$

When $R_3 \to \infty$ $IR_3 = 0$

$$I' = \frac{36}{R_1 + 2R_2} = 6$$

$R_1 + 2R_2 = 6$ ....(2)

From (1) and (2)

$R_1 + R_2 = 4 \quad \Rightarrow \quad R_1 + 2R_2 = 6$

$-R_2 = -2 \quad \Rightarrow \quad R_2 = 2\Omega$

$R_1 = 2\Omega$

Q.24 Reduced the circuit using capacitors in parallel and series rules.

Q.25 Currents i_1, i_2 and i_3 will be in the ratio $\frac{1}{3}:\frac{1}{4}:\frac{1}{5}$

$= 20 : 15 : 12$

Given that, $F_{12} = F_{23}$

$$\frac{\mu_0 I_1 I_2}{2\pi d_1} = \frac{\mu_0 I_2 I_3}{2\pi d_2}$$

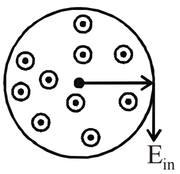
$$\frac{d_1}{d_2} = \frac{I_1}{I_3} = \frac{20}{12} = \frac{5}{3}$$

Q.26 $$A_v = \frac{\Delta V_0}{\Delta V_i} = \beta\,\frac{R_0}{R_i}$$

$$\therefore \quad \Delta V_0 = (\Delta V_i)\left(\beta\frac{R_0}{R_i}\right)$$

$$= \quad 10^{-3} \times 100 \times \frac{10\times10^3}{1\times10^3}$$

$$= \quad 1 \text{ volt}$$

Q.27 

$B\uparrow$ outward

$$\oint E\cdot dl = \frac{d\phi}{dt} = \frac{d(BA)}{dt}$$

$$\int E\cdot 2\pi l = A\frac{dB}{dt} = \pi R^2\frac{dB}{dt}$$

$$E\cdot 2\pi l = \pi R^2\,\frac{dB}{dt}$$

$$E = \frac{R^2}{2l}\frac{dB}{dt}$$

$kx = mg + qE$

$$x = \frac{1}{k}[mg + qE]$$

$$= \frac{1}{k}\left(mg + \frac{qR^2}{2l}\frac{dB}{dt}\right)$$

Q.28 $I_{dc} = \frac{V_{dc}}{R} = \frac{10}{30} = \frac{1}{3}$ A (as average value of ac over complete cycle is zero)

$$Z = \sqrt{R^2 + X_L^2} = \sqrt{(30)^2 + (40)^2} = 50\ \Omega$$

From impendance triangle.

$$\therefore \quad \tan\phi = \frac{4}{3} = 1.333$$

$$\phi = 53^\circ$$

As current lags behind the applied voltage by phase ϕ, current at time t is given by

$$I = \frac{V}{Z} = \frac{10\sqrt{2}}{50}\ \sin(100\pi t + 45^\circ - \phi)$$

$$I = \frac{\sqrt{2}}{5}\ \sin(100\pi t - 45^\circ - 53^\circ)$$

$$I = \frac{\sqrt{2}}{5}\ \sin(100\pi t - 8^\circ)$$

$\therefore$ Current through the circuit is

$$I_{total} = \frac{1}{3} + \frac{\sqrt{2}}{5}\ \sin(100\pi t - 8^\circ)$$

Q.29 Ist case : $\frac{1}{v_1} - \frac{1}{-3} = \frac{1}{3} \Rightarrow v_1 = 6$ cm

When one lens is removed, the new focal length of the objective is

$$\frac{1}{F'} = \frac{1}{F} - \frac{1}{f_1} = \frac{1}{2} - \frac{1}{10}$$

$\Rightarrow \quad F' = 2.5$ cm

The new position of the image is

$$\frac{1}{v_2} - \frac{1}{-3} = \frac{1}{25}$$

$\Rightarrow \quad v_2 = 15$ cm

The position of the image changes by $15 - 6 = 9$ cm. Here, eye piece must be moved by the same distance (= 9 cm) to refocus the image.

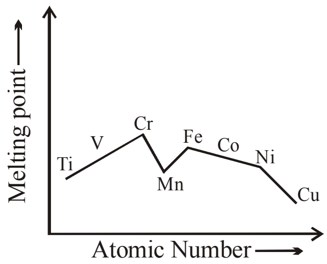
Q.30 $$\oint E\cdot ds = \frac{q_{in}}{\epsilon_0} = \frac{\int q_{in}}{\epsilon_0} = \frac{\int_0^q e(r)4\pi r^2 dr}{\epsilon_0}$$

$$E\cdot 4\pi r^2 = \frac{\int_0^q cr^2 4\pi r^2 dr}{\epsilon_0}$$

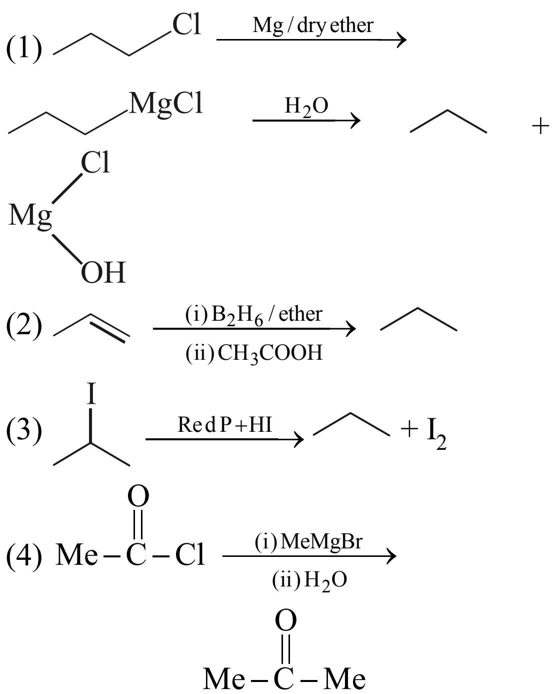
$$E = \frac{4\pi}{4\pi\epsilon_0}\frac{[r^s]_0^a}{5} = \frac{C}{5\epsilon_0}\frac{s}{r^2}$$

CHEMISTRY

Q.31



Q.32



Q.33 $\Delta G = -nFE_{cell} = (-8 \times 96500 \times 0.8)$ J/mol

$\therefore$ % efficiency $= \dfrac{-8 \times 96500 \times 0.8}{-772 \times 1000} \times 100\%$

= 80 % Ans.

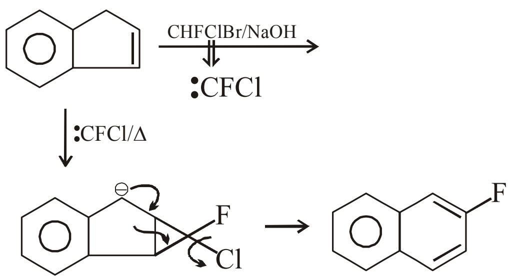
Q.34 $MnO_4^{-} \xrightarrow[\text{Heat}]{\Delta} MnO_4^{2-}$

$\boxed{x = \text{heat}}$

O_3/Δ

$(y = O_3/\Delta)$

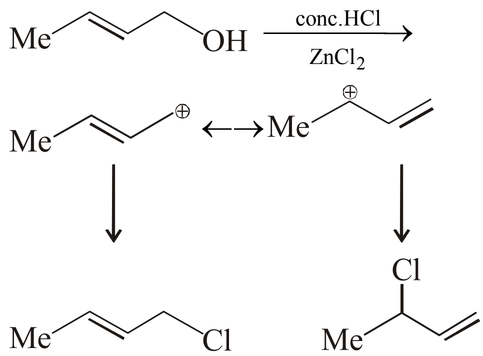
Q.35



Q.36 Theory based

Q.37 Self reduction is done for sulphide ores. FeS_2 is not suphide ore. so carbon reduction is done for FeS_2. Self reduction is done for Pb, Hg and Cu.

Q.38



Q.39 For the solution 1 : pH = 9

$\therefore$ pOH = 5 $\therefore$ $[OH^-]_1 = 10^{-5}$ M

For the solution 2 : pH = 11

$\therefore$ pOH = 3 $\therefore$ $[OH^-]_2 = 10^{-3}$ M

$\therefore$ Resultant $[OH^-] = \left(\dfrac{10^{-3} + 10^{-5}}{2}\right)$ M

$= 5 \times 10^{-4}$ M

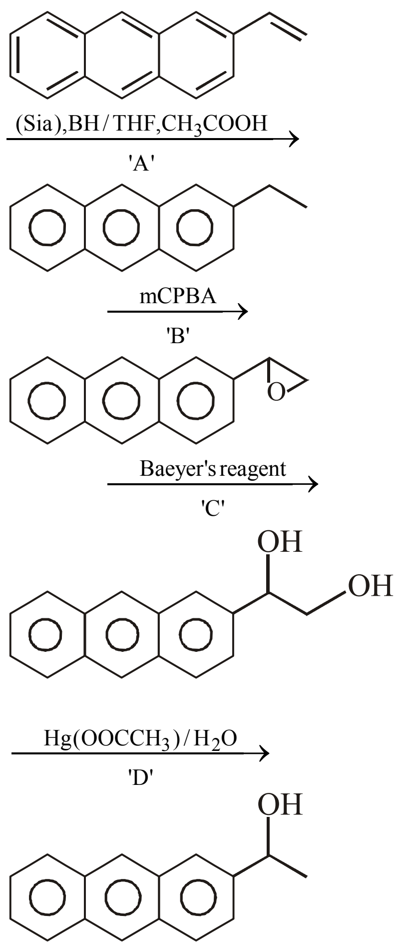
$\therefore$ pOH = – log (5×10^{-4}) = 4 – 0.7

$\therefore$ Resultant pH = 14 – (4 – 0.7) = 10.7

Q.40 PbS + HCl (aq.) $\longrightarrow$ no reaction

PbS + NaOH $\longrightarrow$ no reaction

Q.41

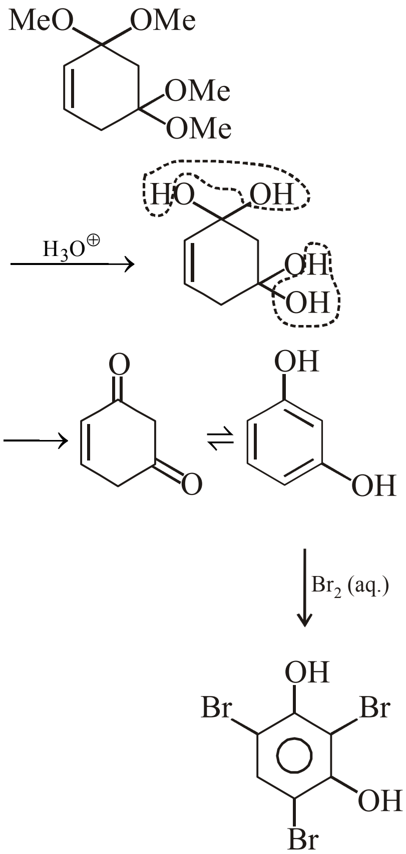


Q.42 $V_C = \dfrac{50}{125}$ L / mol = 0.4 L / mol

But, $Z_C = \dfrac{P_C V_C}{RT_C} = \dfrac{3}{8}$

$\Rightarrow T_C = \dfrac{8 P_C V_C}{3R} = \left(\dfrac{8 \times 30 \times 0.4}{3 \times 0.08}\right) K = 400\ K$

Q.43 Order of ionic radii : $N^{3-} > O^{2-} > F^{-}$
1.71, 1.40, 1.36

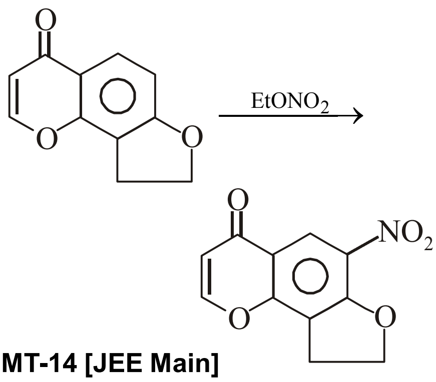
Q.44 

Q.45 KE of the ejected electron =

$\left(9.4 - 13.6 \times \dfrac{2^2}{4^2}\right) eV = 6\ eV$

$\therefore \lambda = \left(\dfrac{150}{6}\right)^{\frac{1}{2}} Å = 5Å$

Q.46 All ligands act as SFL for 4d & 5d series elements, so in $[PtCl_4]^{2-}$, ligand are considered as SFL.

Q.47 

Q.48 Let, $n_{NaHC_2O_4}$ be a- mmol

& $n_{H_2C_2O_4}$ be b-mmol

$\therefore$ In 1st titration : $\dfrac{2a}{5} + \dfrac{2b}{5} = 0.1 \times 50$

$\therefore$ a + b = 12.5 ....(i)

In 2nd titration : a + 2b = 20 .....(ii)

solving (i) and (ii) : b = 7.5

$\therefore m_{H_2C_2O_4} = \dfrac{7.5}{1000} \times 90\ g = 0.675\ g$

Q.49 $[Fe(CO)_5] \xrightarrow{\text{Dimerisation}} \times$

EAN = 26 – 0 + 5 × 2 = 36

Q.50 $Ph - I + C_2H_5\overset{\ominus}{O}\overset{\oplus}{N}a \longrightarrow$ No S_N2, Partial double bond character.

Q.51 Theory based.

Q.52 (1) $K_2O_{2(s)} + H_2O_{(l)} \xrightarrow{R.T.} KOH + O_2$ (Paramagnetic)

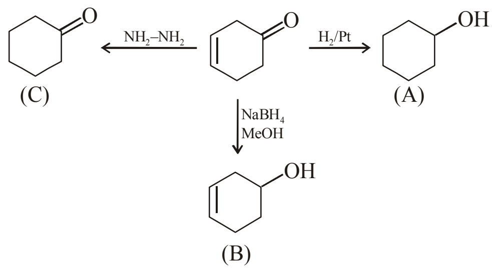
(2) $K_{(s)} + NH_{3(l)} \xrightarrow{0°C} K^+$ (ammoniated) + e^- (ammoniated)

Paramagnetic (due to ammoniated e^-)

(3) $K_{(s)} + H_2O_{(l)} \xrightarrow{R.T.} 2KOH\,(aq.) + H_2\,(g)$

(4) $K_{(s)} + \text{air} \xrightarrow{R.T.} KO_2$ (super oxides)

Paramagnetic

Q.53 

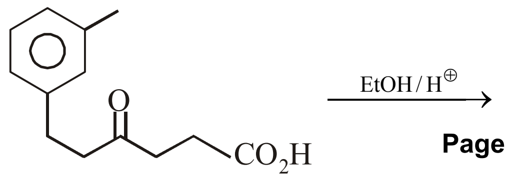
Q.54 Theory based

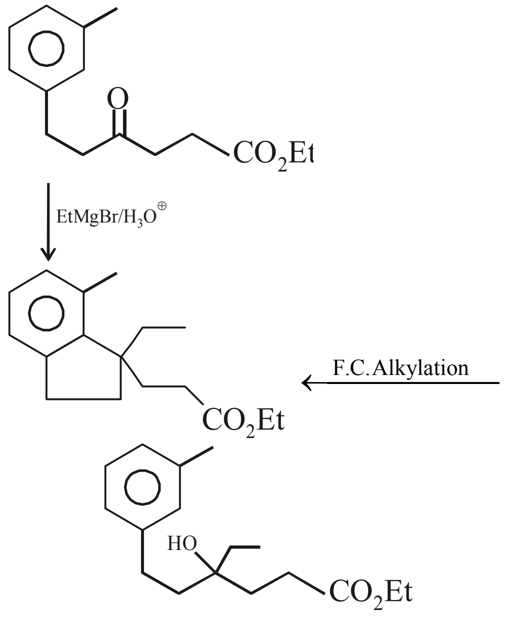
Q.55 (1) $\underline{P}Cl_3 + Cl_2 \longrightarrow \underline{P}Cl_5$
(sp^3) (sp^3d)

(2) $H_2\underline{S}O_4 \xrightarrow{\Delta} H_2O + \underline{S}O_3$
(sp^3) (sp^2)

(3) $\underline{N}Cl_3 + H_2O \longrightarrow \underline{N}H_3 + HOCl$
(sp^3) (sp^3)

(4) $\underline{Xe}F_4 + F^- \longrightarrow \underline{Xe}F_5^-$
(sp^3d^2) (sp^3d^3)

Q.56 



Q.57 $\because \dfrac{P^0 - P_s}{P_s} = \dfrac{n}{N}$

$\therefore \dfrac{2}{98} = \left(\dfrac{m_{urea}/60}{490/18}\right)$

$\therefore m_{urea} = 33.33$ g **Ans.**

Q.58 Dimerisation tendency of $NO_2 > ClO_2$
Reason : Odd e^- is localized in NO_2 and delocalized in ClO_2

Q.59 D-glucose and D-Mannose are C_2 epimers and form the same osazone.

Q.60 For n^{th} order reaction : $t_{1/2} \propto [A]_0^{1-n}$

$\therefore t_{1/2} \propto [A]_0^{1-2.5}$

$\Rightarrow t_{1/2} \propto \dfrac{1}{[A]_0^{1.5}}$

$\therefore m = 1.5$ **Ans.**

MATHEMATICS

Q.61 $\left|\vec{r}\,[\vec{a}\ \vec{b}\ \vec{c}]\right| = |\vec{r}|\,[\vec{a}\ \vec{b}\ \vec{c}] = 2 \times 3 \times 6 = 36.$

Q.62 $f''(x) = f'(x) \Rightarrow f'(x) = k_1 e^x$

$\Rightarrow f(x) = k_1 e^x + k_2 \Rightarrow \lim\limits_{x\to\infty} \dfrac{k_1 e^x + k_2}{ke^x} = 1$

Q.63 $\underbrace{\tan^2 x + \cot^2 x}_{\geq 2} = \underbrace{2\cos^2 y}_{\leq 2}$

$\Rightarrow \tan^2 x = 1$ and $\cos^2 y = 1$

$\underbrace{\cos^2 y}_{1} + \sin^2 z = 1 \Rightarrow \sin^2 z = 0$

$\displaystyle\int_1^3 \frac{t^2}{t^2 - 4t + 8}\,dt = 2\int_1^3 \frac{t^2}{2t^2 - 4t + 8}$

$= 2\displaystyle\int_1^3 \frac{t^2}{t^2 + (4-t)^2}\,dt = 2 \times \frac{1}{2}\,(3-1) = 2.$

Q.64 $(1-x)^{50}(x+1)^{50}$
$= ({}^{50}C_0 - {}^{50}C_1 \cdot x + \ldots.. + {}^{50}C_{50} \cdot x^{50})$
$\cdot ({}^{50}C_0 \cdot x^{50} + {}^{50}C_1 \cdot x^{49} + \ldots\ldots. + {}^{50}C_{50})$
compare the coefficient of x^{30} from both the sides
${}^{50}C_{15} = {}^{50}C_0 \cdot {}^{50}C_{20} - {}^{50}C_1 \cdot {}^{50}C_{21} + \ldots\ldots\ldots$

Q.65 $B_1 + B_2 + B_3 = 5$
${}^{5+2}C_2 = 21$

Q.66 Possible cases are (1, 4, 6), (2, 4, 5) and (2, 3, 6)

$\dfrac{1}{6\cdot5\cdot4}\times 3! + \dfrac{1}{6\cdot5\cdot4}\times 3! + \dfrac{1}{6\cdot5\cdot4}\times 3! = \dfrac{3}{20}$

Q.67 $\vec{n}_1 = (4, -3, 4)$

$\vec{n}_2 = (3, -2, 1)$

$\vec{n}_1 \times \vec{n}_2 = (5, 8, 1)$

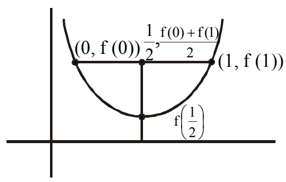
$(\vec{n}_1 \times \vec{n}_2) \cdot \vec{n} = 0$

$\Rightarrow 10 - 8 + a = 0 \Rightarrow a = -2$

Q.68 $\dfrac{50 \times 20 - 300}{10} = 70$

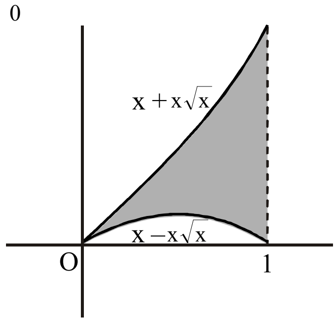
Q.69 $x^3 + 6x^2 + 12x + 9 = 0$
$\Rightarrow (x+2)^3 = -1 \Rightarrow x + 2 = -1, -\omega, -\omega^2$
$\Rightarrow x = -3, -2-\omega, -2-\omega^2$, then common roots are $-2-\omega$ and $-2-\omega^2$
sum of roots $= -4 - (\omega + \omega^2) = -3$;
Product of roots $= (2+\omega)(2+\omega^2)$
$= 4 + (-2) + 1 = 3$
$\therefore$ equation $x^2 + 3x + 3 = 0$
So, $\dfrac{a}{1} = \dfrac{b}{3} = \dfrac{c}{3}$

Q.70 $f\left(\dfrac{1}{2}\right) < \dfrac{f(0) + f(1)}{2}$



Q.71 $y = x \pm x\sqrt{x}$

$\displaystyle\int_0^1 2x^{\frac{3}{2}}\,dx = 2 \times \frac{2}{5} = \frac{4}{5}$



Q.72 Let $x = a\sin\theta$, $\lim_{\theta\to 0} \frac{1}{a^2}\left(\frac{1-4a\cos\theta}{\sin^2\theta\cdot\cos\theta}\right)$ is finite

$\Rightarrow a = \frac{1}{4}$ and $b = 8 \Rightarrow ab = 2$

Q.73 $T_1 = 24, T_2 = 3, T_3 = 8$
L.C.M of $\{T_1, T_2, T_3\} \Rightarrow 24$.

Q.74 Using Venn-diagram it is equal to A'

Q.75 $(T \vee F) \vee F \Rightarrow (T \vee F) \Rightarrow T$

Q.76 $ABC = BCD$
$\Rightarrow ABCC^{-1} = BCDC^{-1}$
$\Rightarrow AB = BCDC^{-1}$
$\Rightarrow ABB^{-1} = BCDC^{-1}B^{-1}$
$\Rightarrow A = BCDC^{-1}B^{-1}$

Q.77 $1^5 + z_1^5 + z_2^5 + z_3^5 + z_4^5 + z_5^5 = 0$

Q.78 $(x+2)^2 = -4(y+3)$
equation of axis is $x + 2 = 0$ and directrix is
$y + 3 = 1 \Rightarrow y + 2 = 0$

Q.79 $p_1p_2 = b^2$

Q.80 $\int \frac{1}{(\sqrt{x})^7\left(1+\frac{1}{(\sqrt{x})^5}\right)}dx$ let $\frac{1}{(\sqrt{x})^5} = t$

$$\Rightarrow \int \frac{-2dt}{5(1+t)} = -\frac{2}{5}\,ln(1+t) + c$$

$$\Rightarrow \frac{2}{5}\,ln\left(\frac{(\sqrt{x})^5}{(\sqrt{x})^5+1}\right) + c \Rightarrow a = \frac{2}{5}, k = \frac{5}{2}$$

Q.81 Let the ratio t : 1

$\Rightarrow$ point $P \equiv \left(\frac{3t-2}{t+1}, \frac{-5t+4}{t+1}, \frac{8t+7}{t+1}\right)$ lies on plane

$$\Rightarrow \left(\frac{3t-2}{t+1}\right)1 - 2\left(\frac{-5t+4}{t+1}\right) + 3\left(\frac{8t+7}{t+1}\right) = 17$$

$$\Rightarrow t = \frac{3}{10}$$

Q.82 $\sin(xy) = xy$
$xy = 0 \Rightarrow x = 0$ or $y = 0$
$\Rightarrow x = 0$ not possible
So, $y = 0 \Rightarrow x = 1 \Rightarrow x = 1$ and $y = 0 \Rightarrow (1, 0)$

Q.83 $f(x+1) = f(x)$ and $f\left(\frac{1}{2}\right) = f\left(\frac{-1}{2}\right)$

$g'(x) = f(x+n) = f(x)$

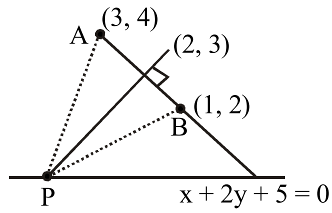
$$g'\left(\frac{5}{2}\right) = f\left(\frac{5}{2}\right) = f\left(2+\frac{1}{2}\right) = f\left(\frac{1}{2}\right) = \frac{3}{2}.$$

Q.84 $e^{-t/2}P(t) = 900e^{-t/2} + C$; $t = 0, P = 850$
$\Rightarrow 850 = 900 + C \Rightarrow C = -50$
$\Rightarrow P(t) = 900 - 50e^{t/2} = 0$
$\Rightarrow e^{t/2} = 18 \Rightarrow t = 2ln\ 18$.

Q.85 $S_1 < 0$
$4 + 9 - 12 - 30 + k < 0 \Rightarrow k < 29$
$r < 4$
$\sqrt{9+25-k} < 4 \Rightarrow k > 18$.

Q.86 $(f(f(x))) = x$.

Q.87 $y - 3 = -1(x - 2)$



$x + y = +5$, $x + 2y = -5$ $\Rightarrow$ $\begin{cases} x = 15 \\ y = -10 \end{cases}$

Q.88 $\sin\left(\frac{2\pi}{7}\right)\cdot\sin\left(\frac{4\pi}{7}\right)\cdot\sin\left(\frac{6\pi}{7}\right)$

$$= \sin\frac{\pi}{7}\cdot\sin\frac{2\pi}{7}\cdot\sin\frac{3\pi}{7} = \frac{\sqrt{7}}{8}$$

Q.89 $f(0^+) = \text{sgn (negative)} = -1$ and $f(0^-)$
$= \text{sgn (positive)} = 1$, discontinuous

Q.90 Area

$$= \frac{1}{2}\sqrt{\left(\frac{k^2}{lm}\right)^2 + \left(\frac{k^2}{mn}\right)^2 + \left(\frac{k^2}{nl}\right)^2} = \frac{k^2}{2lmn}$$

$$\Rightarrow \frac{l^2+m^2+n^2}{3} \ge (l^2m^2n^2)^{\frac{1}{3}}$$

$$\Rightarrow \frac{1}{3} \ge (lmn)^{\frac{2}{3}}$$

$$\Rightarrow \frac{1}{3\sqrt{3}} \ge lmn$$

$$\Rightarrow \frac{1}{lmn} \ge 3\sqrt{3} \Rightarrow \frac{k^2}{2lmn} \ge \frac{3\sqrt{3}k^2}{2}$$