BANSAL CLASSES
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ANSWER KEY

DATE: 19-12-2018

COURSE
NUCLEUS

JEE-MAIN MOCK TEST-12
XII

TEST CODE				
1	1	3	0	1

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

HINTS & SOLUTIONS

MATHEMATICS

Q.1 Let x + 1 = t

$$\int_0^1 (t-1)\cdot \ln t\, dt$$

$$= \left(\frac{t^2}{2} - t\right)\cdot \ln t\Big|_0^1 - \int_0^1 \left(\frac{t}{2} - 1\right) dt$$

$$= 0 - \left[\frac{t^2}{4} - t\right]_0^1 = \frac{3}{4}$$

Q.2 Each diagonal element of matrix A has three choices.

Q.3 $(1 + x + x^2 + x^3)^{100}$

$= a_0 + a_1x + a_2 x^2 + ... + a_{300}\cdot x^{300}$ ....(1)

By differentiating both side

$100 \cdot (1 + x + x^2 + x^3)^{99} \cdot (1 + 2x + 3x^2)$

$= a_1 + 2a_2 x + ... + 300 \cdot a_{300}\cdot x^{299}$

If x = 1

$100\,(4)^{99} \cdot (6) = a_1 + 2a_2 + ... +$

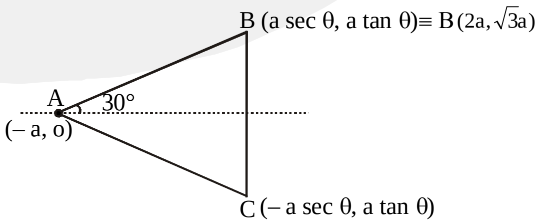
$$300 \cdot a_{300} = \sum_{r=0}^{300} r\cdot a_r \text{ .... (2)}$$

$4^{100} = a_0 + a_1 + ... + a_{300} = k$ .... (3)

By equation (2) & (3)

$$150 \cdot k = \sum_{r=0}^{300} r\cdot a_r$$

Q.4 $$\frac{a\tan\theta}{a\sec\theta + a} = \frac{1}{\sqrt{3}} = \theta = \frac{\pi}{3}$$



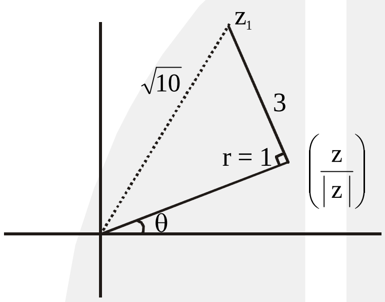
Now, $AB = \sqrt{(2a+a)^2 + \left(\sqrt{3}a\right)^2}$

$= \sqrt{12a^2} = 2\sqrt{3}a$

Q.5 $\sec^2((n(m+2)) = 1 - (m+1)^2$
only possible value of $m = -1$
$\Rightarrow \sec^2(n) = 1$
$\Rightarrow n = 0$
$\Rightarrow A(-1, -2)$
So, straight line passing through
$A(-1, -2)$ and with slpoe $m = 2$ is
$y + 2 = 2(x + 1)$
$y = 2x$

Q.6 $g'(0) = 1,\ g''(0) = 0,\ g'''(0) = -2018$

Q.7



Q.8

1 odd	5 even	$^6C_1$	$\times$	2^6
3 odd	3 even	$^6C_3$	$\times$	2^6
5 odd	1 even	$^6C_5$	$\times$	2^6

$= (^6C_1 + {}^6C_3 + {}^6C_5)\cdot 2^6 = 32 \times 2^6 = 2^{11}$

Q.9 Prime number = 2, 3, 5, 7
Total outcomes

$= \boxed{2}\boxed{\cdot}\boxed{\cdot}\boxed{\cdot}\boxed{\cdot}\boxed{\cdot}\boxed{\cdot}\boxed{\cdot}\boxed{\cdot}\boxed{\cdot} = 4^9 = 2^{18}$

favourable out comes

$= \boxed{2}\boxed{\cdot}\boxed{2}\boxed{\cdot}\boxed{2}\boxed{\cdot}\boxed{2}\boxed{\cdot}\boxed{2}\boxed{\cdot}$

Requried probability $= \dfrac{2^5}{2^{18}} = \dfrac{1}{2^{13}} = 2^5$

Q.10 $\lim\limits_{x\to 0} f(x) = e^{\frac{4b^2-9a}{2b}} = e^3$

$\Rightarrow 4b^2 - 6b - 9a = 0\ \forall\ b \in R$

$D \ge 0 \Rightarrow a \ge \dfrac{-1}{4}$

Q.11 $y = ax^3 + bx^2 + cx + 5$
$0 = -8a + 4b - 2c + 5$ .... (1)
$y' = 3ax^2 + 2bx + c$
$0 = 12a - 4b + c$ .... (2)
$[\because$ parallel to x-axis$]$
and $3 = 3a(0) + 2b(0) + c$ .... (3)
$[\because$ intersect y-axis$]$
by equation (1), (2) and (3)

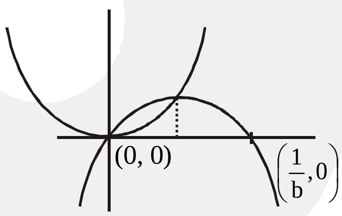
$a = -\dfrac{1}{2}$ and $b = -\dfrac{3}{4}$

So, $a - 2b = -\dfrac{1}{2} + 2\times\dfrac{3}{4} = 1$

Q.12 $g(x) = \int \pi\sin\pi x + 2x - 4)\ dx$
$= -\cos\pi x + x^2 - 4x + 5\ (\because\ g(1) = 3)$
$= (x-2)^2 + (1 - \cos\pi x)$

Q.13 Area $= \displaystyle\int_0^{\frac{b}{b^2+1}} \left[\left(-bx^2 + x\right) - \left(\frac{x^2}{b}\right)\right]dx$

$= \dfrac{b^2}{6\left(b^2+1\right)^2}$



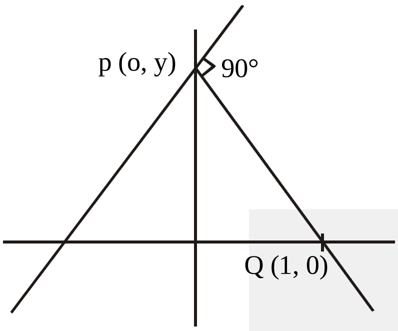
Let $f(b) = \dfrac{b^2}{6(b^2+1)^2} \Rightarrow f(b)_{max}$ at $b = \pm 1$

Q.14 Equation of tangent

$y - y_1 = \dfrac{dy}{dx}\ (x - 0)$

$y = y_1 + x\ \dfrac{dy}{dx}$ ....(1)

Now, $\left(\dfrac{y_1 - 0}{0 - 1}\right)\left(\dfrac{dx}{dy}\right) = -1$



$y_1 = \dfrac{dx}{dy}$ .... (2)

By equation (1) and (2)

$\Rightarrow\ y\dfrac{dy}{dx} - x\left(\dfrac{dy}{dx}\right)^2 = 1$

Q.15 $(x\hat{i}+y\hat{j})\cdot(x\hat{i}+y\hat{j}+8\hat{i}-10\hat{j})+41=0$

$x^2 + y^2 + 8x - 10y + 41 = 0$

centre $(-4, 5)$, $r = \sqrt{16+25-41} = 0$

So, minimum value of $\left|-4\hat{i}+5\hat{j}+2\hat{i}-3\hat{j}\right|^2$

$= \left|-2\hat{i}+2\hat{j}\right|^2 = \left(\sqrt{4+4}\right)^2 = 8$

Q.16 $\displaystyle \lim_{x\to\frac{\pi}{2}} \sqrt{\frac{\tan x - \sin\left(\tan^{-1}(\tan x)\right)}{\tan x + \cos^2(\tan x)}}$

$\displaystyle = \lim_{h\to 0} \sqrt{\frac{\cot h - \cos h}{\cot h + \cos^2(\cot h)}} = 1$

Q.17 $5 + 2\sin x - \sin^2 x = 1 + 5^{\sec^2 y}$

$\Rightarrow (\sin x - 1)^2 = (5 - 5^{\sec^2 y})$

$\Rightarrow \sin x = 1$ and $\sec y = 1$

So, $(x + y)_{min} = \dfrac{\pi}{2}$.

Q.18 $4\cos^2\theta = \dfrac{x^4+2x^2+1}{x^2+1} + \dfrac{4}{x^2+1}$

$4\cos^2\theta = (x^2 + 1) + \dfrac{4}{(x^2+1)}$

$x^2 + 1 + \dfrac{4}{x^2+1} \geq 4$ and $4\cos^2\theta \in [0, 4]$

So, $x^2 + 1 = \dfrac{4}{x^2+1}$

$\Rightarrow x = \pm 1$ and $\cos\theta = 1$

So, $x\cos\theta = \pm 1$

Q.19 $(x\hat{i}+y\hat{j})\cdot(6\hat{j}-4\hat{i}+x\hat{i}+y\hat{j}) = 3$

$x^2 + y^2 - 4x + 6y - 3 = 0$

centre $(2, -3)$, $r = \sqrt{4+9+3} = 4$

So, $|\vec{r}+2\hat{i}-3\hat{j}|_{max} = 2\left(2+\sqrt{13}\right)$.

Q.20 $\left[(\alpha-2)^3\right]^4 + \dfrac{(12)^{12}}{(\alpha\beta)^{12}} - 1$ $[\therefore\ \beta - 6 = -\dfrac{12}{\beta}]$

$= [\alpha^3 - 8 - 6\alpha(\alpha - 2)]^4$

$= [\alpha[\alpha^2 - 6\alpha + 12] - 8]^4 = 8^4$

So, a^b may be 2^{12}, 4^6, 8^4 etc.

So, $(a + b)_{min} = 4 + 6 = 10$

Q.21 At $\lambda = 1$, radical axis of circles are parallel.

Q.22 $AA^{-1} = \dfrac{1}{10}[\lambda A^2 + 9A - A^3]$

$10I = \lambda A^2 + 9A - A^3$

After solving above $\lambda = 2$

Q.23 $\left(\dfrac{7!}{4!\cdot 3!}\times 3!\cdot 3!\right)\left(\dfrac{8!}{4!\cdot 4!\cdot 2!}\times 3!\cdot 3!\right) = \dfrac{(7!)^2}{16}$

Q.24 $f'(x) = 6x^2 - 6\cdot 2\sqrt{2}\times\sin^2\theta + 6\sin^2\theta$

$D \geq 0$

$\Rightarrow 36\cdot 8\cdot\sin^4\theta - 4\cdot 6\cdot 6\sin^2\theta \geq 0$

$\Rightarrow \sin^2\theta\,(2\sin^2\theta - 1) \geq 0$

$\Rightarrow \sin^2\theta \geq \dfrac{1}{2}$

Q.25 One of its period is 3.

So that $\displaystyle\int_{15}^{25} f(x)\,dx = 10\int_{0}^{3} f(x)\,dx = 50.$

Q.26 Equation of tangents are $y = \frac{2x}{5}$ and $y = \frac{-5x}{2}$

Here, $m_1 m_2 = -1$.

Q.27 Let $x_1 > x_2 > x_3 > x_4 \ldots\ldots\ldots\ldots > x_{20}$

$$\text{Median} = \frac{x_{10} + x_{11}}{2}$$

$x_1 - 3, x_2 - 3, x_3 - 3, \ldots\ldots, x_{10} - 3, x_{11} + 5, x_{12} + 5, \ldots\ldots, x_{20} + 5$

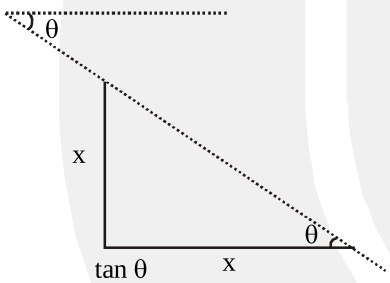
$$\text{Median} = \frac{x_{10} - 3 + x_{11} + 5}{2} = \frac{x_{10} + x_{11}}{2} + 1$$

Q.28 $|z + 1 - 2i| = 3$
Centre C_1 $(-1, 2)$, $r_1 = 3$
$|z - 2 - 6i| = 2$
Centre C_2 $(2, 6)$, $r_2 = 2$
$\Rightarrow C_1C_2 = r_1 + r_2 = 5$

Q.29

Q.30 $\tan\theta = \frac{x}{x} = 1$

$\theta = 45°$.



PHYSICS

Q.31 $\frac{\tan 60°}{\tan 30°} = \frac{Y_B}{Y_A} \Rightarrow Y_B = 3Y_A$

Q.32 From kinematics and symmetry in vertical ascent and descent motion of the ball,

$$\text{required time} = \sqrt{\frac{2h}{g}} + \sqrt{\frac{2h/2}{g}} = t + \frac{t}{\sqrt{2}}$$

Q.33 $$(\chi) = \frac{\text{Intensity of magnetisation (I)}}{\text{Magnetizing field (H)}}$$

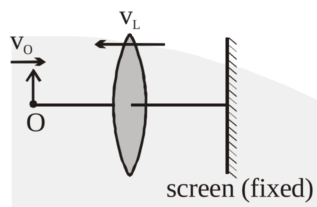
or, $I = \chi H$

Q.34 Pressure difference between lungs of student and atmosphere
= (760 – 750) mm of Hg = 1cm of Hg = 13.6 cm of water
Hence h = 13.6 cm.

Q.35 No friction is required for pure rolling of ring.

Q.36 $\vec{v}_{I,L} = m^2(\vec{v}_{O,L})$

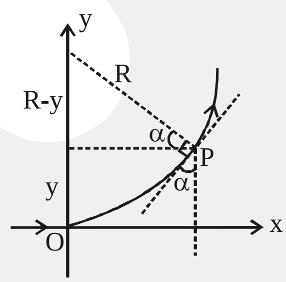
$\Rightarrow 0 - (-v_L) = n^2 (v_O - (-v_L))$



$$\Rightarrow v_O = \left(\frac{1 - n^2}{n^2}\right) v_L \text{ towards screen}$$

Q.37 Applying Snell's law at O and P
$1 \times \sin 90° = n(y) \sin\alpha$

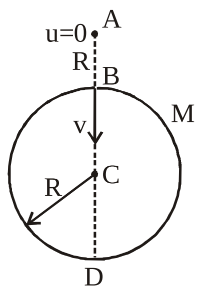
$$\Rightarrow n(y) = \operatorname{cosec}\alpha = \frac{R}{R - y}$$



Q.38 Let v be the velocity of the particle at point B. Applying conservation of mechanical energy at point A and B, we have

$$-\frac{GMm}{2R} = -\frac{GMm}{R} + \frac{1}{2} m v_B^2$$

$$\Rightarrow v_B = \sqrt{\frac{GM}{R}}$$



Thereafter $v = \sqrt{\frac{GM}{R}}$ = constant

($\because$ inside shell, $\vec{F}_g = m\vec{E}_g = 0$)

$\therefore t_{BD} = \frac{2R}{v}$

Q.39 $I_1 = I$ and $I_2 = 4I$

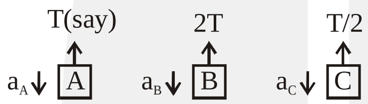
$\therefore I_{net} = I_1 + I_2 + 2\sqrt{I_1 I_2}\cos\phi$

$\therefore I_A = I + 4I = 5I$ ($\because \phi_A = \pi/2$)

& $I_B = I + 4I - 2\sqrt{4I.I} = I$ ($\because \phi_B = \pi$)

$\Rightarrow I_A - I_B = 4I$

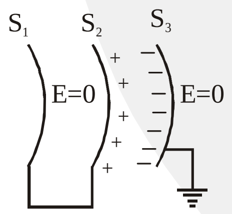
Q.40



$\Sigma\vec{T}.\vec{a} = 0 \quad \therefore -Ta_A - 2Ta_B - \frac{T}{2}a_C = 0$

$\Rightarrow 2a_A + 4a_B + a_C = 0$

Q.41

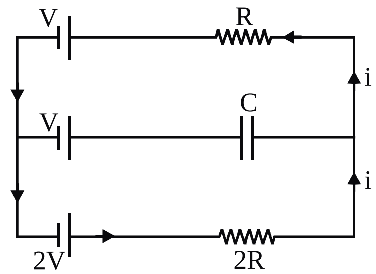


$\therefore C_{eq} = C_{\text{between } S_2 \& S_3} = \frac{4\pi\epsilon_0 bd}{d-b}$

Q.42 In a steady state no current will pass through the capacitor. In the outer loop

$2V - 2iR - iR - V = 0 \Rightarrow i = \frac{V}{3R}$

For the upper loop,



$V - V_C - iR - V = 0$

$\Rightarrow |V_C| = iR = \frac{V}{3}$

Q.43 $eV_0 = K.E_{max} \Rightarrow V_0 = \frac{K.E_{max}}{e}$

Q.44 $\because \theta = \theta_0 e^{-\gamma t} \Rightarrow 5 = 10e^{-\gamma(100 \times 2)}$

$\Rightarrow \gamma = \frac{\ln 2}{200}$ and Q.F. $= \frac{\omega_0}{2\gamma} = \left(\frac{2\pi}{T}\right).\frac{1}{2\gamma}$

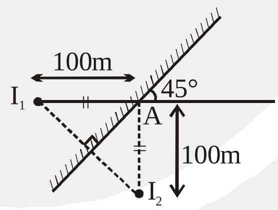
Q.45 v_e = Escape velocity (from height h) $= \sqrt{\frac{2GM}{R+h}} = \sqrt{\frac{2gR^2}{R+h}}$

$\because v_{satellite} > v_e \Rightarrow$ it escapes earth's gravity along a hyperbolic path.

Q.46 For concave mirror

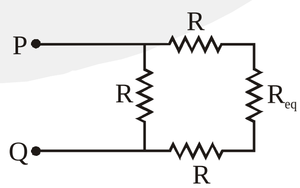
$v = \frac{fu}{u-f} = -1100$ cm

$\Rightarrow I_1$ is 100 cm left of A



$\therefore I_2$ will be formed as shown

Q.47 The circuit can be redrown as shown in the figure



$$\Rightarrow R_{eq} = \frac{(2R + R_{eq})R}{R + (2R + R_{eq})}$$

$$\Rightarrow R^2_{eq} + (2R)\, R_{eq} - 2R^2 = 0$$

$$\therefore R_{eq} = (\sqrt{3} - 1)R$$

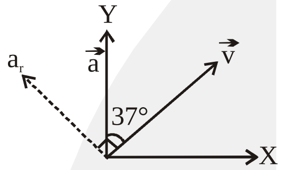
Q.48 $W_{net} = (\Sigma\Delta Q)_{cycle} = 10 + 15 - 10 = 15$ J

$\Delta Q_{in} = 10 + 15 = 25$ J

$$\Rightarrow \eta = \frac{15}{25} \times 100 = 60\%$$

Q.49 $a_r = a \sin 37° = 3 m/s^2$.

Also, $r = \frac{v^2}{a_r} = \frac{25}{3}$ m



Q.50 Capacitance per unit length is given by

$$C = \frac{\lambda}{V} = \frac{2\pi\varepsilon_0}{\ln(D_2/D_1)}$$

where λ = charge per unit length

$$E_{core} = \frac{\lambda}{2\pi\varepsilon_0 r_{core}} = \frac{\lambda}{\pi \in_0 D_1}$$

$$= \frac{2V}{D_1 \ln(D_2/D_1)}$$

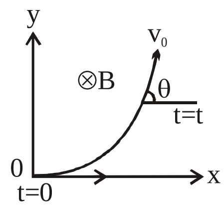
$$\therefore \text{ for } E_{min} \Rightarrow \frac{dE_{core}}{dD_1} = 0 \Rightarrow D_1 = \frac{D_2}{e}$$

Q.51 Magnetic field is in –Z-direction. $\vec{v} \perp \vec{B}$

$\Rightarrow$ path of particle will be a circle in XY plane.

Angular speed $\omega = \frac{qB_0}{m} = \alpha B_0$

In time t, the particle will rotate an angle $\theta = \omega t = B_0 \alpha t$ as shown in figure.



Hence velocity of particle at time t would be

$$\vec{v} = v_0 \cos\theta\hat{i} + v_0 \sin\theta\hat{j}$$

or $$\vec{v} = v_0 \cos(B_0\alpha t)\hat{i} + v_0 \sin(B_0\alpha t)\hat{j}$$

Q.52 $U = 8x^2 - 4x^4$

$$\frac{dU}{dx} = 16x - 16x^3 = 0$$

$\Rightarrow x = 1, 0 \rightarrow$ positions of equilibrium

$\because$ x = 0 is stable equilibrium position

$$\left(\frac{d^2U}{dx^2} > 0\right)$$

$$\therefore F = \frac{-dU}{dx} = 16x^3 - 16x \approx -16x$$

(for small x).

$$\Rightarrow \omega = \sqrt{\frac{16}{2}} = \sqrt{8} \text{ rad/sec}$$

Q.53 The minimum length of transmitting antenna is

$$l_{min} = \frac{\lambda}{4} = \frac{1}{4}\frac{c}{f} = 75m$$

Q.54 $I = I_{max}(1 - e^{-t/\tau})$

$$\varepsilon = L\frac{dI}{dt}$$

Q.55 We know that c hange in pressure = $\partial P = \frac{-B\partial S}{\partial x}$ & will be maximum at t = 0 when

$$\cos\left(\frac{100\pi x}{17}\right) = +1$$

Use option in above equation to justify it.

Q.56 From the given input and output waveforms, the truth table can be constructed as given

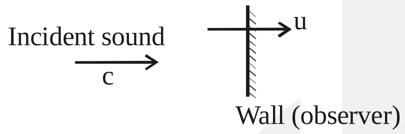
A	B	C
0	0	0

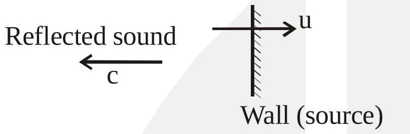
1 1 1
0 1 0
1 0 0

the logic circuit is hence an AND gate.

Q.57 Mean absolute error is greater then the least count hence we consider mean absolute error as error in place of least count in the reported data.

Q.58 Speed of sound is c = 10u. If frequency of source is f





$$f_{in} = f\left(\frac{c-u}{c-u/2}\right) = \frac{18f}{19}$$

$$\therefore \lambda_{in} = \frac{v_{rel}}{f_{in}} = \frac{c-u}{18f/19} = \frac{19u}{2f}$$

$$\lambda_{ref} = \frac{v_{rel}}{f_{ref}} = \frac{(c+u)}{f_{in}} = \frac{(11)(19)u}{18f}$$

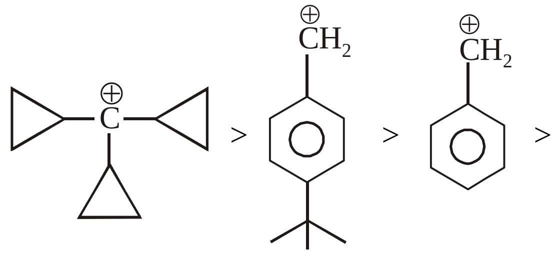
Q.59 Use $I = I_0 / 2$ When unpolarised light pass through a polariser and use $I = I_0 \cos^2\theta$ when polarised light passes through a polariser.

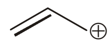
Q.60 $R = \frac{V}{I} = \frac{6-2}{10\times10^{-3}} = 400\ \Omega$

CHEMISTRY

Q.61 Na_2O_2(yellow solid) + Moist air $\to Na_2CO_3$ + NaOH

Q.62 Rate of S_N1 solvolysis α stability of $C^{\oplus}$





Q.63 $CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2(g)$

$$\frac{11.2}{22.4} = n_{CO_2}$$

moles 0.5 0.5

$CaO(s) + H_2O(l) \longrightarrow Ca(OH)_2(aq)$

0.5

\- 0.5

$Ca(OH)_2(aq) + 2HCl(aq) \longrightarrow CaCl_2(aq) + 2H_2O(l)$

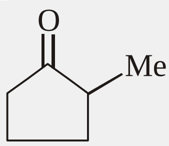
0.5

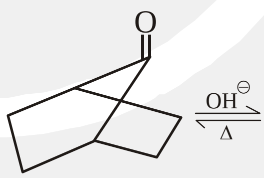
Required moles of HCl = 1

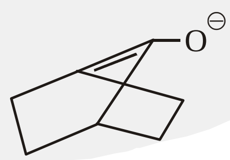
Required mass of HCl = 1 × 36.5 = 36.5 g

Q.64 Theory based

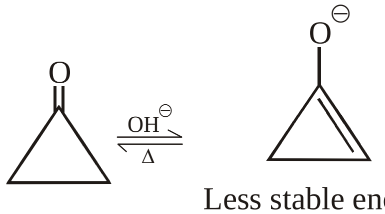
Q.65 Atleast one α-H should be present for aldol condensation.

(1)  $\longrightarrow$ α–H present

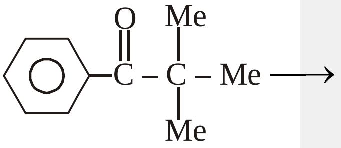
(2) 



Unstable enolate ion

(3) 

Less stable enolate ion

(4) 

No α-H present

Q.66 $\frac{1}{\lambda} = RZ^2\left(\frac{1}{1^2} - \frac{1}{n^2}\right)$

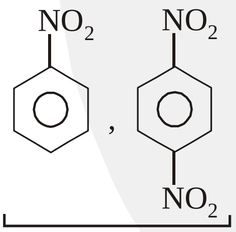
$\frac{1}{\lambda} = R\left(1 - \frac{1}{n^2}\right)$

$n = \sqrt{\frac{\lambda R}{\lambda R - 1}}$

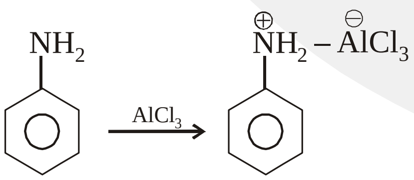
Q.67 Energy order of molecular orbital of N_2 is

$(\sigma_{1s}) < (\sigma^*_{1s}) < (\sigma_{2s}) < (\sigma^*_{2s}) <$

$\pi_{2p_x} = \pi_{2p_y} < \sigma_{2p_z} < \pi^*_{2p_x} = \pi^*_{2p_y} < \sigma^*_{2p_z}$

Q.68 

Deactivating group present



After Lewis base–Lewis acid reaction, it becomes deactivating group.

Q.69 $\left(P + \frac{a}{V^2}\right)(V) = RT$

$PV + \frac{a}{V} = RT$

$Z = 1 - \frac{a}{VRT}$

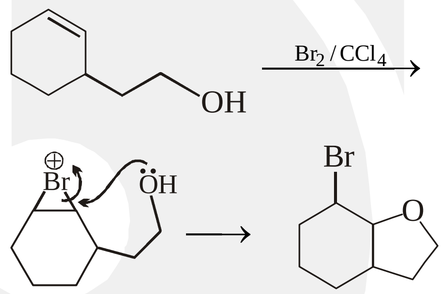
$\text{Slope} = \frac{a}{RT} = 0.22$

$\frac{5.5}{0.08T} = 0.22$

$T = \frac{5.5}{0.08 \times 0.22}$

$= 312.5$ K **Ans.**

Q.70 Zone refining is based on the principle that impurities are more soluble in molten metal than in solid metal.

Q.71 

Q.72 $(r_{x^+} + r_{y^-}) = \frac{\sqrt{3}a}{4} = \frac{\sqrt{3}}{4} \times 654 = 283.15$

Ans.

Q.73 Group II radicals
$(Pb^{2+}, Cu^{2+}, Bi^{3+}, Ag^{2+}, Cd^{2+})$

$\downarrow H_2S + HCl$

$\underbrace{PbS, CuS, Bi_2S_3, HgS,}_{\text{Black}}\ \underbrace{CdS}_{\text{Yellow}}$

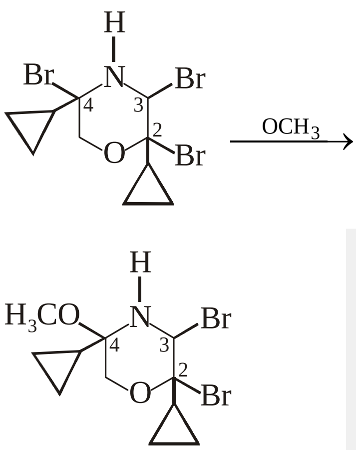
$\downarrow$ Hot & dil. HNO_3

Insoluble Hg^{2+} | $Pb^{2+}, Bi^{3+}, \mathbf{Cu^{2+}}$ (blue colour)

$\downarrow$ excess NH_4OH

$[Cu(NH_3)_4]^{2+}$
(deep blue)

Q.74



More stable $C^{\oplus}$ forms at carbon 4.

Q.75 $\Delta T_b = K_b.m$

$100 - 99.63 = (0.52)\ (m)$

$m = \dfrac{0.37}{0.52}$

$m = \dfrac{n_{sucrose}}{w_{H_2O(g)}} \times 1000 = \dfrac{0.37}{0.52}$

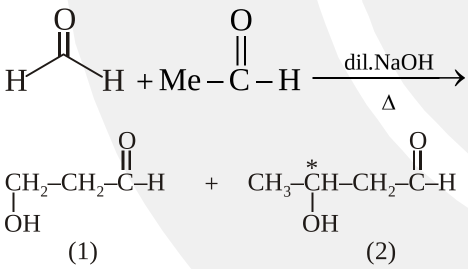
$w_{H_2O} = \dfrac{121.67}{342} \times \dfrac{1000}{0.37} \times 0.52$

$w_{H_2O} = 500$ g

Q.76 (1) $[Fe(CO)_5] : (CO)$

Due to synergic bonding

Q.77



Total product will be (3)

Q.78 $A \longrightarrow 2B + C$

P_0

$P_0 - x \quad 2x \quad x$

$- \quad 2P_0 \quad P_0$

$P_\infty = 3P_0$

$P_0 = P_\infty/3$

$P_T = P_0 - x + 3x$

$x = \dfrac{P_T - \dfrac{P_\infty}{3}}{2}$

$k = \dfrac{1}{t} \ln \dfrac{P_0}{P_0 - x}$

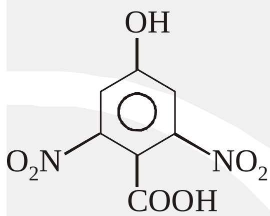
$k = \dfrac{1}{t} \ln \left(\dfrac{2P_\infty}{3(P_\infty - P_T)} \right)$

Q.79 1st I.E. order : Na < Mg > Al < Si

$3s^1 \quad 3s^2 \quad 3p^1 \quad 3p^2$

(fully filled)

Q.80



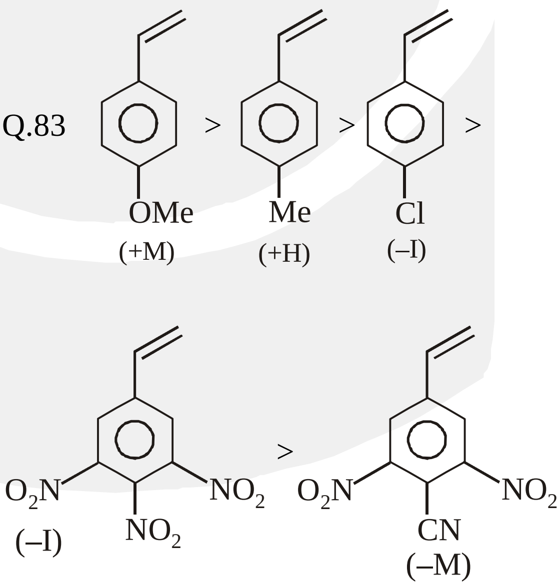
Strongest acid due to S.I.R. effect

Q.81 Theory based

Q.82 $[Co(NH_3)_5(SO_4)]Cl$ and $[Co(NH_3)_4(SO_4)]Cl$

Has no isomerism because molecular formula is different.

Q.83



Q.84 $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

1	-	-
1–d	d	d

$$K_P = \frac{\left(\frac{d}{1+d}.P\right)^2}{\left(\frac{1-d}{1+d}.P\right)^1}$$

$$K_P = \frac{d^2.P}{1-d^2}$$

$\therefore$ d << 1

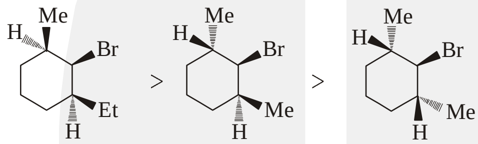
$\therefore$ $1 - d^2 = 1$

$$d^2 = \frac{K_P}{P}$$

$$d \propto \frac{1}{\sqrt{P}}$$

Q.85 Aluminium itself is a very strong reducing agent.

Q.86



Both side anti β-H present > Only one anti β-H present > No anti β-H

Q.87 $H_2(g) + 2H^+(aq) \underset{}{\overset{n=2}{\rightleftharpoons}} 2H^+(aq) + H_2(g)$

1	xM	10^{-8}	1

$$0.180 = \frac{0.06}{2}\log\frac{[H^+]^2}{[10^{-8}]^2}$$

$[H^+] = 10^{-5}$

pH = 5

pOH = 9

Q.88 (1) $Pb(NO_3)_2 \rightarrow$

$Pb^{2+} \xrightarrow{\text{excess NaOH}} Na_2PbO_2$(soluble)

$Pb^{2+} \xrightarrow{\text{excess } NH_4OH} Pb(OH)_2\downarrow$

(2) $Zn(NO_3)_2 \rightarrow$

$Zn^{2+} \xrightarrow{\text{excess NaOH}} Na_2ZnO_2$(clear)

$Zn^{2+} \xrightarrow{\text{excess } NH_4OH} [Zn(NH_3)_4]^{2+}$(clear)

(3) $Cr(NO_3)_3 \rightarrow$

$Cr^{3+} \xrightarrow{\text{excess NaOH}} NaCrO_3$

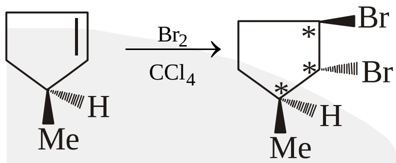
$Cr^{3+} \xrightarrow{\text{excess } NH_4OH} [Cr(NH_3)_6]^{2+}$(Pink)

(4) $Hg(NO_3)_2 \rightarrow$

$Hg^{2+} \xrightarrow{\text{excess NaOH}} Hg(OH)_2\downarrow$

$Hg^{2+} \xrightarrow{\text{excess } NH_4OH} HgO.HgNH_2\downarrow$

Q.89



(3 chiral centre)

Q.90 $C_m = C_{v_1m} + \frac{R}{1-x}$

During process $P \propto T^3$

$P'T^{-3} = K$

$P^{1-x}\,T^x = K$

$PT^{x/1-x} = K$

$$\frac{x}{1-x} = -3$$

$x = -3 + 3x$

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

$$C_m = \frac{5R}{2} + \frac{R}{1-\frac{3}{2}}$$

$$= \frac{5R}{2} - 2R = \frac{R}{2}$$