Solutions to JEE Advanced Revision Test - 2 | Paper-2 |JEE 2024

PHYSICS

SECTION-1

1.(B) Immediately after the switch is closed, the capacitors behave like zero resistance wires, and hence all three resistances are in parallel, giving a net resistance $\frac{R}{3}$

Therefore, immediately after the switch is closed, the current through it is $\frac{V}{\left(\frac{R}{3}\right)} = \frac{3V}{R}$

After a long time, the current through both capacitor branches is zero, and hence they can be removed from the circuit for analysis. So, now the three resistances are in series, and hence the current through the switch is $\frac{V}{3R}$

2.(D) Since the second ball is brought to the position initially occupied by the first ball, in the equilibrium condition, the compression in the spring is exactly equal to the separation between the balls
Let it be x

Then, balancing forces on the ball attached to the spring, $\frac{Q^2}{4\pi\varepsilon_0 x^2} = kx \Rightarrow \quad x = \left(\frac{Q^2}{4\pi\varepsilon_0 k}\right)^{1/3}$

Work done against spring force, $W_1 = \frac{1}{2}kx^2 = \frac{1}{2}k\left(\frac{Q^2}{4\pi\varepsilon_0 k}\right)^{2/3}$

Work done against electrostatic force = Change in electrostatic potential energy

$$= W_2 = \frac{Q^2}{4\pi\varepsilon_0 x} - 0 = k\left(\frac{Q^2}{4\pi\varepsilon_0 k}\right)^{2/3}$$

So, net work, $W = W_1 + W_2 = \frac{3}{2}k\left(\frac{Q^2}{4\pi\varepsilon_0 k}\right)^{2/3} = \frac{3}{2}\left(\frac{1}{4\pi\varepsilon_0}\right)^{2/3} Q^{4/3}k^{1/3}$

Therefore, $W \propto Q^{4/3}\, k^{1/3}$

3.(B) $t = 100\times10^{-9}\, s, P = 30\times10^{-3} W, C = 3\times10^{8}\, ms^{-1}$

Momentum $= \frac{Pt}{C} = \frac{30\times10^{-3}\times1000\times10^{-9}}{3\times10^{8}} = 1.0\times10^{-17}\, kg\, m\, s^{-1}$

4.(C) $V_{ball}^2 = 2\times10\times7.2 \Rightarrow v = 12 m s^{-1}$

$X_{\text{image of ball}} = \frac{4}{3}X_{\text{ball}}$

$V_{\text{image of ball}} = \frac{4}{3}V_{\text{ball}} = \frac{4}{3}\times12 = 16\, m\, s^{-1}$

SECTION-2

5.(AB) When dielectric slabs that cover only part of the area of the capacitor plates are introduced, the charge density on the capacitor plates is no longer uniform.

If the charge density on the lower half of the plates (i.e. in front of the points O and P) is σ_1 and $-\sigma_1$, then

$$E_O = \frac{\sigma_1}{2\varepsilon_0} \quad \text{and} \quad E_P = \frac{\sigma_1}{2(K\varepsilon_0)}$$

If the charge density on the upper half of the plates (i.e. in front of the points M and N) is σ_{21} and $-\sigma_2$, then

$$E_M = \frac{\sigma_2}{2(2K\varepsilon_0)} \quad \text{and} \quad E_N = \frac{\sigma_2}{2(K\varepsilon_0)}$$

Now, the potential difference between the plates can be evaluated in two ways:

$$\Delta V = E_O\left(\frac{d}{2}\right) + E_P\left(\frac{d}{2}\right) = \frac{\sigma_1 d}{4\varepsilon_0}\left(1+\frac{1}{K}\right) \quad \text{and} \quad \Delta V = E_M\left(\frac{d}{2}\right) + E_N\left(\frac{d}{2}\right) = \frac{3\sigma_2 d}{8K\varepsilon_0}$$

Equating these expressions, we get $\sigma_1 = \left(\frac{3}{2(K+1)}\right)\sigma_2$

Therefore, $\frac{E_P}{E_O} = \frac{1}{K}$; $\frac{E_M}{E_O} = \frac{\sigma_2}{2K\sigma_1} = \left(\frac{K+1}{3K}\right)$

$\frac{E_N}{E_M} = 2$; $\frac{\Delta V}{E_O d} = \frac{K+1}{2K}$

6.(AC) The space between the planes *z* = 0 and *z* = *a* can be considered a collection of thin charge sheets, each of thickness *dz*and charge per unit area ρdz. We know that each of these thin sheets will produce a uniform electric field of magnitude $\frac{\rho dz}{2\varepsilon_0}$ directed **away from itself**

Similarly, the space between the planes *z* = 0 and *z* = –*a* can be considered a collection of thin charge sheets, each of thickness *dz*and charge per unit area $-\rho dz$. We know that each of these thin sheets will produce a uniform electric field of magnitude $\frac{\rho dz}{2\varepsilon_0}$ directed **towards itself**

So, the electric field at a point on the plane $z = \frac{a}{2}$ is

$$\vec{E} = \left(\frac{\rho\left(\frac{a}{2}\right)}{2\varepsilon_0}\right)(-\hat{k}) + \left(\frac{\rho\left(\frac{a}{2}\right)}{2\varepsilon_0}\right)(\hat{k}) + \left(\frac{\rho a}{2\varepsilon_0}\right)(-\hat{k}) = \left(\frac{\rho a}{2\varepsilon_0}\right)(-\hat{k})$$

Similarly, the electric field at a point on the plane *z* = *z* (such that $0 \le z \le a$) is

$$\vec{E} = \left(\frac{\rho(a-z)}{2\varepsilon_0}\right)(-\hat{k}) + \left(\frac{\rho z}{2\varepsilon_0}\right)(\hat{k}) + \left(\frac{\rho a}{2\varepsilon_0}\right)(-\hat{k}) = \left(\frac{\rho(a-z)}{\varepsilon_0}\right)(-\hat{k})$$

So, the potential difference between the planes *z* = 0 and *z* = *a* is

$$V_a - V_0 = -\int_0^a \left(\frac{\rho(a-z)}{\varepsilon_0}\right)(-\hat{k})\bullet(dz\ \hat{k}) = \int_0^a \left(\frac{\rho(a-z)}{\varepsilon_0}\right)dz \quad \Rightarrow \quad V_a - V_0 = \frac{\rho a^2}{2\varepsilon_0}$$

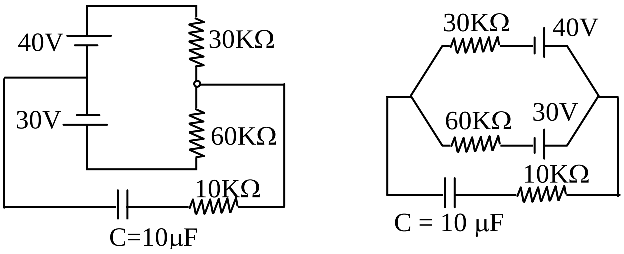
7.(BD) The stopping potential (cut off voltage) is independent of the distance of the light source.
The intensity of light is inversely proportional to the square of the distance between light source and the photoelectric cell and the saturation current depends directly on the intensity of light.

Hence, the new saturation current would be in the ratio of $\left(\frac{0.2m}{0.6m}\right)^2 = \frac{1}{9}$ which is $\frac{18mA}{9} = 2.0mA.$

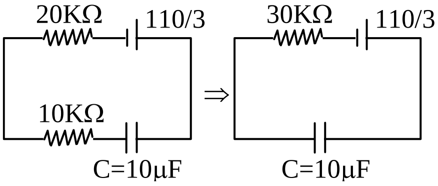
SECTION-3

1.(110)

Equivalent circuit



$$E_{Eq} = \frac{\frac{40}{30}+\frac{30}{60}}{\frac{1}{30}+\frac{1}{60}} = \frac{\frac{4}{3}+\frac{1}{2}}{\frac{1}{30}+\frac{1}{60}} = \frac{8+3}{6\times\frac{3}{60}} = \frac{110}{3}. \qquad \therefore \qquad R_{eq} = \frac{30\times 60}{30+60} = \frac{1800}{90} = 20K\Omega$$

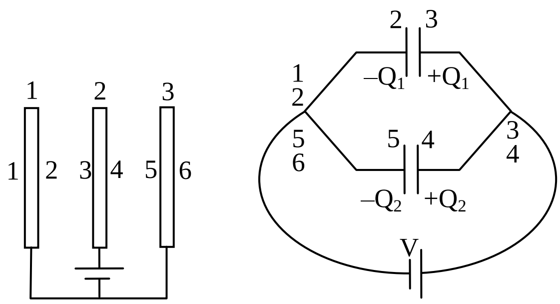


$\therefore \quad V_{max}$ on $C = \frac{110}{3}V$

2.(0.30) Time constant $\lambda_1 = RC$

$= 30\times 10^3 \times 10 \times 10^{-6} = 0.3\text{sec}$

3.(2)



$Q_1 = C_{23}V \qquad\qquad Q_2 = C_{54}V$

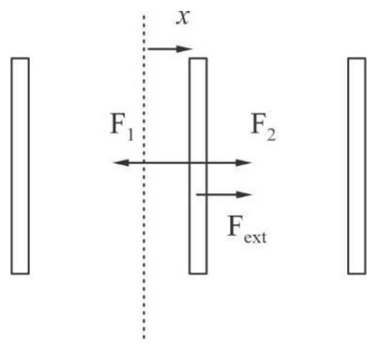
$= \frac{\epsilon_0 A}{d}V \qquad\qquad = \frac{\epsilon_0 A}{d}V$

Charge on plate (2) $= Q_1 + Q_2 = \frac{2\epsilon_0 A}{d}V$

4.(0.33) $F_{ext} = F_1 - F_2$

$dW_{ext} = (F_1 - F_2)dx$

$W_{ext} = \int (F_1 - F_2)dx$



$$= \frac{A\in_0 V^2}{2}\left[\int_0^{\partial/2} \frac{dx}{(d+x)^2} - \int_0^{\partial/2} \frac{dx}{(d-x)^2}\right]$$

$$= \frac{A\in_0 V^2}{2}\left[\left(\frac{1}{d} - \frac{2}{3d}\right) - \left(\frac{2}{d} - \frac{1}{d}\right)\right]$$

$$= \frac{A\in_0 V^2}{2}\left[\frac{1}{3d} - \frac{1}{d}\right] = \frac{-A\in_0 V}{3d} \qquad = -\frac{1}{3}\, Joules$$

SECTION-4

5.(8) $(V_C)_{rms} = I_{rms}\left(\frac{1}{\omega C}\right)$ and $(V_R)_{rms} = I_{rms}R$

$$\Rightarrow \quad (V_R)_{rms} = (V_C)_{rms}(\omega RC) = (40)(200)(100)\left(10^{-5}\right) = 8V$$

6.(5) We know that after the first charging, the charge on each capacitor is $\frac{CV}{N}$ and

$$U_I = N\left(\frac{1}{2C}\left(\frac{CV}{N}\right)^2\right) = \frac{CV^2}{2N}$$

Now, in the final steady state, let the charge on each of the original N capacitors be $\left(\frac{CV}{N} - x\right)$

Therefore, the charge on the $(N+1)^{\text{th}}$ capacitor is x

So, applying KVL, $N\left(\frac{1}{C}\left(\frac{CV}{N} - x\right)\right) = \frac{x}{C} \quad \Rightarrow \quad x = \frac{CV}{N+1}$

So, in the final steady state, the charge on the original N capacitors is

$$Q_N = \frac{CV}{N} - \frac{CV}{N+1} = \frac{CV}{N(N+1)}$$

And, the charge on the $(N+1)^{th}$ capacitor is $\frac{CV}{N+1}$

Therefore, $U_F = N\left(\frac{1}{2C}\left(\frac{CV}{N(N+1)}\right)^2\right) + \frac{1}{2C}\left(\frac{CV}{N+1}\right)^2 = \frac{CV^2}{N(N+1)}$

So, $\frac{U_F}{U_I} = \frac{1}{N+1}$

7.(3) At steady state, Heat produced = Heat lost

$\Rightarrow \quad Vi = k\left(T - T_0\right)$

$\Rightarrow \quad k = \dfrac{(50)(6)}{(120-20)} = 3 \text{ W/°C}$

8.(2) Let the instantaneous currents in the coils be I_1 and I_2

Since the coils are in parallel, the induced EMF across both of them is always equal

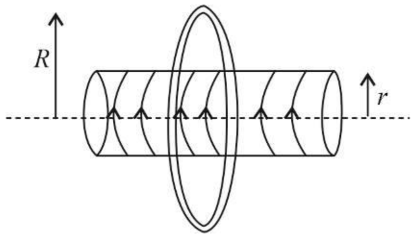
Therefore, $L_1\dfrac{dI_1}{dt} = L_2\dfrac{dI_2}{dt} \quad \Rightarrow \quad L_1 dI_1 = L_2 dI_2$

Integrating, $\int_0^{I_1} L_1 dI_1 = \int_0^{I_2} L_2 dI_2$

Therefore, at any instant, $L_1 I_1 = L_2 I_2$

9.(6) $\phi_{initial} = \left(\mu_0 n i_0\right)\pi r^2$

$\phi_{final} = \left(\mu_0 \dfrac{n i_0}{3}\right)\pi r^2 + Li$



$i = \dfrac{2\mu_0 n\pi r^2 i_0}{3L}$

$= \dfrac{2}{3} r^2 i_0 = \dfrac{2}{3}\times\dfrac{1}{4}\times i_0 = \dfrac{i_0}{6}$

10.(5) Let the charge per unit area be σ

Then, $\sigma = \dfrac{Q}{\pi R^2 - \pi\left(\dfrac{R}{2}\right)^2} = \dfrac{4Q}{3\pi R^2}$

Consider a ring element of radius *r* and thickness *dr*

Charge on the element, $dq = \sigma(2\pi r dr)$

Equivalent current due to rotation of the element, $dI = dq\left(\dfrac{\omega}{2\pi}\right) = \sigma\omega r dr$

Magnetic moment of the element, $dm = dI(\pi r^2) = \pi\sigma\omega r^3 dr$

Since the magnetic moment of each element will be in the same direction (parallel to the axis of rotation), the net magnetic moment,

$m = \int dm = \pi\sigma\omega \int_{R/2}^{R} r^3 dr = \dfrac{15}{64}\pi\sigma\omega R^4 \qquad$ So, $\quad m = \dfrac{15}{64}\pi\omega R^4\left(\dfrac{4Q}{3\pi R^2}\right) = \dfrac{5}{16} Q R^2 \omega$

CHEMISTRY

SECTION-1

1.(D) $k_{uncata.} = Ae^{-Ea_1/RT}$

$$\ell n\ k_{uncata.} = \ell nA - \frac{E_{a_1}}{RT}$$

$$k_{cata.} = Ae^{-Ea_2/RT}$$

$$\ell n\, k_{cata.} = \ell nA - Ea_2 / RT$$

$$\ell n \frac{k_{cata.}}{k_{uncata.}} = \frac{-Ea_2 + Ea_1}{RT} = \frac{-21+30}{2\times 10^{-3}\times 300} = 15$$

$$\log \frac{k_{cata}}{k_{uncata.}} = \frac{15}{2.303} = 6.51$$

2.(B) $\text{Anode}: Ag(s) \longrightarrow Ag^{+}_{(aq)} + e^{-}$

$$\text{Cathode}: \underline{Ag^{+}_{(aq)} + e^{-} \longrightarrow Ag(s)}$$

$$\text{Net Rx}^{n}: Ag^{+}_{(AgBr)} \longrightarrow Ag^{+}_{(Ag_2CO_3)}$$

$$E_{cell} = E^{\circ}_{cell} - \frac{0.059}{1}\log_{10}\frac{[Ag^{+}]_{Ag_2CO_3}}{[Ag^{+}]_{AgBr}}$$

$$0 = 0 - 0.059\log_{10}\left(\frac{\sqrt{\dfrac{(Ksp)_{Ag_2CO_3}}{[CO_3^{2-}]}}}{\dfrac{(Ksp)_{AgBr}}{[Br^{-}]}}\right); \qquad \sqrt{\frac{(Ksp)_{Ag_2CO_3}}{[CO_3^{2-}]}} = \frac{(Ksp)_{AgBr}}{[Br^{-}]}$$

$$\frac{[Br^{-}]}{\sqrt{[CO_3^{2-}]}} = \frac{(Ksp)_{AgBr}}{\sqrt{(Ksp)_{Ag_2CO_3}}} = \frac{4\times 10^{-13}}{\sqrt{8\times 10^{-12}}} = \frac{4\times 10^{-13}}{2\sqrt{2}\times 10^{-6}} = \sqrt{2}\times 10^{-7}$$

3.(B) Lyophobic sols have nearly same surface tension as that of dispersion medium.

4.(A) $Ca_3P_2 + H_2O \longrightarrow Ca(OH)_2 + \underset{(X)}{PH_3} \xrightarrow{HI_{(g)}} \underset{(Y)}{PH_4I}$

SECTION-2

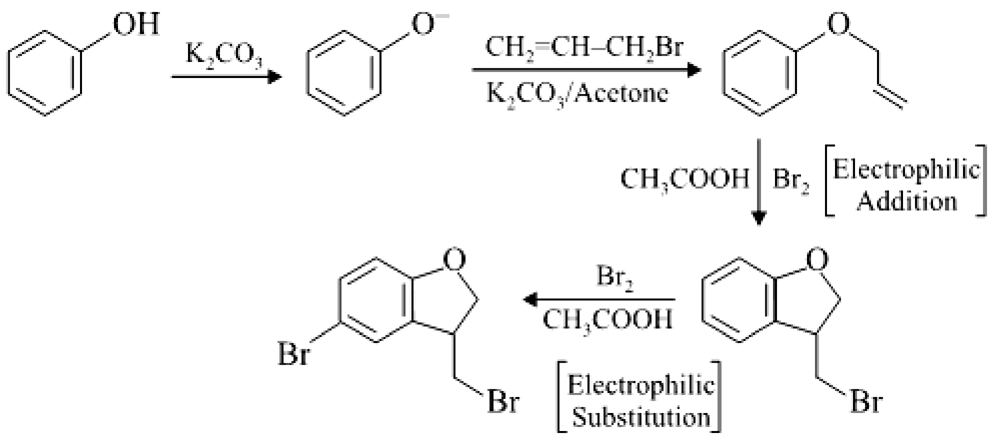
5.(ABC)

$$\underset{(A)}{(CH_3)_2CHCOOR} \xrightarrow[\text{(ii) } H_3O^{+}]{\text{(i) } 2CH_3MgBr} \underset{(B)}{(CH_3)_2CH - \overset{\overset{\displaystyle OH}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C}} - CH_3}$$

$R = C_2H_5, C_6H_5$

6.(ACD) In both cases, the reaction goes via $S_N NGP$ mechanism.

7.(AC)



SECTION-3

1.(12) $Ag + PCl_5 \rightarrow PCl_3 + AgCl$

$Sn + PCl_5 \rightarrow PCl_3 + SnCl_4$

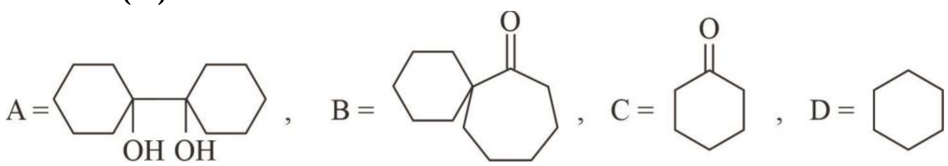
Hence $t = 1, y = 4, z = 3$

$t.y.z = 12$

2.(3) $P_{(s)} + HCl_{(aq)} \rightarrow \underset{(A)}{PCl_3} + \underset{(D)}{PH_3}$

in PH_3, three bond angles are close to 90°

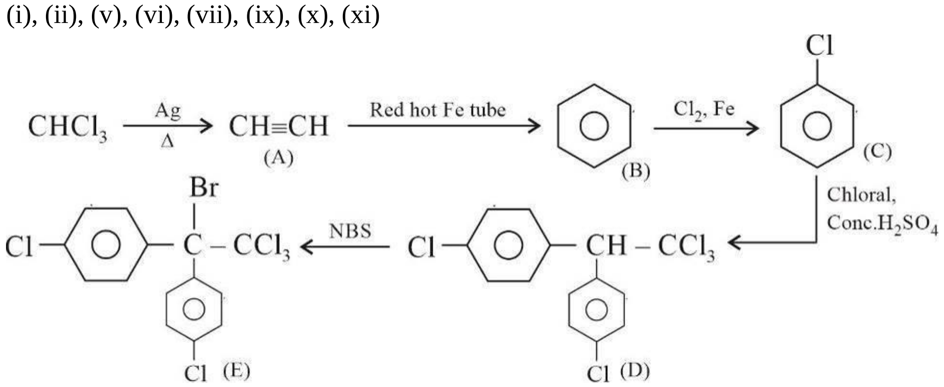
3.(11) **4.(86)**



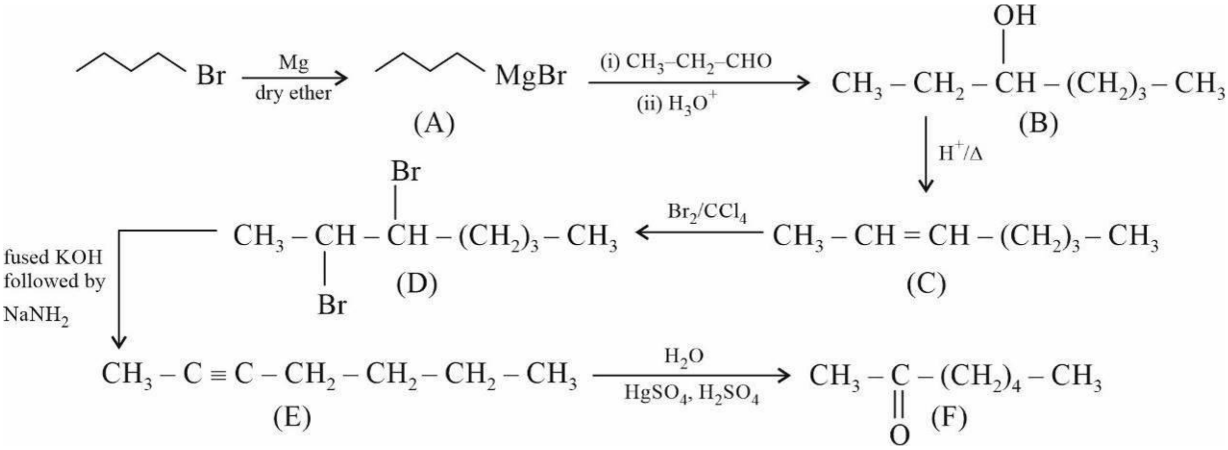
SECTION-4

5.(8) (i), (ii), (v), (vi), (vii), (ix), (x), (xi)

6.(11)



7.(114)



Molar mass = 114 g/mol

8.(108) $(\lambda_{eq}^{\infty})Ba_3(PO_4)_2 = 6(160+140-100) = 1200\ ohm^{-1}cm^2eq^{-1}$

$(k)Ba_3(PO_4)_2 = 1.2\times10^{-5}ohm^{-1}cm^{-1}$

$S = 1.2\times10^{-5}\times\dfrac{1000}{1200} = 10^{-5}$

$(K_{sp})Ba_3(PO_4)_2 = 108\times10^{-25}.$

9.(48) $\Delta T_f = K_f .m$

$0.4 = 1.86\times m \ \Rightarrow\ m = \dfrac{0.4}{1.86}$

$\pi = \dfrac{0.4}{1.86}\times0.08\times279 = 4.8\,atm = 48\times10^{-1}atm$

10.(1275) Total number of NH_3 molecules $= \dfrac{10^{16}\times10^4}{(10^{-3}/18)} = 18\times10^{23}$

No. of NH_3 molecules adsorbed per g of charcoal $= \dfrac{18\times10^{23}}{4}$

No. of moles of NH_3 adsorbed per g of charcoal $= \dfrac{18\times10^{23}}{24\times10^{23}} = \dfrac{3}{4}$

Mass of NH_3 adsorbed per g of charcoal $= \dfrac{3}{4}\times17 = 12.75g$

MATHEMATICS

SECTION-1

1.(C) Since coefficient of $x^2 + ax + 1$ are symmetrical so roots will be $\alpha, \frac{1}{\alpha}$

$$\lim_{x\to 1/\alpha}\frac{\sin\left(x^2+ax+1\right)}{(\alpha x-1)} = \lim_{x\to 1/\alpha}\frac{\sin\left[\left(x-\frac{1}{\alpha}\right)(x-\alpha)\right]}{\left(x-\frac{1}{\alpha}\right)(x-\alpha)}\cdot\frac{\left(x-\frac{1}{\alpha}\right)(x-\alpha)}{(\alpha x-1)} =$$

$$\lim_{x\to 1/\alpha}\frac{(x-\alpha)}{\alpha}=\frac{\frac{1}{\alpha}-\alpha}{\alpha}=\frac{1-\alpha^2}{\alpha^2}$$

2.(B) $e^{-\sqrt{-\ln t}} = t^{\frac{1}{\sqrt{\ln t}}}, t\in(0,1)$

3.(D) $f'(x) = A\cdot\frac{\pi}{2}\cos\left(\frac{\pi x}{2}\right)$

$f'\left(\frac{1}{2}\right) = A\frac{\pi}{2}\cos\frac{\pi}{4} = \frac{A\pi}{2\sqrt{2}} = \sqrt{2}$ $\quad\therefore\quad A = \frac{4}{\pi}$

$\int_0^1 f(x)\,dx = \left[-\frac{2A}{\pi}\cos\left(\frac{\pi x}{2}\right) + Bx\right]_0^1$

$\frac{2A}{\pi} + B = \frac{2A}{\pi}$ $\quad\therefore\quad B = 0$

4.(C) $x|x| - x^2|x| \ge 0 \Rightarrow |x|(x-x^2)\ge 0$

$x = 0, 1$ or $x - x^2 > 0 \Rightarrow 0 < x < 1$

$$f(x)=\begin{cases} x|x| & , \quad 0\le x\le 1 \\ x^2|x| & , \quad x<0 \text{ or } x>1\end{cases}$$

$$g(x)=\begin{cases} x^2|x| & , \quad 0\le x\le 1 \\ x|x| & , \quad x<0 \text{ or } x>1\end{cases}$$

$$\int_{-1}^{0}(x^2|x| - x|x|)dx + \int_0^1 (x|x| - x^2|x|)\,dx$$

$$= \int_{-1}^{0}(x^2 - x^3)\,dx + \int_0^1 (x^2-x^3)\,dx = \int_{-1}^{1}(x^2-x^3)\,dx = 2\int_0^1 x^2\,dx = \frac{2}{3}$$

SECTION-2

5.(BCD) $2a^2 + a + 1 > 3a^2 - 4a + 1$

$\Rightarrow \quad a^2 - 5a < 0 \quad\Rightarrow\quad a(a-5) < 0 \quad\Rightarrow\quad a\in(0,5)$

But at $a = 1$, $3a^2 - 4a + 1 = 0$ which is not in domain $\quad\Rightarrow\quad a = 2, 3, 4$.

6.(AB) $(x^2+1)(x^2-bx+b)>0$

So, $b^2-4b<0$

$\Rightarrow$ $b\in(0,\,4)$

7.(ABC) Check derivative of $\left(\dfrac{\tan x}{\sin^7 x}\right)$

SECTION-3

1.(1), 2.(1)

Since $f(x)$ is even, so we check in $[0,2]$

$$f(x)=\begin{cases} ax^2+b, & 0\le x<1 \\ 1, & x=1 \\ \dfrac{\lambda}{x} & 1<x\le 2\end{cases}$$

for continuity, a + b = 1 = λ

3.(1), 4.(1)

$$\lim_{x\to 0^+} f(x)=\lim_{x\to 0^+}\frac{\tan^2\{x\}}{\left(x^2-[x]^2\right)}=\lim_{x\to 0^+}\frac{\tan^2 x}{x^2}=1$$

$$\left(x\to 0^+\Rightarrow [x]=0\Rightarrow \{x\}=x\right)$$

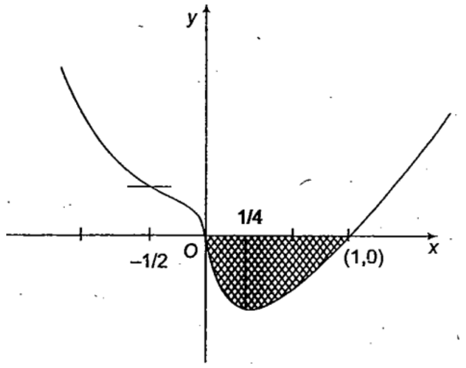
$$\lim_{x\to 0^-} f(x)=\lim_{x\to 0^-}\sqrt{\{x\}\cot\{x\}}=\sqrt{\cot 1}$$

$$\left(x\to 0^-,[x]=-1\Rightarrow \{x\}=x+1\Rightarrow \{x\}\to 1\ as\ x\to 0^-\right)$$

Also $\cot^{-1}\left(\lim\limits_{x\to 0^-} f(x)\right)^2=\cot^{-1}(\cot 1)=1$

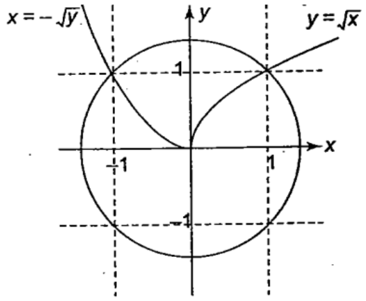
SECTION-4

5.(0) Graph of $f(x)$ is as



$$A=\int_0^1 (x^{4/3}-x^{1/3})\,dx=\left.\frac{3}{7}x^{3/7}-\frac{3}{4}x^{4/3}\right]_0^1 =\left|\frac{3}{7}-\frac{3}{4}\right|=\left|\frac{4-7}{28}\right|=\frac{9}{28}\quad\Rightarrow\quad A=\frac{9}{28}=0.32$$

6.(1) Required area = area of one quadrant of the circle $= \pi/2$



7.(2) $\frac{dy}{dx} - y = 1 - e^{-x}$

$P = -1 \quad Q = 1 - e^{-x}$

I.F. $= e^{\int P dx} = e^{\int -1 dx} = e^{-x}$

$\therefore \quad y \cdot e^{-x} = \int e^{-x}(1 - e^{-x})dx + C$

$ye^{-x} = -e^{-x} + \frac{1}{2}e^{-2x} + C$

$y = -1 + \frac{1}{2}e^{-x} + Ce^{x}$

$\because \quad x = 0 \quad y = y_0$

So $\quad C = y_0 + \frac{1}{2}$

$y = -1 + \frac{1}{2}e^{-x} + (y_0 + 1/2)e^{x}$

$x \to \infty \quad y \to$ finite value so $y_0 + \frac{1}{2} = 0$

$y_0 = -\frac{1}{2}$

8.(3) $y = u^m$

$\frac{dy}{dx} = mu^{m-1}\frac{du}{dx}$

The given differential equation becomes

$2x^4 \cdot u^m \cdot mu^{m-1}\frac{du}{dx} + u^{4m} = 4x^5$

$\Rightarrow \quad \frac{du}{dx} = \frac{4x^5 - u^{4m}}{2mx^4x^{2m-1}}$

For homogeneous equation degree should be same in numerator & denominator so,

$6 = 4m = 4 + 2m - 1 \Rightarrow m = \frac{3}{2}$

9.(4) $y(1+xy)dx = xdy$ or $\frac{dy}{dx} = \frac{y(1+xy)}{x}$

$\Rightarrow \quad \frac{dy}{dx} - \frac{y}{x} + y^2$ or $\frac{1}{y^2}\frac{dy}{dx} - \frac{1}{y}\frac{1}{x} = 1$

Put $-\frac{1}{y} = t$

10.(4) Let $I=\int \frac{(x^2-1)\,dx}{x^3\sqrt{2x^4-2x^2+1}}$ [dividing numerator and denominator by x^5]

$=\int \frac{\left(\frac{1}{x^3}-\frac{1}{x^5}\right)dx}{\sqrt{2-\frac{2}{x^2}+\frac{1}{x^4}}}$ Put $2-\frac{2}{x^2}+\frac{1}{x^4}=t \Rightarrow \left(\frac{4}{x^3}-\frac{4}{x^5}\right)dx=dt \;\therefore$

$I=\frac{1}{4}\int \frac{dt}{\sqrt{t}}=\frac{1}{4}.\frac{t^{1/2}}{1/2}+c=\frac{1}{2}\sqrt{2-\frac{2}{x^2}+\frac{1}{x^4}}+c$