SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR MPC **Date: 09-07-2020**
Time: 3 Hours **Max Marks : 300**

JEE MAINS – GT 5

KEY SHEET

MATHS

1) **B**	2) **A**	3) **C**	4) **A**	5) **A**	6) **B**	7) **C**	8) **B**	9) **B**	10) **C**
11) **A**	12) **B**	13) **D**	14) **A**	15) **D**	16) **C**	17) **C**	18) **B**	19) **C**	20) **A**
21) **-3**	22) **11**	23) **2**	24) **5**	25) **28**					

PHYSICS

26) **C**	27) **D**	28) **A**	29) **D**	30) **A**	31) **A**	32) **A**	33) **B**	34) **C**	35) **C**
36) **B**	37) **A**	38) **B**	39) **D**	40) **D**	41) **B**	42) **C**	43) **D**	44) **D**	45) **C**
46) **250**	47) **200**	48) **2.5**	49) **3.2**	50) **150**					

CHEMISTRY

51) **A**	52) **D**	53) **D**	54) **B**	55) **A**	56) **B**	57) **A**	58) **A**	59) **D**	60) **D**
61) **A**	62) **D**	63) **D**	64) **C**	65) **A**	66) **D**	67) **B**	68) **D**	69) **B**	70) **D**
71) **4**	72) **8**	73) **75**	74) **0.05**	75) **-96**					

HINTS & SOLUTIONS

MATHEMATICS

01. P(number chosen is odd) = 3/5
P(number chosen is even)=2/5

$ab+c$ *is even* → *a, b, c are all odd*

$ab+c$ *is even* → *c is even atleast a or b is even*

E: $(ab+c)$ is even note that even E can occurs in two cases

E_1 :all the three numbers a,b and 'c' are odd $P(E_1)=\left(\frac{3}{5}\right)^3=\frac{27}{125}$

E_2 : 'c' is even and at least one of a or b is even $P(E_2)=\frac{2}{5}\left(1-\frac{9}{25}\right)=\frac{2}{5}.\frac{16}{25}=\frac{32}{125}$

$P(E)=P(E_1\ or\ E_2)$

$= P(E_1) + P(E_2)$

$= \frac{59}{125}$

02.

Let $g(x) = (\sin x)^{\ln x} = e^{\ln x . \ln(\sin x)}$

$f(x) = g'(x) = (\sin x)^{\ln x} \left[\cot x (\ln x) + \frac{\ln(\sin x)}{x} \right]$

Hence $f\left(\frac{\pi}{2}\right) = g'\left(\frac{\pi}{2}\right) = 1(0+0) = 0$

03. $f''(x)$ is an odd function

$\therefore \phi\ \alpha, \beta\ = 0 \Rightarrow\ \sin^4\alpha - 1\ ^2 +\ \cos^4\beta - 1\ ^2 + 2\ \sin^2\alpha - \cos^2\beta\ ^2 = 0$

$\Rightarrow \sin^2\alpha + \sin^2\beta = 1$

04. The given equation denotes that PA+PB=13
Point P lies on line segment AB

05. $y = x^{3/2}; \frac{dr}{dt} = 11$

$\frac{dx}{dt}$ *when* $x = 3$

$r^2 = x^2 + y^2 \qquad \Rightarrow r = 6$

$r\frac{dr}{dt} = x\frac{dx}{dt} + y\frac{dy}{dt}.........(1)$

Also, $\frac{dy}{dt} = \frac{3}{2}\sqrt{x}\frac{dx}{dt}.....(2)$

$r\frac{dr}{dt} = x\frac{dx}{dt} + y\frac{3}{2}\sqrt{x}\frac{dx}{dt}$

$r\frac{dr}{dt} = \left(x + \frac{3y\sqrt{x}}{2}\right)\frac{dx}{dt}$

$6.11 = \left(3 + \frac{3.3\sqrt{3}.\sqrt{3}}{2}\right)\frac{dx}{dt}$

$66 = \left(3 + \frac{27}{2}\right)\frac{dx}{dt}$

$\Rightarrow 66 = \left(\frac{33}{2}\right)\frac{dx}{dt}$

$\Rightarrow \frac{dx}{dt} = 4$

06. D.R's normal to the plane P1 is parallel to

$(2j + 3k) \times (4j - 3k)$

$$\begin{vmatrix} i & j & k \\ 0 & 2 & 3 \\ 0 & 4 & -3 \end{vmatrix}$$

$i(-6-12) = -18i$

D.R's normal to the plane P2 is parallel to

$(j - k) \times (3i + 3j)$

$$\begin{vmatrix} i & j & k \\ 0 & 1 & -1 \\ 3 & 3 & 0 \end{vmatrix}$$

$i(3)-j(3)+k(-3)$

D.R's parallel to the line of intersection of planes P_1 *and* P_2 is

$$\begin{vmatrix} i & j & k \\ -1 & 0 & 0 \\ 1 & -1 & -1 \end{vmatrix} = i(0)-j(1)+k(1) = -j+k$$

$=(0,-1,1)$

Angle between $\cos\theta = \left|\frac{0-1-2}{3\sqrt{2}}\right|$

$\theta = \frac{\pi}{4}$

07. $(\sin x+\cos x)+\left(\frac{\sin x}{\cos x}+\frac{\cos x}{\sin x}\right)+\left(\frac{1}{\cos x}+\frac{1}{\sin x}\right)=7$

$(\sin x+\cos x)+\frac{1}{\sin x\cos x}+\left(\frac{\sin x+\cos x}{\sin x\cos x}\right)=7$

$(\sin x+\cos x)\left(1+\frac{2}{\sin 2x}\right)=7-\frac{2}{\sin 2x}$

Squaring we get

$(1+\sin 2x)\left(1+\frac{4}{\sin^2 2x}+\frac{4}{\sin 2x}\right)=49+\frac{4}{\sin^2 2x}-\frac{28}{\sin 2x}$

$\Rightarrow \sin^3 2x-44\sin^2 2x+36\sin 2x=0$

$\sin^2 2x-44\sin 2x+36=0 \quad \because \sin 2x\neq 0$

$\therefore \sin 2x = 22-8\sqrt{7} \therefore a=22\ b=8$

08. $\sin\cos^{-1}\left(\cos\left(\tan^{-1}x\right)\right)=p$

For $x\in R; \tan^{-1}x\in\left(\frac{-\pi}{2},\frac{\pi}{2}\right)$

$\cos\left(\tan^{-1}x\right)\in(0,1]$

$\cos^{-1}\cos\left(\tan^{-1}x\right)\in\left[0,\frac{\pi}{2}\right)$

$\sin\left[\cos^{-1}\cos\left(\tan^{-1}x\right)\right]\in[0,1)$

09. Equation of pair of tangents, $(a^2-1)y^2-x^2+2ax-1=0$

angle between them, $\tan\theta=\frac{2\sqrt{h^2-ab}}{a+b}=\frac{2\sqrt{a^2-1}}{a^2-2}<0 \Rightarrow a\in\left(-\sqrt{2},-1\right)\cup\left(1,\sqrt{2}\right)$

10.

P	q	$p\to q$	$\sim p$	$\sim pvq$	$p\to q\leftrightarrow(\sim pvq)$
T	T	T	F	T	T
T	F	F	F	F	T
F	T	T	T	T	T
F	F	T	T	T	T

11. $x_1+x_2=15;\ x_r\geq 0;\ r=2; n=15$

No. of non negative integral solutions $= {}^{n+r-1}C_{r-1} = {}^{16}C_1 = 16$

$x_1 + x_2 + x_3 + x_4 + x_5 = 20$

$x_3 + x_4 + x_5 = 5 \Rightarrow {}^{5+3-1}C_{3-1} = {}^7C_2 = 21$

Total no. of solutions = 16 x 21 = 336

12. $\bar{x} = \dfrac{1.1^2 + 2.2^2 + 3.3^2 + ... + n.n^2}{1^2 + 2^2 + ... + n^2} = \dfrac{\sum n^3}{\sum n^2} = \dfrac{3n(n+1)}{2(2n+1)}$

13. put $\sqrt{x-1} = t \text{ or } x = t^2 + 1$

$\sqrt{t^2 + 4 - 4t} + \sqrt{t^2 + 9 - 6t} = 1$

$\Rightarrow \sqrt{(t-2)^2} + \sqrt{(t-3)^2} = 1 \Rightarrow |t-2| + |t-3| = 1$

This equation is satisfied for all values of t between 2 and 3 that is $2 \le t \le 3$ thus the given equation satisfied for all values of x lying between 5 and 10

14. $f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$

$= \lim\limits_{h \to 0} \dfrac{f\left(\dfrac{2x+2h}{2}\right) - f(x)}{h}$

$= \lim\limits_{h \to 0} \dfrac{\dfrac{f(2x) + f(2h)}{2} - f(x)}{h}$

We have $f\left(\dfrac{x+y}{2}\right) = \dfrac{f(x) + f(y)}{2}$

$x = 2x,\ y = 0 \text{ then } f(x) = \dfrac{f(2x) + f(0)}{2}$

$f(2x) = 2f(x) - f(0)$

$f'(x) = \lim\limits_{h \to 0} \dfrac{2f(x) - f(0) + 2f(h) - f(0) - 2f(x)}{2h}$

$\lim\limits_{h \to 0} \dfrac{f(h) - f(0)}{h} = f'(0) = -1$

15. $2^{n\left(\frac{n+1}{2}\right)} = 2^{7 \times 4} = 2^{28}$

16. Let α, β be roots and

$\alpha > 2\ \beta < 2$

$(\alpha - 2)(\beta - 2) < 0$

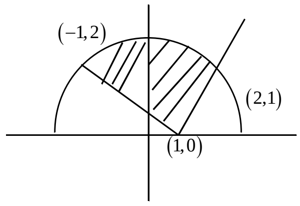
$\alpha\beta - 2(\alpha + \beta) + 4 < 0$

$k^2 + k - 8 - 2(k+1) + 4 < 0$

$k^2 - k - 6 < 0$

$(k-3)(k+2) < 0, \quad also\ \Delta > 0 \Rightarrow 3k^2 + 2k - 33 < 0 \Rightarrow (3k+11)(k-3) < 0 \Rightarrow \dfrac{-11}{3} < k < 3$,

$-2 < k < 3$

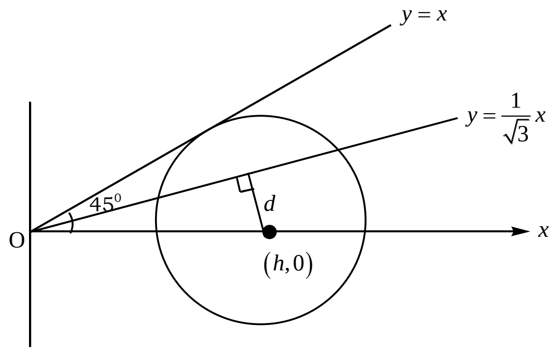


17.

Area = $\int_{-1}^{2}\left(\sqrt{5-x^2}-|x-1|\right)dx$

$=\int_{-1}^{2}\sqrt{5-x^2}\,dx+\int_{-1}^{1}(x-1)\,dx-\int_{1}^{2}(x-1)\,dx$

18.



$r=\frac{h}{\sqrt{2}}$ *and* $d=\frac{h}{2}$

$2\sqrt{\frac{h^2}{2}-\frac{h^2}{4}}=2\Rightarrow h=2$

$r=\sqrt{2}$

19. $f(x)=\begin{cases}-2x & for\ \ x\le -1\\ 2 & for\ -1\le x\le 1\\ 2x & for\ x\ge 1\end{cases}$

F is diff in $(-1,1)$

20. Let the line be $\frac{x}{a}=\frac{y}{b}=\frac{z}{c}$

This intersects the given line

$\begin{vmatrix}1 & -3 & 5\\ a & b & c\\ 2 & 4 & 3\end{vmatrix}=0$ *and* $\begin{vmatrix}4 & -3 & 14\\ a & b & c\\ 2 & 3 & 4\end{vmatrix}=0$

21. Slope of the give line = $-\frac{3}{2}$

The points on the curve at which the tangent is parallel to the given line. So, differentiating both sides with respect to x of $3x^2-4y^2=72$ we get

$\frac{dy}{dx}=\frac{3x}{4y}=\frac{-3}{2}(given)$

$\Rightarrow\frac{x}{y}=-2$

Now $3\left(\frac{x}{y}\right)^2-4=\frac{72}{y^2}\Rightarrow y^2=9\Rightarrow y=-3,3$

So, points are $(-6,3)\,and\,(6,-3)$

Now, distance of $(-6,3)$ from the given line = $\left|\frac{-18+6+1}{\sqrt{13}}\right|=\frac{11}{\sqrt{13}}$

And distance of $(6,-3)$ from the given line = $\left|\frac{18-6+1}{\sqrt{13}}\right|=\frac{13}{\sqrt{13}}$

Clearly , the required point is on $(-6,3)=(x_o,y_o)$ (given)

So, $x_o=-6, y_o=3$

Hence $(x_0+y_o)=-6+3=-3$

22.

$|P| = 1(12-12) - \alpha(4-6) + 3(4-6)$

$= 2\alpha - 6$

$|P| = |A|^2 = 16$

$2\alpha - 6 = 16$

$\alpha = 11.$

23. k = 2,

Let $e^{i\frac{2\pi}{n}} = \alpha$ then $\sum_{j=1}^{n-12} \frac{1}{1-e^j} = \frac{1}{1-\alpha} + \frac{1}{1-\alpha^2} + ... + \frac{1}{1-\alpha^{n-1}}$

Where α is a nth root of unity $\left(\alpha, \alpha^2, \alpha^3, ...\alpha^{n-1}\right)$ are the roots of

$$\frac{x^n - 1}{x-1} = (x-\alpha)\left(x-\alpha^2\right).......\left(x-\alpha^{n-1}\right)$$

Taking log on both side

$$\log\frac{x^n-1}{x-1} = \log(x-\alpha) + \log\left(x-\alpha^2\right) + ... + \log\left(x-\alpha^{n-1}\right)$$

Diff w.r.t. x and use $\lim\limits_{x\to 1}$

$$\Rightarrow \frac{n-1}{2} = \frac{1}{1-\alpha} + \frac{1}{1-\alpha^2} + ... + \frac{1}{1-\alpha^{n-1}}$$

24.

$$\int_{-2}^{2} f(x)dx = \int_{-2}^{0}\left(x-[x]\right)dx + \int_0^2\left(x+|x|\right)dx = 5$$

25. The coefficient of x^6 in the given expression = coefficient of x^6 in

$\left(1+{}^6C_1x^6\right)\left(1+{}^5C_1x^5\right)\left(1+{}^4C_1x^4\right)\left(1+{}^3C_1x^3+{}^3C_2x^6\right)\left(1+{}^2C_1x^2+{}^2C_2x^4\right)(1+x)$

= coefficient of x^6 in $\left(1+6x^6+5x^5+4x^4\right)\left(1+2x^2+3x^3+x^4+6x^5+3x^6\right)(1+x)$

= coefficient of x^6 in $\left(11x^5+17x^6\right)(1+x)$

= 28

PHYSICS

26. $T = 2\pi\sqrt{\frac{l}{g}}$ *or* $g = 4\pi^2\frac{l}{T^2}$

or $\log g = \log\left(4\pi^2\right) + \log l - 2\log T$. The maximum error in g is

$$\frac{\Delta g}{g} = \frac{\Delta l}{l} + 2\frac{\Delta T}{T} = 2\% + 2\times 3\% = 8\%$$

27. Refer to Fig. A is the highest point on the trajectory

Average velocity $= \frac{displacement\,OA}{time\,taken}$

$$= \frac{\sqrt{h_{\max}^2 + \frac{R^2}{4}}}{\frac{1}{2}t_f}$$

Where $h_{\max} = \frac{u^2\sin^2\theta}{2g}$

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

and $t_f = \dfrac{2u\sin\theta}{g}$

Using these in Eq. (1) and simplifying we get average velocity $= \dfrac{u}{2}\left(1+3\cos^2\theta\right)^{1/2}$

So the correct choice is (d)

28. The forces acting on the balloon are its weight acting downwards and upthrust F acting upwards. Thus

$F - Mg = Ma$

When mass m is removed, we have

$F - (M-m)g = (M-m)a'$

Where a' is the new acceleration. Eliminating F from (i) and (ii) and simplifying we get

$a' = \dfrac{Ma+mg}{M-m}$

Which is choice

29. The velocity attained after a fall through a height h is given by

$v^2 = 2gh$

Thus $h \propto v^2$. The velocity after first rebound is ev. Therefore, the height attained after first rebound $= e^2 h$. Velocity after second rebound is $e^2 v$. Hence the height attained after second rebound is $e^4 h$. Thus the correct choice is

30. From the law of conservation of angular momentum we have

$I\omega = I'\omega'$

Here $I = MR^2 \; and \; I' = (M+2m)R^2$. Therefore

$\dfrac{\omega'}{\omega} = \dfrac{I}{I'} = \dfrac{M}{(M+2m)}$

Hence the correct choice

32. Using Bernoulli's theorem, we have

$\dfrac{1}{2}\rho v^2 = p = \rho g h$

or $h = \dfrac{v^2}{2g}$

Now $v = r\omega = r(2\pi v)$. Using this in (1) we get

$h = \dfrac{2\pi^2 v^2 r^2}{g}$

Given $v = 2\,rev.$ per second, $r = 0.05\,m, g = 10\,ms^{-2} \; and \; \pi^2 = 10$

Using these values, we get h= 0.02 m = 2 cm, which is choice

33. Let $\theta_1 \; and \; \theta_2$ be the temperatures at the two faces of the composite slab and let θ be the temperature at the common face of the slab. If l is the length of each slab and A the area of their face, then in the steady state, the rate of flow of heat across A=rate of flow of heat across B, ie

$\dfrac{k_1 A(\theta_1-\theta)}{l} = \dfrac{k_2 A(\theta-\theta_2)}{l}$

or $k_1(\theta_1-\theta) = k_2(\theta-\theta_2)$

Now $k_2 = 2k_1$. Therefore

$(\theta_1-\theta) = 2(\theta-\theta_2)$

Also, $\theta_1-\theta_2 = 12^0 C \; or \; \theta_2-\theta_1-12$

Using (ii) in (i) we have

$(\theta_1-\theta) = 2\{\theta-(\theta_1-12)\}$

or $3(\theta_1 - \theta) = 24$

or $\theta_1 - \theta = 8^0 C$

Hence the correct choice

34. The velocity of transverse waves is given by $v = \sqrt{T/m}$ where T= tension and m = mass per unit length of the wire. If r is the radius of the wire and ρ its density, then $m = \pi r^2 \rho$. Therefore,

$v = \frac{\sqrt{T}}{r\sqrt{\pi\rho}}.Thus\ v_A = \frac{\sqrt{T_A}}{r_A\sqrt{\pi\rho}}$

and $v_B = \frac{\sqrt{T_B}}{r_B\sqrt{\pi\rho}}$

Now $\frac{v_A}{v_B} = \sqrt{\frac{T_A}{T_B}}.\frac{r_B}{r_A}$

It is given that $r_A = 2\ r_B\ and\ T_A = \frac{1}{2}T_B$. Hence

$\frac{v_A}{v_B} = \frac{1}{2\sqrt{2}}$. The correct choice is

35. Given $I = 1mA = 10^{-3} A,\ G = 20\Omega\ and\ R = 4980\Omega$

Now $I = \frac{V}{R+G}$

or $V = I(R+G) = 10^{-3} \times (4980+20)$

$= 5.0V$

Hence the correct choice is

36. Given $v = (3\hat{i} + 2\hat{j}) ms^{-1}\ and\ B = (2\hat{j} + 3\hat{k})$ tesla.

Force experienced by the proton is

$F = q(v \times B) = q(3\hat{i} + 2\hat{j}) \times (2\hat{j} + 3\hat{k})$

$= q(6\hat{i} \times \hat{j} + 9i \times \hat{k} + 4\hat{j} \times \hat{j} + 6\hat{j} \times \hat{k})$

$= q(6\hat{k} - 9\hat{j} + 0 + 6\hat{i})$

$= 3q(2\hat{i} - 3\hat{j} + 2\hat{k})$ newton

$\therefore$ Acceleration $= \frac{F}{m} = \frac{3q}{m}(2\hat{i} - 3\hat{j} + 2\hat{k})$

$= 3 \times (0.96 \times 10^8)(2\hat{i} - 3\hat{j} + 2\hat{k})$

$= 2.88 \times 10^8 (2\hat{i} - 3\hat{j} + 2\hat{k}) ms^{-2}$

Hence the correct choice is

37. Let I_0 be the maximum current and I be the current at time t when the energy stored in inductor becomes 1/9 of the maximum energy, then

$\frac{1}{2}LI^2 = \frac{1}{9} \times \frac{1}{2}LI_0^2 \Rightarrow I = \frac{I_0}{3} \Rightarrow I_0 = 3I$

Time constant $\tau = \frac{L}{R} = \frac{100 \times 10^{-3}}{0.2} = \frac{1}{2}$ second

Now $I = I_0(1 - e^{-t/\tau})$

$\Rightarrow I = 3I(1 - e^{-t/\tau})$

$\Rightarrow\ e^{-t/\tau} = \frac{2}{3}$

$\Rightarrow\ e^{t/\tau} = \frac{3}{2}$

$\Rightarrow\ \frac{t}{\tau} = \ln\left(\frac{3}{2}\right)$

$t = \tau \ln\left(\frac{3}{2}\right) = \frac{1}{2}\ln\left(\frac{3}{2}\right)$ second

So the correct choice is

38. Impedance $z = \sqrt{R^2 + (\omega L)^2}$ $and\ I_0 = \frac{V_0}{Z}.As\,\omega$ is increased, Z increase. Hence current I_0 decreases. As a result the brightness of the bulb will decrease. So the correct choice is

39. $B_0 = \frac{E_0}{c} = \frac{6.0\times10^{-4}}{3\times10^{8}} = 2.0\times10^{-12}T$ which is choice is

40. $E = \frac{1}{2}mv^2 = hv_0 - W_0.Now\,E_1 = 2-1 = 1eV$ and

$E_2 = 10-1 = 9\,eV$. Therefore $E_1/E_2 = 1/9\,i.e$

$$\frac{\frac{1}{2}mv_1^2}{\frac{1}{2}mv_2^2} = \frac{1}{9}$$

or $\frac{v_1}{v_2} = \frac{1}{3}$. Hence the correct choice is

41. The longest wavelengths in the two series are given by

$\frac{1}{\lambda_L} = R\left(\frac{1}{1^2} - \frac{1}{2^2}\right) = R.\frac{3}{4}$

and $\frac{1}{\lambda_B} = R\left(\frac{1}{2^2} - \frac{1}{3^2}\right) = R.\frac{5}{36}$

$\therefore\ \frac{\lambda_B}{\lambda_L} = \frac{3}{4}\times\frac{36}{5} = \frac{27}{5}$ $or\ \lambda_L : \lambda_B = 5:27$

42. A pn junction diode is formed by joining a p-type semiconductor to an n-type semiconductor. Separately, the two semiconductors are electrically neutral. When they are joined, some electrons near the junction diffuse from the n-type into the p-type semiconductor, where they fill a few of the holes. Consequently, the n-type is left with a positive charge and the p-type acquires a net negative charge. Therefore a potential difference is established, with the n-type at a higher potential than the p-type. Hence an electric field is set up at the junction and it is directed from the n-type side to the p-type side. Thus the correct choice is

43. Gate P is OR gate and gate Q is AND gate. The output of gate Q is $X = 1$ only if D=1 and C=1 If $A = 1 and\ B = then\ D = 1$. So the only correct choice is

44. $\lambda_{\min} = \frac{\lambda}{4}$

45. $F = 6\pi\eta rv$

$F' = 6\pi\eta\left(\frac{r}{2}\right)\times\left(\frac{v}{2}\right) = \frac{1}{4}\times6\pi\eta rv = \frac{F}{4}$

So the correct choice is

46. sol: As $\frac{P_2}{P_1}=\frac{T_2}{T_1}, \frac{\left(P+\frac{0.4}{100}P\right)}{P}=\frac{T+1}{T}$

or $1+\frac{0.4}{100}=1+\frac{1}{T}$

Whence, $T=250\,K$

47. $T_1=127^0C=127+273=400\,K,\ T_2=27^0C=300\,K, Q=800\,J$

The efficiency of the engine is given by

$\eta=\frac{W}{Q}=1-\frac{T_2}{T_1}$

$\therefore$ Work done $W=Q\left(1-\frac{T_2}{T_1}\right)$

$=800\times\left(1-\frac{300}{400}\right)=200\,J$

Hence the correct choice is

48. Potential difference between the plates before the slab is introduced is

$V=E\times d=200\times 0.05=10V$

The capacitance of the capacitor is given by

$C=\frac{\varepsilon_0 A}{d}=\frac{\varepsilon_0 A}{0.05}\ or\ \varepsilon_0 A=0.05C$

When a slab of dielectric constant K and thickness t is introduced, the capacitance becomes

$C'=\frac{\varepsilon_0 A}{d-t\left(1-\frac{1}{K}\right)}=\frac{0.05C}{0.05-0.01\left(1-\frac{1}{4}\right)}=\frac{20C}{17}$

Now $Q-CV=C'V'$. Therefore

$V'=\frac{CV}{C'}=\frac{CV}{20C/17}=\frac{17V}{20}=\frac{17\times 10}{20}=8.5V$

49. Given $\beta=4.0\,mm\ and\ \lambda=6000\,\overset{0}{A}$

We know that the fringe width is given by

$\beta=\frac{\lambda D}{d}$

for $\lambda'=4800\,\overset{0}{A},$ the fringe width will be

$\beta'=\frac{\lambda' D}{d}$

From (i) and (ii) we have

$\beta'=\beta\frac{\lambda'}{\lambda}=\frac{4.0mm\times 4800\,\overset{0}{A}}{6000\,\overset{0}{A}}=3.2\,mm$

50. Friction force $=\mu mg=0.2\times 5\times 10=10\,N$. Effective force F = applied force - frictional force = 25-10= 15 N. Kinetic energy = work done by force F in pulling the body through a distance $S\left(=10\,m\right)=15\times 10=150\,J,$ which is choice is

CHEMISTRY

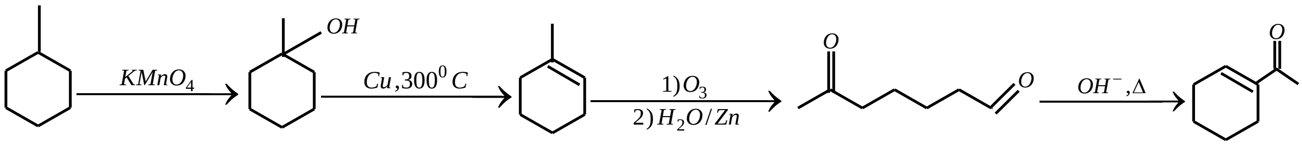
51. NCERT – XI, VOL – II, P.NO: 277,278, 281, 287
52. NCERT – XI, VOL – II, P.NO: 313
53. NCERT – XII, VOL – I, P.NO: 220

54. NCERT – XII, VOL – I, P.NO:199

55. NCERT – XI, VOL – I, P.NO: 127

57. NCERT – XI, VOL – II, P.NO: 407

58.



60. NCERT – XII, VOL – II, P.NO: 291

61. NCERT – XI, VOL – I, P.NO: 183

$\Delta = -10\times 75.3 - 6030 - 36.8\times 10$

$= -753 - 6030 - 368 = -7151\,J$

62. NCERT – XI, VOL – I, P.NO: 36

63. NCERT – XII, VOL – II, P.NO: 399

64. NCERT – XI, VOL – II, P.NO: 350

68. NCERT – XI, VOL – I, P.NO: 228, Q.NO: 7.45

$\left[H^+\right]$ from H_2S is negligible when compared with, $\left[H^+\right]$ from HCl

$$K_{a1} = \frac{\left[H^+\right]\left[HS^-\right]}{\left[H_2S\right]} \Rightarrow \left[HS^-\right] = K_{a1}\frac{\left[H_2S\right]}{\left[H^+\right]} = 9.1\times 10^{-18}\times\frac{10^{-1}}{10^{-3}}$$

$$= 9.1\times 10^{-6} M$$

$$K_{a1}K_{a2} = \frac{\left[H^+\right]^2\left[S^{2-}\right]}{\left[H_2S\right]}\left[S^{2-}\right] = \frac{9.1\times 10^{-8}\times 1.2\times 10^{-13}\times 0.1}{\left(10^{-3}\right)^2}$$

$$= 10.92\times 10^{-16} M$$

69. NCERT – XII, VOL – I, P.NO: 62

$$P_{\text{Benzene}} = \frac{1}{5}\times 50 = 10mm \text{ of Hg}$$

$$P_{\text{Toluene}} = \frac{4}{5}\times 30 = 24mm \text{ of Hg}$$

In vapour phase $x_{\text{Benzene}} = \frac{10}{34} = 0.29$

70. NCERT – XII, PART – I, P.NO: 130

71. NCERT – XI, VOL –I I, P.NO: 265

73. NCERT – XI, VOL – II, P.NO: 358

$$\omega\% \text{ of } N = \frac{1.4\times 10\times 2}{0.5} = 56\%$$

$$56 = \frac{14\times 3}{G.M.W\left(ing\right)}\times 100 \Rightarrow G.M.W = 75g$$

74. NCERT – XII, VOL – I, P.NO: 98

Average rate $= \frac{1}{2}\left[-\frac{\Delta[A]}{\Delta t}\right] = \frac{1}{2}\times\frac{6}{60} = 0.05 \text{ mole } |lt| \min$

75. $$E_{MnO_4^-/Mn^{2+}} = E^0_{MnO_4^-/Mn^{2+}} - \frac{0.06}{5}\log\frac{\left[Mn^{2+}\right]}{\left[MnO_4^-\right]\left[H^+\right]^8}$$

$$= E^0_{MnO_4^-/Mn^{2+}} - 0.012\log\frac{\left[Mn^{2+}\right]}{\left[MnO_4^-\right]} - 0.096\,pH$$