ALLEN® CAREER INSTITUTE KOTA (RAJASTHAN) path to success

CLASSROOM CONTACT PROGRAMME

(Academic Session : 2021 - 2022)

JEE (Main)

Sample Test Paper # 04

JEE(Main) : Leader Course

ANSWER KEY

PART-1 : PHYSICS

SECTION-I	Q.	1	2	3	4	5	6	7	8	9	10
	A.	B	B	A	C	C	D	B	D	B	B
	Q.	11	12	13	14	15	16	17	18	19	20
	A.	A	D	B	C	A	C	C	A	A	C
SECTION-II	Q.	1	2	3	4	5	6	7	8	9	10
	A.	1.50	3.32	2.00	6.00	0.73	44.00	4.00	10.00	30.00	900.00

PART-2 : CHEMISTRY

SECTION-I	Q.	1	2	3	4	5	6	7	8	9	10
	A.	D	C	C	D	C	D	C	C	C	A
	Q.	11	12	13	14	15	16	17	18	19	20
	A.	A	A	C	B	A	B	C	C	C	B
SECTION-II	Q.	1	2	3	4	5	6	7	8	9	10
	A.	4.00	3.00	4.00	4.04	112.00	2.00	2.00	5.00	7.00	5.00

PART-3 : MATHEMATICS

SECTION-I	Q.	1	2	3	4	5	6	7	8	9	10
	A.	B	C	A	C	C	C	D	C	A	A
	Q.	11	12	13	14	15	16	17	18	19	20
	A.	B	D	C	C	A	B	D	B	B	C
SECTION-II	Q.	1	2	3	4	5	6	7	8	9	10
	A.	1.00	49.00	11.00	5.00	3.00	1.00	4.00	16.00	20.00	0.50

HINT – SHEET

PART-1 : PHYSICS

SECTION-I

1. Ans (B)

$$\vec{E} = (20x + 10)\hat{i}$$

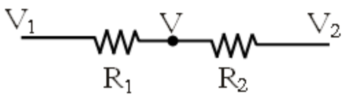
$$V_1 - V_2 - \int_{-5}^{1} (20x + 10)\, dx$$

$$V_1 - V_2 = -\left(10x^2 + 10x\right)_{-5}^{1}$$

$$V_1 - V_2 = 10(25 - 5 - 1 - 1)$$

$$V_1 - V_2 = 180 \text{ V}$$

2. Ans (B)



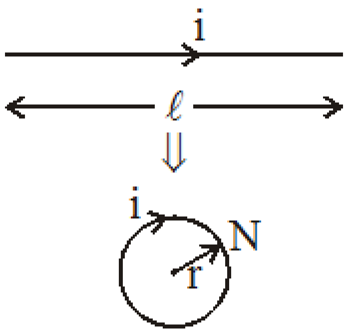
$$V = \frac{\frac{V_1}{R_1} + \frac{V_2}{R_2}}{\frac{1}{R_1} + \frac{1}{R_2}}$$

4. Ans (C)

$\ell = (2\pi r)N$

$M = Ni\pi r^2$

$= Ni\pi\left(\dfrac{\ell}{2\pi N}\right)^2$



$M \propto \dfrac{1}{N}$

$\dfrac{M_1}{M_2} = \dfrac{N_2}{N_1} = \dfrac{2}{1}$

6. Ans (D)

$\dfrac{1}{F} = \dfrac{1}{f_1} + \dfrac{1}{f_2} - \dfrac{d}{f_1 f_2}$

$O = \dfrac{1}{20} + \dfrac{1}{f} - \dfrac{5}{20f}$

$O = \dfrac{20 + f - 5}{20f}$

$f = -15$ cm

7. Ans (B)

Let v be the apparent depth of bubble then by using $\dfrac{\mu_2}{v} - \dfrac{\mu_1}{u} = \dfrac{\mu_2 - \mu_1}{R}$

$\therefore \dfrac{1}{v} - \dfrac{1.5}{-4} = \dfrac{1-1.5}{-10}$

$\Rightarrow v = -\dfrac{40}{13} = -3.07$ cm

8. Ans (D)

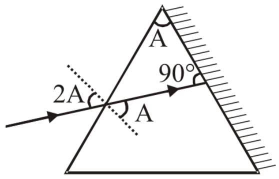
$m_1 = -\left(\dfrac{f}{u_1 - f}\right)$

$m_2 = -\left(\dfrac{f}{u_2 - f}\right)$

$\dfrac{m_1}{m_2} = \dfrac{u_2 - 1}{u_1 - 1}$

9. Ans (B)

$\dfrac{\sin 2A}{\sin A} = \mu$



$\mu = 2\cos A$

10. Ans (B)

$\lambda = \dfrac{h}{\sqrt{2mk}}$

11. Ans (A)

$n_i^2 = n_e \times n_h$

$n_h = \dfrac{n_i^2}{n_e} = \dfrac{(1.41 \times 10^{16})^2}{10^{21}}$

$= 2 \times 10^{11}\ m^{-3}$

13. Ans (B)

The de-Broglie wavelength $\lambda = \dfrac{h}{\sqrt{2mK}}$

Given $h = 6.6 \times 10^{-34}$ Js

$m = 1 \times 10^{-30}$ Kg

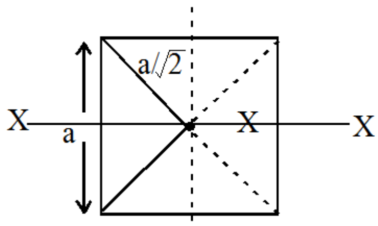
$k = 200$ eV $= 200 \times 1.6 \times 10^{-19}$ J

Substituting all these values

$\lambda = \dfrac{6.6 \times 10^{-34}}{\sqrt{2 \times 1 \times 10^{-30} \times 200 \times 1.6 \times 10^{-19}}}$

$= 0.825 \times 10^{-10} = 8.25 \times 10^{-11}$ m

20. Ans (C)



X–X in axis of symmetry so centre of mass lie on X–X at centroid position of dotted triangle.

$\dfrac{2}{3}$ (median of triange)

$\dfrac{2}{3}\sqrt{\left(\dfrac{a}{\sqrt{2}}\right)^2 - \left(\dfrac{a}{2}\right)^2}$

$= \dfrac{2a}{3}\sqrt{\dfrac{1}{2} - \dfrac{1}{4}} = \dfrac{a}{6}$

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PART-1 : PHYSICS

SECTION-II

1. **Ans (1.50)**

$$i_{max} = q_0\omega = \frac{q_0}{\sqrt{LC}} = \frac{CV_0}{\sqrt{LC}} = V_0\sqrt{\frac{C}{L}}$$

2. **Ans (3.32)**

$$I = \frac{1}{2}\varepsilon_0 E_0^2 C = 3.32\ W/m^2$$

3. **Ans (2.00)**

$$\frac{\mu_3}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R_1} + \frac{\mu_3 - \mu_2}{R_2}$$

4. **Ans (6.00)**

$$m = \frac{v}{u} = \frac{f}{u+f}$$

$$\boxed{\frac{u+1}{f} = \frac{1}{m}}$$

5. **Ans (0.73)**

$${}^1_0N \rightarrow {}^1_1P + {}^0_{-1}e + Q$$

$Q = (M_{Reactant} - M_{Product})\ C^2$

$= [1.6747 \times 10^{-27} - (1.6725 \times 10^{-27} + 9 \times 10^{-31})]C^2$

$= [0.0022 \times 10^{-27} - 9 \times 10^{-31}]C^2$

$= (22 \times 10^{-31} - 9 \times 10^{-31})C^2$

$= 13 \times 10^{-31} \times 9 \times 10^{16} J$

$$Q = \frac{13 \times 9 \times 10^{-15}}{1.6 \times 10^{-13}}$$

$$= \frac{13 \times 9}{160}$$

$$= \frac{117}{160} \simeq 0.73\ MeV$$

6. **Ans (44.00)**

$$\frac{6}{0.125} = R + \frac{1}{\left(\frac{1}{8} + \frac{1}{16} + \frac{1}{16}\right)}$$

8. **Ans (10.00)**

$$a_T = \frac{dv}{dt} = 4t + 1$$

$$a_c = \frac{v^2}{r}$$

$$a = \sqrt{a_c^2 + a_T^2}$$

$a = 10\ m/s^2$

It is the centripetal acceleration of a moving ball.

PART-2 : CHEMISTRY

SECTION-I

1. **Ans (D)**

In SO_2, $p\pi - p\pi$ and $p\pi - d\pi$ bonds are present.

2. **Ans (C)**

$Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$

Oxidising
agent

3. **Ans (C)**

Highly electropositive metals (like s-block metals) are extracted by electrolysis of their fused salt. (not by reduction with carbon)

4. **Ans (D)**

A cation is smaller than it's parent atom.

5. **Ans (C)**

$Ca(OCl)_2 \Rightarrow$ Bleach, $CaSO_4.\frac{1}{2}H_2O \Rightarrow$ P.O.P.

$CaO \Rightarrow$ Cement, $CaCO_3 \Rightarrow$ Antacid

6. **Ans (D)**

$2Cu^{2+} + 4I^- \rightarrow Cu_2I_2 + I_2$

7. **Ans (C)**

Fact

8. **Ans (C)**

	$A_2(g)$	$+ B_2(g)$	$\rightleftharpoons$	$2AB(g)$
Moles at eqm	$2-x$	$4-x$		$2x$

$$K_c = \frac{4x^2}{(2-x)(4-x)}$$

$$\Rightarrow x = \frac{32}{24} = 1.33\ \text{mole}$$

$$[AB(g)] = \frac{2 \times 1.33}{4} = 0.66\ M$$

9. **Ans (C)**

V.P. depends only on temperature.

10. **Ans (A)**

$$\frac{(t_{1/2})_I}{(t_{1/2})_{II}} = \left(\frac{a_1}{a_2}\right)^{1-n}$$

$$= \frac{300}{600} = \left(\frac{1}{2}\right)^{1-n} \quad \Rightarrow 1 - n = 1$$

$= n = 0$

11. Ans (A)

Mass of solvent = a – c

Molality $= b = \left(\dfrac{c}{\text{mol.wt.} = ?}\right) \Big/ \left(\dfrac{a-c}{1000}\right)$

$\therefore$ mol. wt. $= \dfrac{1000 \times c}{b \times (a-c)}$

12. Ans (A)

Larger the value of $E°_{RP}$ larger is tendency for reduction and consequently stronger will be the oxidant. Similarly, smaller the value of $E°_{RP}$ larger the tendency for oxidation and consequently stronger will be the reductant.

13. Ans (C)

$$\overset{0}{\underset{6}{C}}H_{12}O_6 \to 2\overset{2/3}{\underset{3}{C}}H_4O_3 + 4H^+ + 4e^-$$

n-factor = 4

14. Ans (B)

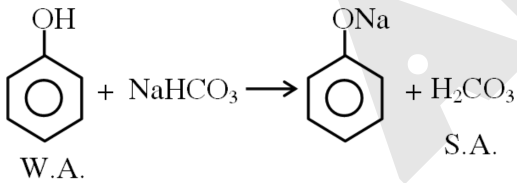
Allene containing even no. of p-bond, shows optical isomerism if molecule is unsymmetrical.

16. Ans (B)

$CH\equiv C^{\ominus}$ > $CH_2=C^{\ominus}$

sp	sp^2
more EN	less EN

17. Ans (C)



Reaction always proceeds from S.A. to W.A., not from W.A. to S.A.

PART-2 : CHEMISTRY

SECTION-II

1. Ans (4.00)

Correct order are :

(i), (iii), (iv), (vi)

2. Ans (3.00)

$K_3[\overset{+3}{Cr}(OX)_3]$

$Cr^{+3} = [Ar]\ 4s^o\ 4d^3$

(It has 3 unpaired electrons)

3. Ans (4.00)

S_2, N_2, RbO_2 and ClO_3 are Paramagnetic

4. Ans (4.04)

$\sqrt{3}\,a = 2\,[r_{Cs^+} + r_{Cl^-}]$

$a = \dfrac{2[1.69 + 1.81]}{\sqrt{3}} = 4.04$ Å

5. Ans (112.00)

mol of $C_2H_2 = \dfrac{1}{2} \times$ mol of CHI_3

$= \dfrac{1}{2} \times 0.01 = 0.005$

vol. at N.T.P = 0.005 × 22400

= 112 ml

6. Ans (2.00)

$M^{+3} \to M^{+n}$ (Reduction)

n-factor = (3 – n) e^- gain

(oxidation)

n-factor = (+ 4 to + 6)

= $2e^-$ loss

Total loss = Total gain

0.1 M × (3 – n) × 50 ml = 0.1 M × (2) × 25 ml

3 – n = 1

n = 2

7. Ans (2.00)

$p = \dfrac{n}{v}.RT$

$\ell n\, p = \ell n \dfrac{n}{v} + \ell n\, RT$

$\log \dfrac{n}{v} = -0.3010$

$\log \dfrac{v}{n} = 0.3010$

$\dfrac{v}{n} = \text{anti log } 0.3010$

$\dfrac{v}{n} = 2$

v = 2L

PART-3 : MATHEMATICS

SECTION-I

2. Ans (C)

$(AB)^2 = (AB)(AB) = A(BA)B = A^3B^2$

Now, $(AB)^3 = AB\ AB\ AB = A^7B^3$

So, $(AB)^n = (A)^{2^n - 1}.\ B^n$

So, $K = 2^{10} - 1 = 1023$

3. Ans (A)

$\therefore \sum a^2 + \sum ab \leqslant 0 \Rightarrow (a+b)^2 + (b+c)^2 + (c+a)^2 \leqslant 0$

$\Rightarrow a+b=0, b+c=0, c+a=0$

$\Rightarrow a=b=c=0$

$$\therefore \begin{vmatrix} 4 & 0 & 1 \\ 1 & 4 & 0 \\ 0 & 1 & 4 \end{vmatrix} = 65$$

4. Ans (C)

Required ways

$${}^{9}C_6 \times \frac{\lfloor 6}{\lfloor 3 \lfloor 3} - {}^{3\times 6}C_6 \times \frac{\lfloor 6}{\lfloor 3 \lfloor 3} = 1620$$

5. Ans (C)

Exhaustive cases (परिपूर्ण स्थितियाँ) = 26, 34, 43, 62 = 4

Favourable cases (अनुकूल स्थितियाँ) = 34, 43 = 2

$\therefore$ Required Probability $= \frac{1}{2}$

6. Ans (C)

$Z_1\ (0, 4), Z_2(0, -4), k = 10$

$|z_1 - z_2| = 8$

$k > |z_1 - z_2|$

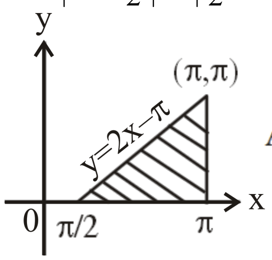
Ellipse

7. Ans (D)

$$y = \left|\frac{\pi}{2} - \sin^{-1}(\sin x)\right| + \left|\frac{\pi}{2} - \cos^{-1}(\cos x)\right|$$

$$y = \left|\frac{\pi}{2} - (\pi - x)\right| + \left|\frac{\pi}{2} - x\right|$$

$$y = \left|x - \frac{\pi}{2}\right| + \left|\frac{\pi}{2} - x\right| = 2x - \pi \ \forall x \in \left[\frac{\pi}{2}, \pi\right]$$



$$\text{Area} = \frac{1}{2}\left(\frac{\pi}{2}\right)\pi = \frac{\pi^2}{4}$$

8. Ans (C)

$$A = \int_0^{\pi} \frac{\sin x}{x^2} dx$$

$$= \left(\sin x\left(-\frac{1}{x}\right)\right)_0^{\pi} + \int_0^{\pi} \frac{\cos x}{x}\, dx$$

$$A = 0 - (-1) + \int_0^{\pi} \frac{\cos x}{x}\, dx$$

Put $x = 2y$

$$A = 1 + \int_0^{\pi/2} \frac{\cos 2y}{y}\, dy$$

$$A = 1 + \int_0^{\pi/2} \frac{\cos 2x}{x}\, dx \quad \text{[By P-(1)]}$$

$$\int_0^{\pi/2} \frac{\cos 2x}{x} dx = A - 1$$

9. Ans (A)

Let $y + 1 = Y$

$$\therefore \frac{dY}{dx} = Y^2 e^{\frac{x^2}{2}} - xY$$

Put $-\frac{1}{Y} = k$

$$\Rightarrow \frac{dk}{dx} + k(-x) = e^{\frac{x^2}{2}}$$

$$\text{I.F.} = e^{-\frac{x^2}{2}}$$

$$\therefore \ k = (x+c)e^{x^2/2}$$

Put $k = -\frac{1}{y+1}$

$$\therefore \ y + 1 = -\frac{1}{(x+c)\, e^{x^2/2}} \quad \text{...(i)}$$

when $x = 2$, $y = 0$, then $c = -2 - \frac{1}{e^2}$

differentiate equation (i) & put $x = 1$

we get $\left(\frac{dy}{dx}\right)_{x=1} = -\frac{e^{3/2}}{(1+e^2)^2}$

14. Ans (C)

$$\bar{x} = \frac{\sum x_i}{n}$$

$$\Rightarrow 4 = \frac{1+2+6+x_1+x_2}{5}$$

$$\Rightarrow x_1 + x_2 = 11 \quad ....(1)$$

$$\Rightarrow \sigma^2 = \frac{1}{n}\sum x_i^2 - x^{-2}$$

$$\Rightarrow 5.2 = \frac{1+4+36+x_1^2+x_2^2}{5} - 16$$

$$\Rightarrow 106 = x_1^2 + x_2^2 + 41$$

$$\Rightarrow x_1^2 + x_2^2 = 65 \quad ....(2)$$

Solving (1) and (2)

$x_1 = 4 \quad ; \quad x_2 = 7$

15. Ans (A)

$p \to q$ will is false

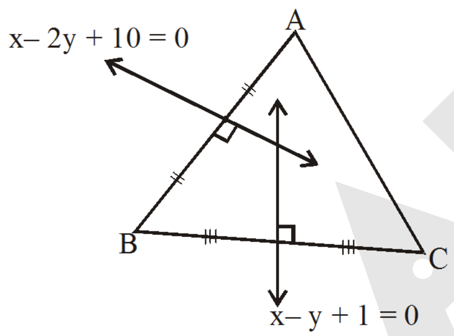
is P : T, q : F

$(p \wedge \sim q) \wedge r \to \sim r \; : \; F$

$\Rightarrow \sim r = F$

$r = T$

16. Ans (B)



Circumcenter is the point of intersection of the perpendicular bisectors of the sides.

17. Ans (D)

Area of parallelogram formed by line $y = m_1x + c_1$, $y = m_1x + c_2$, $y = m_2x + d_1$, $y = m_2x + d_2$ is given by

$$\text{Area of parallelogram} = \left|\frac{(c_1 - c_2).(d_1 - d_2)}{m_1 - m_2}\right|$$

For the given lines

$$y = -\frac{x}{2} + \frac{5}{2};\; y = -\frac{x}{2} + \frac{15}{2} \text{ and}$$

$$y = -3x + 10\,;\; y = -3x + \frac{c}{2},$$

$$\text{Area of parallelogram} = \frac{5.\left|\frac{c}{2} - 10\right|}{\frac{5}{2}} \geqslant 1$$

(Given)

$\Rightarrow |c - 20| \geqslant 1 \Rightarrow c \geqslant 21$ or $c \leqslant 19$

18. Ans (B)

Any point on the given hyperbola is

$P(\sqrt{2}\sec\theta, \tan\theta)$

Asymptotes are $x - \sqrt{2}y = 0$, $x + \sqrt{2}y = 0$

Product of perpendiculars from P on these asymptotes

$$= \frac{(\sqrt{2}\sec\theta - \sqrt{2}\tan\theta)(\sqrt{2}\sec\theta + \sqrt{2}\tan\theta)}{1+2}$$

$$= \frac{2\sec^2\theta - 2\tan^2\theta}{3} = \frac{2}{3}$$

19. Ans (B)

Let $\vec{a} = \lambda\vec{b} + \mu\vec{c}$

$\vec{a}$ is equally inclined to $\vec{b}$ and $\vec{d}$, where

$\vec{d} = \hat{j} + 2\hat{k}$

$$\Rightarrow \frac{\vec{a}\cdot\vec{b}}{|\vec{a}||\vec{b}|} = \frac{\vec{a}\cdot\vec{d}}{|\vec{a}||\vec{d}|}.$$

$$\Rightarrow \frac{\left(\lambda\vec{b} + \mu\vec{c}\right).\vec{b}}{\sqrt{5}} = \frac{\left(\lambda\vec{b} + \mu\vec{c}\right)\cdot\vec{d}}{\sqrt{5}}$$

$$\frac{\left[\lambda\left(2\hat{i} + \hat{j}\right) + \mu\left(\hat{i} - \hat{j} + \hat{k}\right)\right]\cdot\left(2\hat{i} + \hat{j}\right)}{\sqrt{5}}$$

$$= \frac{\left[\lambda\left(2\hat{i} + \hat{j}\right) + \mu\left(\hat{i} - \hat{j} + \hat{k}\right)\right]\cdot\left(\hat{j} + 2\hat{k}\right)}{\sqrt{5}}$$

or $\lambda(4 + 1) + \mu(2–1) = \lambda(1) + \mu(–1+2)$

or $4\lambda = 0$, i.e., $\lambda = 0$

$$\therefore \hat{a} = \frac{\hat{i} - \hat{j} + \hat{k}}{\sqrt{3}}$$

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20. **Ans (C)**

According to $\frac{A}{\ell}=\frac{B}{m}=\frac{C}{n}$, direction ratio of plane are respectively (3,0,4).

Equation of plane passing through point (1, 1,1) is

$\Rightarrow A(x-x_1)+B(y-y_1)+C(z-z_1)=0$

$\Rightarrow 3(x-1)+0(y-1)+4(z-1)=0$

$\Rightarrow 3x+4z-7=0$

Normal form of plane is, $\frac{3x}{5}+\frac{4z}{5}=\frac{7}{5}$

$\therefore$ Perpendicular distance from (0,0,0) = $\frac{7}{5}$.

PART-3 : MATHEMATICS

SECTION-II

1. **Ans (1.00)**

$$\frac{2^3-1^3}{1^3.2^3}+\frac{3^3-2^3}{2^3.3^3}+\frac{4^3-3^3}{3^3.4^3}+\ldots\infty$$

$$\left(\frac{1}{1^3}-\frac{1}{2^3}\right)+\left(\frac{1}{2^3}-\frac{1}{3^3}\right)+\left(\frac{1}{3^3}-\frac{1}{4^3}\right)+\ldots\ldots\infty$$

$$\Rightarrow \lim_{n\to\infty}\left(\frac{1}{1^3}-\frac{1}{n^3}\right)=1$$

2. **Ans (49.00)**

Let T_{1+1} is max.

$$T_{1+1}=\frac{{}^{100}C_r}{(r+1)(r+2)(r+3)(r+4)}$$

$$=\frac{{}^{104}C_{r+4}}{101\,.\,102\,.\,103\,.\,104}$$ is max, when

$r+4=52$

$r=48$

so term is 49^{th}

3. **Ans (11.00)**

$$A_{10}+A_{12}=\int \tan^{10}x\,dx+\int \tan^{12}x\,dx$$

$$=\int\left(\tan^{10}x+\tan^{12}x\right)dx$$

$$=\int \tan^{10}x\left(1+\tan^2x\right)dx$$

$$=\int \tan^{10}x.\sec^2x\,dx$$

Let $\int \tan x=t\Rightarrow \sec^2x\,dx=dt$

$$A_{10}+A_{12}=\int t^{10}dt=\frac{t^{11}}{11}+\lambda$$

$$=\frac{\tan^{11}x+\lambda}{11}$$

4. **Ans (5.00)**

$$I=\int(\sin 100x.\cos x+\cos 100x.\sin x)\sin^{99}x.dx$$

$$I=\int \sin 100x.\cos x.\sin^{99}x\,dx+\int \cos 100x\sin^{100}x\,dx$$

$$I=\int\frac{\sin(100x)\sin^{100}x}{100}-\frac{100}{100}\int\cos(100x)\sin^{100}x\,dx+$$

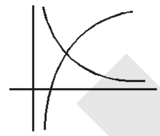
$$\int\cos(100x).\sin^{100}x.dx$$

$$I=\frac{\sin(100x)\sin^{100}x}{100}+C$$

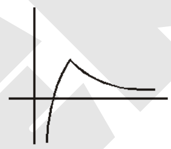
5. **Ans (3.00)**

Do your self

6. **Ans (1.00)**



Only one point of intersetion



Sharp corner at one point

7. **Ans (4.00)**

$\tan^2x-\sec^6x+1=0\Rightarrow \sec^2x=\sec^6x$

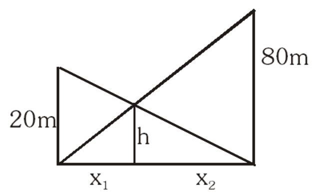
$\sec^2x\le\sec^6x$ as $|\sec x|>1$.

Hence only possible solutions are $\sec^2x=1$

i.e., $x=n\pi$ as $0<x<13$,

possible solutions are $\pi, 2\pi, 3\pi, 4\pi$

8. **Ans (16.00)**



by similar triangle

$$\frac{h}{x_1}=\frac{80}{x_1+x_2}\qquad\ldots(1)$$

$$\frac{h}{x_2}=\frac{20}{x_1+x_2}\qquad..(2)$$

by (1) and (2)

$\frac{x_2}{x_1}=4$ or $x^2=4x1$

$\Rightarrow\frac{h}{x_1}=\frac{80}{5x_1}$

or $h=16m$

9. Ans (20.00)

Since, the given line touches the given circle, the length of the perpendicular from the centre (2, 4) of the circle to the line $3x - 4y - k = 0$ is equal to the radius $\sqrt{4+16+5} = 5$ of the circle.

$\therefore \dfrac{3 \times 2 - 4 \times 4 - k}{\sqrt{9+16}} = \pm 5$

$\Rightarrow k = 15$

$[\because k > 0]$

hence equation of tangent is

$3x - 4y - 15 = 0$ ..... (1)

Let equation of normal to circle

$4x + 3y = \lambda$

It passes through centre (2, 4)

$\Rightarrow \lambda = 20$

hence equation of normal is

$4x + 3y = 20$ .... (2)

Solve (1) & (2)

$a = 5$,

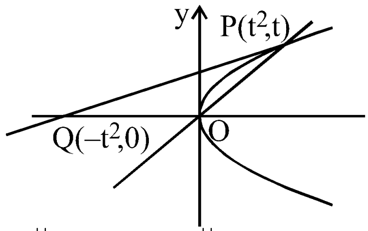
$b = 0$

$k + a + b$

$= 15 + 5 + 0 = 20$

10. Ans (0.50)

$\Delta OPQ = 4$



$$\frac{1}{2}\left\|\begin{matrix} 0 & 0 & 1 \\ t^2 & t & 1 \\ -t^2 & 0 & 1 \end{matrix}\right\| = 4$$

$t = 2 \quad (\because t > 0)$

$\therefore \quad m = \dfrac{1}{2} = 0.50$