QUESTION PAPER CODE 65/2/3/F

EXPECTED ANSWER/VALUE POINTS

SECTION A

1. $(\vec{a}+\vec{b}+\vec{c})\cdot(\vec{a}+\vec{b}+\vec{c}) = 0$ $\quad \frac{1}{2}$

$\Rightarrow |\vec{a}|^2 + |\vec{b}|^2 + |\vec{c}|^2 + 2(\vec{a}\cdot\vec{b}+\vec{b}\cdot\vec{c}+\vec{c}\cdot\vec{a}) = 0$

$\Rightarrow \vec{a}\cdot\vec{b}+\vec{b}\cdot\vec{c}+\vec{c}\cdot\vec{a} = -\frac{3}{2}$ $\quad \frac{1}{2}$

2. $a^2 b^2 \sin^2\theta + a^2 b^2 \cos^2\theta = 400$ $\quad \frac{1}{2}$

$\Rightarrow |\vec{b}| = 4$ $\quad \frac{1}{2}$

3. $\frac{x}{\sqrt{3}}+\frac{y}{\sqrt{3}}+\frac{z}{\sqrt{3}} = 5\sqrt{3}$ or $x + y + z = 15$ $\quad \left[\frac{1}{2}\text{ mark for dc's of normal}\right]$ $\quad 1$

4. 1×1 $\quad 1$

5. Expanding we get

$x^3 = -8 \Rightarrow x = -2$ $\quad \frac{1}{2}+\frac{1}{2}$

6. $P = \frac{1}{2}(A + A')$ $\quad \therefore\ P = \begin{bmatrix} 3 & 6 \\ 6 & 9 \end{bmatrix}$ $\quad \frac{1}{2}+\frac{1}{2}$

SECTION B

7. Let $\quad u = \tan^{-1}\frac{\sqrt{1+x^2}-1}{x}$

Put $\quad x = \tan\theta \Rightarrow \theta = \tan^{-1}x$ $\quad \frac{1}{2}$

$\therefore \quad u = \tan^{-1}\left[\frac{\sec\theta - 1}{\tan\theta}\right]$

$= \tan^{-1}\left[\frac{1-\cos\theta}{\sin\theta}\right]$

$= \tan^{-1}\left(\tan\frac{\theta}{2}\right)$

$= \frac{\theta}{2} = \frac{1}{2}\tan^{-1}x$ $\quad 1$

$\Rightarrow \frac{du}{dx} = \frac{1}{2(1+x^2)}$ $\quad 1$

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

$= 2\tan^{-1}x$

$$\Rightarrow \frac{dv}{dx} = \frac{2}{1+x^2}$$ 1

$$\therefore \frac{du}{dv} = \frac{du/dx}{dv/dx} = \frac{1}{4}$$ $\frac{1}{2}$

OR

$$x = \sin t \Rightarrow \frac{dx}{dt} = \cos t$$ $\frac{1}{2}$

$$y = \sin pt \Rightarrow \frac{dy}{dt} = p\cos pt$$ $\frac{1}{2}$

$$\frac{dy}{dx} = \frac{p\cos pt}{\cos t}$$ 1

$$\frac{d^2y}{dx^2} = \frac{\cos t\,(-p^2 \sin pt) - p\cos pt\,(-\sin t)}{\cos^2 t} \cdot \frac{dt}{dx}$$

$$= \frac{-p^2 \sin pt \cos t + p\cos pt \sin t}{\cos^3 t}$$ 1

Now $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + p^2 y = 0$ $\left[\text{Substituting values of } y, \frac{dy}{dx} \,\&\, \frac{d^2y}{dx^2}\right]$ 1

8. Eqn of given curves

$y^2 = 4ax$ and $x^2 = 4by$

Their point of intersections are (0, 0) and $\left(4a^{1/3}\, b^{2/3}, 4a^{2/3}\, b^{1/3}\right)$ 1

$$y^2 = 4ax \Rightarrow \frac{dy}{dx} = \frac{2a}{y}, \text{ slope} = \frac{a^{1/3}}{2\,b^{1/3}} \quad \text{...(i)}$$ 1

$$x^2 = 4by \Rightarrow \frac{dy}{dx} = \frac{x}{2b}, \text{ slope} = \frac{2a^{1/3}}{b^{1/3}} \quad \text{...(ii)}$$ 1

At (0, 0), angle between two curves is 90°

or

Acute angle θ between (i) and (ii) is

$$\theta = \tan^{-1}\left\{\frac{3}{2}\left(\frac{a^{1/3}\, b^{1/3}}{a^{2/3} + b^{2/3}}\right)\right\}$$ 1

9. $$I = \int_0^{\pi} \frac{(\pi - x)}{1 + \sin\alpha \sin(\pi - x)}\,dx$$ 1

$$2I = \pi\int_0^{\pi} \frac{dx}{1+\sin\alpha\sin x}$$

$$= 2\pi\int_0^{\pi/2} \frac{dx}{1+\sin\alpha\sin x}$$

$$\Rightarrow I = \pi\int_0^{\pi/2} \frac{dx}{1+\sin\alpha\,\frac{2\tan\frac{x}{2}}{1+\tan^2\frac{x}{2}}}$$ 1

$$I = \pi\int_0^1 \frac{2dt}{1+t^2+2t\sin\alpha} \qquad \text{Put } \tan\frac{x}{2} = t$$ $\frac{1}{2}$

$$\Rightarrow \ I = 2\pi\int_0^1 \frac{dt}{(t+\sin\alpha)^2+\cos^2\alpha}$$ 1

$$= \frac{2\pi}{\cos\alpha}\left[\tan^{-1}\left(\frac{t+\sin\alpha}{\cos\alpha}\right)\right]_0^1$$

$$\Rightarrow \ I = \frac{\pi}{\cos\alpha}\left(\frac{\pi}{2}-\alpha\right)$$ $\frac{1}{2}$

10. $I = \int (2x+5)\sqrt{10-4x-3x^2}\,dx$

$$= -\frac{1}{3}\int(-4-6x)\sqrt{10-4x-3x^2}\,dx + \frac{11}{3}\int\sqrt{10-4x-3x^2}\,dx$$ 1

$$= -\frac{2}{9}(10-4x-3x^2)^{3/2} + \frac{11\sqrt{3}}{3}\int\sqrt{\left(\frac{\sqrt{34}}{3}\right)^2-\left(x-\frac{2}{3}\right)^2}\,dx$$ 1 + 1

$$= -\frac{2}{9}(10-4x-3x^2)^{3/2} + \frac{11\sqrt{3}}{3}\left[\frac{\left(x-\frac{2}{3}\right)-\sqrt{\left(\frac{\sqrt{34}}{3}\right)^2-\left(x-\frac{2}{3}\right)^2}}{2} + \frac{17}{9}\sin^{-1}\frac{3x-2}{\sqrt{34}}\right] + C$$ 1

OR

$x^2 = y$ (say) $\frac{1}{2}$

$$\frac{(y+1)(y+4)}{(y+3)(y-5)} = 1 + \frac{A}{y+3} + \frac{B}{y-5}$$ $\frac{1}{2}$

using partial fraction we get $A = \frac{1}{4}$, $B = \frac{27}{4}$ 1

$$\int\frac{(x^2+1)(x^2+4)}{(x^2+3)(x^2-5)}\,dx = \int 1.dx + \frac{1}{4}\int\frac{dx}{x^2+3} + \frac{27}{4}\int\frac{dx}{x^2-5}$$ 1

$$= x + \frac{1}{4\sqrt{3}}\tan^{-1}\frac{x}{\sqrt{3}} + \frac{27}{8\sqrt{5}}\log\left|\frac{x-\sqrt{5}}{x+\sqrt{5}}\right| + C$$ 1

11. $I = \int\frac{x\sin^{-1}x}{\sqrt{1-x^2}}\,dx$

put $\sin^{-1}x = t \Rightarrow \frac{dx}{\sqrt{1-x^2}} = dt$ $\frac{1}{2}+\frac{1}{2}$

$$= \int t\cdot\sin t\,dt$$ 1

$$= -t\cos t + \sin t + c$$ $1\frac{1}{2}$

$$= -\sqrt{1-x^2}\,\sin^{-1}x + x + c$$ $\frac{1}{2}$

12. $y^2\,dx + (x^2 - xy + y^2)\,dy = 0$

$\Rightarrow \quad \dfrac{dx}{dy} = -\dfrac{(x^2 - xy + y^2)}{y^2}$ $\qquad \dfrac{1}{2}$

put $x = vy \Rightarrow \dfrac{dx}{dy} = v + y\dfrac{dv}{dy}$ $\qquad \dfrac{1}{2}$

$v + y\dfrac{dv}{dy} = \dfrac{(v^2y^2 - y^2v + y^2)}{y^2}$

$\Rightarrow \quad \dfrac{dv}{v^2+1} = -\dfrac{dy}{y}$ $\qquad 1\dfrac{1}{2}$

Integrating both sides

$\tan^{-1} v = -\log y + c$ $\qquad \dfrac{1}{2}+\dfrac{1}{2}$

$\Rightarrow \quad \tan^{-1}\dfrac{x}{y} = -\log y + c$ $\qquad \dfrac{1}{2}$

13. $\dfrac{dx}{dy} - \dfrac{x}{1+y^2} = \dfrac{\cot^{-1} y}{1+y^2}$ $\qquad \dfrac{1}{2}$

$\text{I.F} = e^{-\int \frac{1}{1+y^2}} = e^{\cot^{-1} y}$ $\qquad 1$

$\Rightarrow \quad \dfrac{d}{dy}\left(x \cdot e^{\cot^{-2} y}\right) = \dfrac{\cot^{-1} t\, e^{\cot^{-1} y}}{1+y^2}$

Integrating, we get

$x \cdot e^{\cot-1 y} = \int \dfrac{\cot^{-1} y\, e^{\cot-1 y}}{1+y^2}\,dy$ $\qquad 1\dfrac{1}{2}$

put $\cot^{-1} y = t$

$= -\int t\, e^t\, dt$

$= (1 - t)\,e^t + c$

$\Rightarrow \quad x = (1 - \cot^{-1} y) + ce^{-\cot^{-1} y}$ $\qquad 1$

14. $\vec{a} \times \vec{b} = \vec{c} \times \vec{d}$ $\qquad$ ...(i)

$\vec{a} \times \vec{c} = \vec{b} \times \vec{d}$ $\qquad$ ...(ii)

$(1) - (2) \Rightarrow \vec{a} \times (\vec{b} - \vec{c}) = \vec{d} \times (\vec{b} - \vec{c})$ $\qquad 2$

$\Rightarrow (\vec{a} - \vec{d}) \times (\vec{b} - \vec{c}) = \vec{0}$ $\qquad 1$

$\Rightarrow (\vec{a} - \vec{d}) \,||\, (\vec{b} - \vec{c})$ $\qquad 1$

15. Equation of line $\overrightarrow{AB}$

$\vec{r} = (-\hat{j} - \hat{k}) + \lambda (4\hat{i} + 6\hat{j} + 2\hat{k})$ 1

Equation of line $\overrightarrow{CD}$

$\vec{r} = (3\hat{i} + 9\hat{j} + 4\hat{k}) + \mu (-7\hat{i} - 5\hat{j})$ $\frac{1}{2}$

$\vec{a}_2 - \vec{a}_1 = 3\hat{i} + 10\hat{j} + 5\hat{k}$ $\frac{1}{2}$

$\vec{b}_1 \times \vec{b}_2 = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 4 & 6 & 2 \\ -7 & -5 & 0 \end{vmatrix} = 10\hat{i} - 14\hat{j} + 22\hat{k}$ 1

$(\vec{a}_2 - \vec{a}_1) \cdot (\vec{b}_1 \times \vec{b}_2) = 30 - 140 + 110 = 0$ 1

$\Rightarrow$ Lines intersect

16. Let selection of defective pen be considered success

$p = \frac{2}{20} = \frac{1}{10}, q = \frac{9}{10}$ 1

Reqd probability = P(x = 0) + P(x = 1) + P(x = 2) $1\frac{1}{2}$

$$= {}^5C_0 \left(\frac{1}{10}\right)^0 \left(\frac{9}{10}\right)^5 + {}^5C_1 \left(\frac{1}{10}\right)^1 \left(\frac{9}{10}\right)^4 + {}^5C_2 \left(\frac{1}{10}\right)^2 \left(\frac{9}{10}\right)^3$$

$$= \left(\frac{9}{10}\right)^5 + \frac{1}{2}\left(\frac{9}{10}\right)^4 + \frac{1}{10} \times \left(\frac{9}{10}\right)^3$$

$$= \left(\frac{9}{10}\right)^3 \times \frac{34}{25}$$ $1\frac{1}{2}$

OR

$\sum_{i=0}^{4} P(x_i) = 1$ $\frac{1}{2}$

$\Rightarrow 8k = 1 \Rightarrow k = \frac{1}{8}$ $\frac{1}{2}$

(i) $P(x = 1) = \frac{1}{8}$ 1

(ii) P(at most 2 colleges) = P(0) + P(1) + P(2)

$= \frac{5}{8}$ 1

(iii) P(atleast 2 colleges) = 1 – [P(x = 0) + P(x = 1)]

$= 1 - \frac{1}{8} = \frac{7}{8}$ 1

17. LHS $= \cot^{-1}\left[\dfrac{\left(\cos\frac{x}{2}+\sin\frac{x}{2}\right)+\left(\cos\frac{x}{2}-\sin\frac{x}{2}\right)}{\left(\cos\frac{x}{2}+\sin\frac{x}{2}\right)-\left(\cos\frac{x}{2}-\sin\frac{x}{2}\right)}\right]$ 1+1

$= \cot^{-1}\left(\cot\frac{x}{2}\right)$ 1

$= \frac{x}{2} = \text{RHS}$ 1

OR

$\tan^{-1}\left[\dfrac{\frac{x-2}{x-1}+\frac{x+2}{x+1}}{1-\frac{x-2}{x-1}\cdot\frac{x+2}{x+1}}\right] = \frac{\pi}{4}$ $1\frac{1}{2}$

$\Rightarrow \quad \frac{2x^2-4}{3} = \tan\frac{\pi}{4}$ $1\frac{1}{2}$

$\Rightarrow \quad x = \pm\sqrt{\frac{7}{2}}$ 1

18. Let each poor child pay ₹ x per month and each rich child pay ₹ y per month.

$\therefore \quad 20x + 5y = 9000$ $\frac{1}{2}$

$5x + 25y = 26000$ $\frac{1}{2}$

In matrix form,

$$\begin{bmatrix} 20 & 5 \\ 5 & 25 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 9000 \\ 26000 \end{bmatrix}$$ 1

$AX = B \Rightarrow X = A^{-1}B$

$$A^{-1} = \frac{1}{475}\begin{bmatrix} 25 & -5 \\ -5 & 20 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{475}\begin{bmatrix} 25 & -5 \\ -5 & 20 \end{bmatrix}\begin{bmatrix} 9000 \\ 26000 \end{bmatrix} = \begin{bmatrix} 200 \\ 1000 \end{bmatrix}$$

$\Rightarrow \quad x = 200, y = 1000$ 1

Value: Compassion or any relevant value 1

19. $f'_{1-} = 2x + 3 = 5$

$f'_{1+} = b$

$f'_{1-} = f'_{1+} \Rightarrow \boxed{b = 5}$ 1+1

$\lim_{x\to 1^-} f(x) = f(1) = \lim_{x\to 1^+} f(x)$

$\Rightarrow \quad 4 + a = b + 2$ 1

$\Rightarrow \quad \boxed{a = 3}$ 1

SECTION C

20. Equation of family of planes passing through two given planes

$(x + 2y + 3z - 4) + k\,(2x + y - z + 5) = 0$ 1

$\Rightarrow$ $(1 + 2k)\,x + (2 + k)\,y + (3 - k)\,z = 4 - 5k$ ...(i)

$$\Rightarrow \quad \frac{x}{\frac{4-5k}{1+2k}} + \frac{y}{\frac{4-5k}{2+k}} + \frac{z}{\frac{4-5k}{3-k}} = 1$$

As per condition

$$\frac{4-5k}{1+2k} = \frac{2(4-5k)}{(3-k)}$$ 1

$$\Rightarrow \quad k = \frac{4}{5} \text{ or } \frac{1}{5}$$ 1

For $k = \frac{1}{5}$, Eqn. of plance is $7x + 11y + 14z = 15$ 1

For $k = \frac{4}{5}$, Eqn. of plane is $13x + 14y + 11z = 0$ $\frac{1}{2}$

Equation of plane passing through (2, 3, –1)

and parallel to the plane is:

$7(x - 2) + 11(y - 3) + 14(z + 1) = 0$

$\Rightarrow$ $7x + 11y + 14z = 33$ 1

Vector form: $\vec{r}\cdot(7\hat{i} + 11\hat{j} + 14\hat{k}) = 33$ $\frac{1}{2}$

21. Let H_1 be the event 2 red balls are transferred

H_2 be the event 1 red and 1 balck ball, transferred

H_3 be the event 2 black and 1 balck ball transferred

E be the event that ball drawn from B is red. 1

$P(H_1) = \frac{^3C_2}{^8C_2} = \frac{3}{28}$ $P(E/H_1) = \frac{6}{10}$

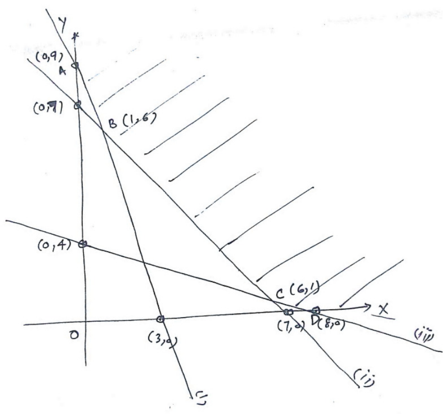
$P(H_2) = \frac{^3C_1 \times {^5C_1}}{^8C_2} = \frac{15}{28}$ $P(E/H_2) = \frac{5}{10}$

$P(H_3) = \frac{^5C_2}{^8C_2} = \frac{10}{28}$ $P(E/H_3) = \frac{4}{10}$ $1\frac{1}{2} + 1\frac{1}{2}$

$$P(H_1/E) = \frac{\frac{3}{28}\times\frac{6}{10}}{\frac{3}{28}\times\frac{6}{10} + \frac{15}{28}\times\frac{5}{10} + \frac{10}{28}\times\frac{4}{10}}$$ $1\frac{1}{2}$

$$= \frac{18}{133}$$ $\frac{1}{2}$

22. Let x tablets of type X and y tablets of type Y are taken



Minimise $C = 2x + y$ — 1

subjected to

$$\left.\begin{aligned} 6x + 2y &\geq 18 \\ 3x + 3y &\geq 21 \\ 2x + 4y &\geq 16 \\ x, y &\geq 0 \end{aligned}\right\}$$ — 2

Correct Graph — $1\frac{1}{2}$

$C|_{A(0,\,9)} = 9$

$C|_{B\,(1,\,6)} = 8 \leftarrow$ Minimum value

$C|_{C\,(6,\,1)} = 13$

$C|_{D\,(8,\,0)} = 16$

$2x + y < 8$ does not pass through unbounded region — $\frac{1}{2}$

Thus, minimum value of $C = 8$ at $x = 1, y = 6$. — 1

23. $f(x) = |x| + x, \quad g(x) = |x| - x \quad \forall\ x \in R$

$(fog)(x) = f(g(x))$ — 1

$= ||x| - 1| + |x| - x$ — 1

$(gof)(x) = g(f(x))$ — $\frac{1}{2}$

$= ||x| + x| - |x| - x$ — $\frac{1}{2}$

$(fog)(-3) = 6$ — 1

$(fog)(5) = 0$ — 1

$(gof)(-2) = 2$ — 1

24. $$abc\begin{vmatrix} \frac{1}{a}+1 & \frac{1}{b} & \frac{1}{c} \\ \frac{1}{a} & \frac{1}{b}+1 & \frac{1}{c} \\ \frac{1}{a} & \frac{1}{b} & \frac{1}{c}+1 \end{vmatrix} = 0$$ — $1\frac{1}{2}$

$C_1 \to C_1 + C_2 + C_3$

$$\Rightarrow abc\begin{vmatrix} 1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c} & \frac{1}{b} & \frac{1}{c} \\ 1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c} & \frac{1}{b}+1 & \frac{1}{c} \\ 1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c} & \frac{1}{b} & \frac{1}{c}+1 \end{vmatrix} = 0$$ — $1\frac{1}{2}$

$$\Rightarrow \ abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)\begin{vmatrix} 1 & \frac{1}{b} & \frac{1}{c} \\ 1 & \frac{1}{b}+1 & \frac{1}{c} \\ 1 & \frac{1}{b} & \frac{1}{c}+1 \end{vmatrix} = 0$$

$R_2 \to R_2 - R_1, R_3 \to R_3 - R_1$ $1\frac{1}{2}$

$$\Rightarrow \ abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right) = 0$$

$\because$ a, b, c, $\neq 0$

$\therefore \ 1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c} = 0$ $1\frac{1}{2}$

OR

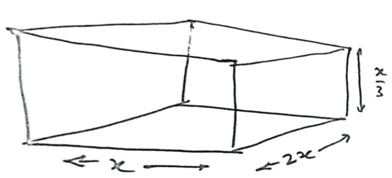
$|A| = 1$ 1

$$\text{adj } A = \begin{bmatrix} \cos\alpha & \sin\alpha & 0 \\ -\sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$$ 3

$$A(\text{adj } A) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = I$$ 1

$$|A|\, I_3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = I$$ 1

25. $S = 6x^2 + 4\pi r^2$



$\Rightarrow r = \sqrt{\frac{S-6\pi^2}{4\pi}}$ ...(i) $\frac{1}{2}$

$V = \frac{2x^3}{3} + \frac{4}{3}\pi r^3$ 1

$= \frac{2}{3}x^3 + \frac{4}{3}\pi\left(\frac{S-6x^2}{4\pi}\right)^{3/2}$

$= \frac{2x^3}{3} + \frac{(S-6x^2)^{3/2}}{6\sqrt{\pi}}$ 1

$\frac{dV}{dx} = 2x^2 - \frac{3x}{\sqrt{\pi}}\sqrt{S-6x^2}$ 1

$\frac{dV}{dx} = 0 \Rightarrow 2x^2 = \frac{3x\sqrt{S-6x^2}}{\sqrt{\pi}}$

$\Rightarrow r = \frac{x}{3}$ [using (i)] 1

$$\frac{d^2V}{dx^2} = 4x\left[\frac{3x}{\sqrt{\pi}} \cdot \frac{(-12x)}{2\sqrt{S-6x^2}} + \frac{3}{\sqrt{\pi}}\sqrt{S-6x^2}\right]$$ 1

$$\left.\frac{d^2V}{dx^2}\right|_{x=\frac{r}{3}} > 0$$

$\Rightarrow$ V is minimum at $x = \frac{r}{3}$ i.e. $r = 3x$

Minimum value of sum of volume $= \left(\frac{2x^3}{3} + 36\pi x^3\right)$ cubic units $\frac{1}{2}$

OR

Equatioin of given curve

$y = \cos(x + y)$ ...(i)

$$\Rightarrow \frac{dy}{dx} = -\sin(x+y)\left(1 + \frac{dy}{dx}\right)$$

$$\Rightarrow \frac{dy}{dx} = \frac{-\sin(x+y)}{1+\sin(x+y)}$$ 2

given line $x + 2y = 0$, its slope $= -\frac{1}{2}$ $\frac{1}{2}$

condition of || lines

$$\frac{-\sin(x+y)}{1+\sin(x+y)} = -\frac{1}{2}$$ 1

$\Rightarrow \sin(x + y) = 1$

$\Rightarrow \cos(x + y) = 0 \;\; y = 0$ using (i)

$\Rightarrow \cos x = 0 \Rightarrow x = (2n+1)\frac{\pi}{2}, n \in I$

$\therefore x = \frac{-3\pi}{2}, \frac{\pi}{2} \in [-2\pi, 2\pi]$ 1

Thus tangents are || to the line $x + 2y = 0$

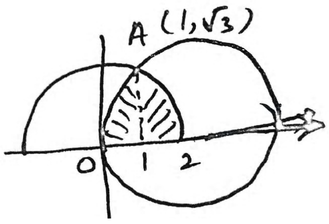
only at pts $\left(-\frac{3\pi}{2}, 0\right)$ and $\left(\frac{\pi}{2}, 0\right)$ $\frac{1}{2}$

$\therefore$ Required equation of tangents are

$y - 0 = -\frac{1}{2}\left(x + \frac{3\pi}{2}\right) \Rightarrow 2x + 4y + 3\pi = 0$ $\frac{1}{2}$

$y - 0 = -\frac{1}{2}\left(x - \frac{1}{2}\right) \Rightarrow 2x + 4y - \pi = 0$ $\frac{1}{2}$

26. Their point of intersection $\left(1, \sqrt{3}\right)$ 1



Correct Figure 1

$$\text{Required Area} = \int_0^1 \sqrt{(2)^2 - (x-2)^2}\, dx + \int_1^2 \sqrt{2^2 - x^2}\, dx$$ 2

$$= \left[\frac{(x-2)\sqrt{4x - x^2}}{2} + 2\sin^{-1}\frac{x-2}{2}\right]_0^1 + \left[\frac{x\sqrt{4-x^2}}{2} + 2\sin^{-1}\frac{x}{2}\right]_1^2$$ 1

$$= \left(\frac{5\pi}{3} - \sqrt{3}\right) \text{Sq. units}$$ 1