

QUESTION PAPER CODE 65/1/G
EXPECTED ANSWERS/VALUE POINTS

SECTION - A

Marks

1. $3 \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix} - \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$ ½ m

$= \begin{bmatrix} 8 & 7 \\ 6 & 2 \end{bmatrix}$ ½ m

2. $y = e^{-x} + ax + b \Rightarrow y' = -e^{-x} + a$ ½ m

$y'' = e^{-x}$ or $\frac{d^2y}{dx^2} = e^{-x}$ ½ m

3. Order = 2, degree = 2 (any one correct) ½ m

Sum = 2 + 2 = 4 ½ m

4. d.r's of \vec{AB} : 1, -5 - a, b - 3 ; d.r's of \vec{BC} are -4, 16, 9 - b or d.r's of \vec{AC} : -3, 11 - a, 6 ½ m

getting $a = -1, b = 1, a + b = 0$ ½ m

5. $|\vec{a}| |\vec{b}| \sin \theta = 16 \Rightarrow \sin \theta = \frac{16}{20} = \frac{4}{5} \Rightarrow \cos \theta = \pm \frac{3}{5}$ ½ m

$\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \theta = \pm 12$ ½ m

6. $d = \frac{|9 - 6|}{\sqrt{2^2 + (-1)^2 + (-2)^2}}$ ½ m

$= 1$ ½ m

SECTION - B

$$\begin{aligned}
 7. \quad \text{LHS} &= \sin \left[\cot^{-1} \left(\frac{2x}{1-x^2} \right) + 2 \tan^{-1} x \right] && 1 \text{ m} \\
 &= \sin \left[\frac{\pi}{2} - \tan^{-1} \left(\frac{2x}{1-x^2} \right) + 2 \tan^{-1} x \right] && 1 \text{ m} \\
 &= \sin \left[\frac{\pi}{2} - 2 \tan^{-1} x + 2 \tan^{-1} x \right] && 1 \text{ m} \\
 &= \sin \frac{\pi}{2} = 1 = \text{R.H.S} && 1 \text{ m}
 \end{aligned}$$

OR

$$\begin{aligned}
 \tan^{-1} \left(\frac{\frac{x-5}{x-6} + \frac{x+5}{x+6}}{1 - \frac{x-5}{x-6} \cdot \frac{x+5}{x+6}} \right) &= \frac{\pi}{4} && 2 \text{ m} \\
 \Rightarrow \frac{(x-5)(x+6) + (x+5)(x-6)}{x^2 - 36 - x^2 + 25} &= \tan \frac{\pi}{4} && 1 \text{ m} \\
 \Rightarrow 2x^2 &= 49 && \frac{1}{2} \text{ m} \\
 \Rightarrow x &= \pm \frac{7}{\sqrt{2}} && \frac{1}{2} \text{ m}
 \end{aligned}$$

$$8. \quad \text{L.H.S.} = \begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix}$$

$$R_1 \rightarrow R_1 + b \cdot R_3, \quad R_2 \rightarrow R_2 - a R_3$$

$$= \begin{vmatrix} 1+a^2+b^2 & 0 & -b(1+a^2+b^2) \\ 0 & 1+a^2+b^2 & a(1+a^2+b^2) \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} \quad 1+1 \text{ m}$$

$$= (1+a^2+b^2)^2 \begin{vmatrix} 1 & 0 & -b \\ 0 & 1 & a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} \quad 1 \text{ m}$$

Expanding and getting

$$\Delta = (1+a^2+b^2)^3 = \text{R.H.S.} \quad 1 \text{ m}$$

9. $A^2 = \begin{pmatrix} 6 & -5 & 5 \\ -5 & 6 & -5 \\ 5 & -5 & 6 \end{pmatrix}$ 1½ m

$$A^2 - 5A + 4I = \begin{pmatrix} 6 & -5 & 5 \\ -5 & 6 & -5 \\ 5 & -5 & 6 \end{pmatrix} - \begin{pmatrix} 10 & -5 & 5 \\ -5 & 10 & -5 \\ 5 & -5 & 10 \end{pmatrix} + \begin{pmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{pmatrix}$$

$$= O \quad 1 \text{ m}$$

Pre multiplying by A^{-1} and getting $A^{-1} = \frac{1}{4}(5I - A)$ ½ m

and $A^{-1} = \frac{1}{4} \begin{pmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{pmatrix}$ 1 m

OR

$$A = IA \quad 1 \text{ m}$$

$$\Rightarrow \begin{pmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 0 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} A$$

$$R_1 \leftrightarrow R_2$$

$$\begin{pmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 3 & 1 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix} A$$

$$R_3 \rightarrow R_3 - 3R_1$$

$$\begin{pmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 0 & -5 & -9 \end{pmatrix} = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & -3 & 1 \end{pmatrix} A$$

$$R_1 \rightarrow R_1 - 2R_2, \quad R_3 \rightarrow R_3 + 5R_2$$

$$\begin{pmatrix} 1 & 0 & -1 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} -2 & 1 & 0 \\ 1 & 0 & 0 \\ 5 & -3 & 1 \end{pmatrix} A$$

$$R_1 \rightarrow R_1 + R_3, \quad R_2 \rightarrow R_2 - 2R_3$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 3 & -2 & 1 \\ -9 & 6 & -2 \\ 5 & -3 & 1 \end{pmatrix} A \text{ [operating Row wise to reach at this step]} \quad 2\frac{1}{2} \text{ m}$$

$$A^{-1} = \begin{pmatrix} 3 & -2 & 1 \\ -9 & 6 & -2 \\ 5 & -3 & 1 \end{pmatrix} \quad \frac{1}{2} \text{ m}$$

10. A Candidate who has made an attempt to solve the question

to be given 4 marks

4 m

11. $y = -x^3 \log x$

$\frac{1}{2}$ m

$$\frac{dy}{dx} = -x^2(1 + 3 \log x)$$

1 m

$$\frac{d^2y}{dx^2} = - (5x + 6x \log x) \quad 1 \text{ m}$$

$$\text{L.H.S.} = x [-(5x + 6x \log x)] + 2x^2 (1 + 3 \log x) + 3x^2 \quad 1 \text{ m}$$

$$= 0 \quad \frac{1}{2} \text{ m}$$

$$= \text{R.H.S.}$$

OR

$$f(x) = (x-4)(x-6)(x-8)$$

$$= x^3 - 18x^2 + 104x - 192$$

Being a polynomial function $f(x)$ is continuous

in $[4, 10]$ and differentiable in $(4, 10)$ with

$$f'(x) = 3x^2 - 36x + 104 \quad 1+1 \text{ m}$$

$$\exists c \in (4, 10) \text{ such that } f'(c) = \frac{f(b) - f(a)}{b - a}$$

$$\Rightarrow 3c^2 - 36c + 104 = 8 \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow c = 4, 8 \quad ; c = 4 \notin (4, 10)$$

$$\therefore c = 8 : \text{ verifies the theorem} \quad \frac{1}{2} \text{ m}$$

12. Given $\frac{x}{x-y} = \log a - \log(x-y) \quad \frac{1}{2} \text{ m}$

Differentiating both sides and getting $[\because x \neq y]$

$$x - 2y + y \frac{dy}{dx} = 0 \quad 2\frac{1}{2} \text{ m}$$

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

$$\Rightarrow \frac{dy}{dx} = 2 - \frac{x}{y} \quad 1 \text{ m}$$

$$\begin{aligned}
 13. \quad I &= \int \frac{dx}{x^3 (x^5 + 1)^{3/5}} \\
 &= \int \frac{dx}{x^3 \cdot x^3 \left(1 + \frac{1}{x^5}\right)^{3/5}}
 \end{aligned}$$

1½ m

Put $1 + \frac{1}{x^5} = t$

$$\Rightarrow \frac{dx}{x^6} = -\frac{dt}{5}$$

1 m

$$\begin{aligned}
 \therefore I &= -\frac{1}{5} \int t^{-3/5} dt = -\frac{1}{2} t^{2/5} + C \\
 &= -\frac{1}{2} \left(1 + \frac{1}{x^5}\right)^{2/5} + C
 \end{aligned}$$

1 m

½ m

$$\begin{aligned}
 14. \quad I &= \int_2^4 |x - 2| dx + \int_2^4 |x - 3| dx + \int_2^4 |x - 4| dx \\
 &= \int_2^4 (x - 2) dx + \int_2^3 -(x - 3) dx + \int_3^4 (x - 3) dx + \int_2^4 -(x - 4) dx \\
 &= \left[\frac{x^2}{2} - 2x\right]_2^4 - \left[\frac{x^2}{2} - 3x\right]_2^3 + \left[\frac{x^2}{2} - 3x\right]_3^4 - \left[\frac{x^2}{2} - 4x\right]_2^4 \\
 &= 5
 \end{aligned}$$

½ m

2 m

1 m

½ m

OR

$$\begin{aligned}
 I &= \int_0^{\pi/4} \frac{\sec x}{1 + 2 \sin^2 x} dx = \int_0^{\pi/4} \frac{\cos x}{\cos^2 x (1 + 2 \sin^2 x)} dx \\
 &= \int_0^{\pi/4} \frac{\cos x}{(1 - \sin x)(1 + \sin x)(1 + 2 \sin^2 x)} dx
 \end{aligned}$$

1 m

Put $\sin x = t \Rightarrow \cos x \, dx = dt$, when $x = 0, t = 0$

$$x = \frac{\pi}{4}, t = \frac{1}{\sqrt{2}} \quad \frac{1}{2} \text{ m}$$

$$\therefore I = \int_0^{1/\sqrt{2}} \frac{dt}{(1-t)(1+t)(1+2t^2)}$$

$$\therefore I = \int_0^{1/\sqrt{2}} \frac{dt}{6(1-t)} + \int_0^{1/\sqrt{2}} \frac{dt}{6(1+t)} + \int_0^{1/\sqrt{2}} \frac{2 \, dt}{3(1+2t^2)} \quad 1 \text{ m}$$

$$= \left[\frac{1}{6} \log \left| \frac{1+t}{1-t} \right| + \frac{\sqrt{2}}{3} \tan^{-1}(\sqrt{2}t) \right]_0^{1/\sqrt{2}} \quad 1 \text{ m}$$

$$= \frac{1}{6} \log \left| \frac{1 + \frac{1}{\sqrt{2}}}{1 - \frac{1}{\sqrt{2}}} \right| + \frac{\sqrt{2}}{3} \tan^{-1}(1)$$

$$= \frac{1}{3} \log |\sqrt{2} + 1| + \frac{\pi}{6\sqrt{2}} \quad \text{or} \quad \frac{1}{6} \log(3 + 2\sqrt{2}) + \frac{\pi}{6\sqrt{2}} \quad \frac{1}{2} \text{ m}$$

15. $I = \int_{\pi/4}^{\pi/2} e^{2x} \left(\frac{1 - \sin 2x}{1 - \cos 2x} \right) dx$

$$= \int_{\pi/4}^{\pi/2} e^{2x} \left(\frac{1 - 2 \sin x \cos x}{2 \sin^2 x} \right) dx$$

$$= \int_{\pi/4}^{\pi/2} e^{2x} \left(\frac{1}{2} \operatorname{cosec}^2 x - \cot x \right) dx \quad 1\frac{1}{2} \text{ m}$$

Put $2x = t \Rightarrow dx = \frac{dt}{2}$

when $x = \frac{\pi}{4}$, $t = \frac{\pi}{2}$; $x = \frac{\pi}{2}$, $t = \pi$ 1 m

$$\therefore I = \frac{1}{2} \int_{\frac{\pi}{2}}^{\pi} e^t \left(\frac{1}{2} \operatorname{cosec}^2 \frac{t}{2} - \cot \frac{t}{2} \right) dt$$

$$= -\frac{1}{2} \left[\cot \frac{t}{2} \cdot e^t \right]_{\frac{\pi}{2}}^{\pi}$$
1 m

$$= \frac{e^{\pi/2}}{2}$$
½ m

16. Let $\overrightarrow{OA} = 4\hat{i} + 8\hat{j} + 12\hat{k}$, $\overrightarrow{OB} = 2\hat{i} + 4\hat{j} + 6\hat{k}$

$$\overrightarrow{OC} = 3\hat{i} + 5\hat{j} + 4\hat{k}, \overrightarrow{OD} = 5\hat{i} + 8\hat{j} + 5\hat{k}$$

$$\overrightarrow{AB} = -2\hat{i} - 4\hat{j} - 6\hat{k}, \overrightarrow{AC} = -\hat{i} - 3\hat{j} - 8\hat{k}, \overrightarrow{AD} = \hat{i} - 7\hat{k}$$
1½ m

Now, $\left[\overrightarrow{AB} \quad \overrightarrow{AC} \quad \overrightarrow{AD} \right] = \begin{vmatrix} -2 & -4 & -6 \\ -1 & -3 & -8 \\ 1 & 0 & -7 \end{vmatrix} = 0$ 2 m

\therefore A, B, C, D are coplanar ½ m

17. Let E_1 : Event that transferred ball is black

E_2 : Event that transferred ball is Red

E_3 : Event that balls drawn are black

$$P(E_1) = \frac{5}{9}, \quad P(E_2) = \frac{4}{9}$$
1 m

$$P(A/E_1) = \frac{{}^5C_2}{{}^8C_2} = \frac{5}{14}, \quad P(A/E_2) = \frac{{}^4C_2}{{}^8C_2} = \frac{3}{14}$$
1 m

$$P(E_1/A) = \frac{P(E_1) \cdot P(A/E_1)}{P(E_1) \cdot P(A/E_1) + P(E_2) \cdot P(A/E_2)}$$
½ m

$$= \frac{\frac{5}{9} \times \frac{5}{14}}{\frac{5}{9} \times \frac{5}{14} + \frac{4}{9} \times \frac{3}{14}} \quad 1 \text{ m}$$

$$= \frac{25}{37} \quad \frac{1}{2} \text{ m}$$

18. Equation of line joining (4, 3, 2) and (1, -1, 0) is

$$\frac{x-4}{-3} = \frac{y-3}{-4} = \frac{z-2}{-2} \quad \frac{1}{2} \text{ m}$$

Equation of line joining (1, 2, -1) and (2, 1, 1) is

$$\frac{x-1}{1} = \frac{y-2}{-1} = \frac{z+1}{2} \quad \frac{1}{2} \text{ m}$$

Let equation of the required line be

$$\frac{x-1}{a} = \frac{y+1}{b} = \frac{z-1}{c} = \lambda \dots\dots\dots (i) \quad \frac{1}{2} \text{ m}$$

According to the question $3a + 4b + 2c = 0$

$$a - b + 2c = 0 \quad 1 \text{ m}$$

Solving, $\frac{a}{10} = \frac{b}{-4} = \frac{c}{-7} = \mu$

$$\Rightarrow a = 10\mu, b = -4\mu, c = -7\mu \quad \frac{1}{2} \text{ m.}$$

(i) \Rightarrow Equation of the line is

$$\frac{x-1}{10} = \frac{y+1}{-4} = \frac{z-1}{-7} \quad [\text{cartesian form}] \quad \frac{1}{2} \text{ m}$$

Vector form, $\vec{r} = (\hat{i} - \hat{j} + \hat{k}) + \lambda (10\hat{i} - 4\hat{j} - 7\hat{k}) \quad \frac{1}{2} \text{ m}$

19. H R HW 1 m

$$\begin{matrix} A \\ B \\ C \end{matrix} \begin{bmatrix} 3 & 4 & 6 \\ 4 & 5 & 3 \\ 6 & 2 & 4 \end{bmatrix} \begin{bmatrix} 2500 \\ 3100 \\ 5100 \end{bmatrix}$$

$$= \begin{bmatrix} 50500 \\ 40800 \\ 41600 \end{bmatrix} \quad 1 \text{ m}$$

Hence money awarded by A = Rs. 50500
 money awarded by B = Rs. 40800 1 m
 money awarded by C = Rs. 41600
 Respect for elders or Any relevant value 1 m

SECTION - C

20. $(a, b) * (c, d) = (a + c, b + d) \quad \forall a, b, c, d \in \mathbb{R}$

Since $a + c \in \mathbb{R}$ and $b + d \in \mathbb{R} \Rightarrow (a + c, b + d) \in \mathbb{R} \times \mathbb{R}$ 1½ m

i.e. ‘*’ is binary operation

For commutative

$$\begin{aligned} \text{consider } (c, d) * (a, b) &= (c + a, d + b) \\ &= (a + c, b + d) \\ &= (a, b) * (c, d) \end{aligned} \quad 1½ \text{ m}$$

\Rightarrow ‘*’ is commutative

For Associative

Let $(a, b), (c, d), (e, f) \in \mathbb{R} \times \mathbb{R} = A$

$$\begin{aligned} [(a, b) * (c, d)] * (e, f) &= (a + c, b + d) * (e, f) \\ &= (a + c + e, b + d + f) \dots\dots\dots(i) \end{aligned}$$

again $(a, b) * [(c, d)] * (e, f) = (a, b) * (c + e, d + f)$

$$= (a + c + e, b + d + f) \dots\dots\dots(ii) \quad 1½ \text{ m}$$

(i) & (ii) \Rightarrow '*' is associative

For identity element

Let $(e_1, e_2) \in \mathbb{R} \times \mathbb{R}$ be the identity element (if exists)

then $(a, b) * (e_1, e_2) = (a, b) = (e_1, e_2) * (a, b)$

$$\Rightarrow (e_1, e_2) = (0, 0) \in \mathbb{R} \times \mathbb{R} \quad 1\frac{1}{2} \text{ m}$$

OR

$$f(x) = x^2 - x; \quad x \in \{-1, 0, 1, 2\}$$

$$f(-1) = 2, \quad f(0) = 0, \quad f(1) = 0, \quad f(2) = 2$$

$$\therefore f = \{(-1, 2), (0, 0), (1, 0), (2, 2)\} \quad 2 \text{ m}$$

$$g(x) = 2 \left| x - \frac{1}{2} \right| - 1 \quad \forall x \in \{-1, 0, 1, 2\}$$

$$g(-1) = 2, \quad g(0) = 0, \quad g(1) = 0, \quad g(2) = 2$$

$$\therefore g = \{(-1, 2), (0, 0), (1, 0), (2, 2)\} \quad 2 \text{ m}$$

$$\begin{aligned} (g \circ f)(x) &= g(f(-1)), g(f(0)), g(f(1)), g(f(2)) \quad \forall x \in A \\ &= 2, 0, 0, 2 \end{aligned}$$

$$\therefore g \circ f = \{(-1, 2), (0, 0), (1, 0), (2, 2)\} \quad 2 \text{ m}$$

Hence $f = g = g \circ f$

21. Given curve cuts the x-axis when $y = 0$ 1/2 m

when $y = 0$, $x = 7$, hence point is $(7, 0)$ 1/2 m

$$\frac{dy}{dx} = \frac{1 - y(2x - 5)}{x^2 - 5x + 6} \quad 2\frac{1}{2} \text{ m}$$

$$\left. \frac{dy}{dx} \right|_{(7,0)} = \frac{1}{20} \quad 1/2 \text{ m}$$

Equation of the tangent is $y - 0 = \frac{1}{20}(x - 7)$ 1 m

$$\Rightarrow x - 20y = 7$$

Equation of the normal is $y - 0 = -20(x - 7)$ 1 m

$$\Rightarrow 20x + y = -7$$

OR

$$f(x) = \cos^2 x + \sin x, \quad x \in [0, \pi]$$

$$f'(x) = \cos x (-2 \sin x + 1) \quad 1 \text{ m}$$

For extremum, $f'(x) = 0 \Rightarrow x = \frac{\pi}{2}$ or $x = \frac{\pi}{6}, \frac{5\pi}{6}$ 1½ m

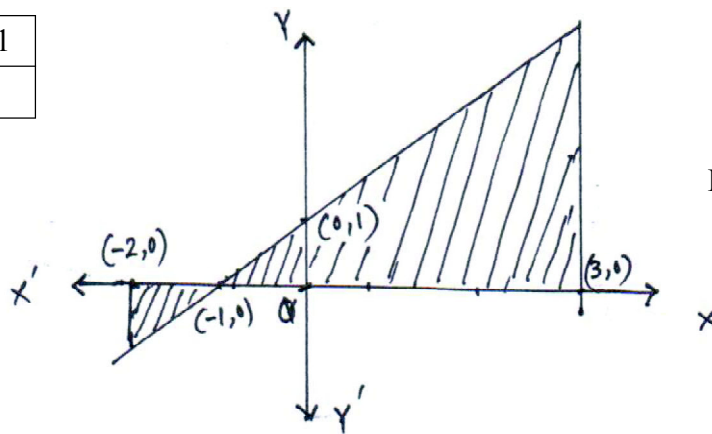
Now $f(0) = 1, f\left(\frac{\pi}{6}\right) = \frac{5}{4}, f\left(\frac{\pi}{2}\right) = 1, f\left(\frac{5\pi}{6}\right) = \frac{5}{4}, f(\pi) = 1$ 1½ m

Absolute max. is $\frac{5}{4}$ at $x = \frac{\pi}{6}$ and $\frac{5\pi}{6}$ 1 m

Absolute min. is 1 at $x = 0, \frac{\pi}{6}$ and π 1 m

22. $y = x + 1, \quad x = -2, \quad x = 3$

x	0	-1
y	1	0



For correct figure 1 m

$$\text{Reqd area} = \left| \int_{-2}^{-1} (x+1) dx \right| + \int_{-1}^3 (x+1) dx \quad 2 \text{ m}$$

$$= \left| \left(\frac{x^2}{2} + x \right)_{-2}^{-1} \right| + \left(\frac{x^2}{2} + x \right)_{-1}^3 \quad 2 \text{ m}$$

$$= \frac{17}{2} \text{ sq. units} \quad 1 \text{ m}$$

23. $(y - \sin x) dx + (\tan x) dy = 0 \Rightarrow \frac{dy}{dx} + \cot x y = \cos x$ 1 m

Linear diff. equ. with $P = \cot x$, $Q = \cos x$

I.F. = $\sin x$ 1 m

Solution is $y \cdot \sin x = \int \cos x \cdot \sin x dx + c$

$$= -\frac{1}{4} \cos 2x + c$$
 2 m

when $x = 0, y = 0 \Rightarrow c = \frac{1}{4}$ 1 m

Particular solution is

$$y \sin x = \frac{1}{4} (-\cos 2x + 1) = \frac{\sin^2 x}{2}$$

$$\Rightarrow y = \frac{1}{2} \sin x$$
 1 m

24. d.r's of first line : $k - 5, 1, 2k + 1$ 1 m

d.r's of 2nd line : $-1, k, 5$ 1 m

\therefore lines are $\perp \therefore -1(k - 5) + k(1) + 5(2k + 1) = 0$

$$\Rightarrow k = -1$$
 1 m

Eqns of lines become $\frac{x+3}{-6} = \frac{y-1}{-1} = \frac{z-5}{-1}$ and $\frac{x+2}{-1} = \frac{y-2}{-1} = \frac{z}{5}$ 1 m

Eqn of plane containing these two lines is

$$\begin{vmatrix} x+2 & y-2 & z \\ -6 & 1 & -1 \\ -1 & -1 & 5 \end{vmatrix} = 0$$
 1 m

$$\Rightarrow 4x + 31y + 7z = 54$$
 1 m

25. Let x kg of B_1 and y kg of B_2 is taken

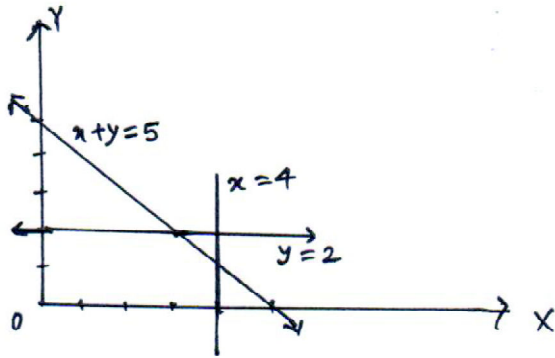
then to minimize $Z = 5x + 8y$

1 m

subject to the following constraints

3 m

$$x + y = 5, \quad x \leq 4, \quad y \geq 2$$



Graph

2 m

26. Let x denote no. of heads

$$\text{here } p = \frac{1}{2}, \quad q = \frac{1}{2}$$

1 m

$$P(x=r) = {}^n C_r \left(\frac{1}{2}\right)^r \left(\frac{1}{2}\right)^{n-r}$$

$$= {}^n C_r \left(\frac{1}{2}\right)^n$$

1 m

$$\text{Now } P(x=1) = {}^n C_1 \left(\frac{1}{2}\right)^n$$

$$P(x=2) = {}^n C_2 \left(\frac{1}{2}\right)^n$$

1½ m

$$P(x=3) = {}^n C_3 \left(\frac{1}{2}\right)^n$$

According to the question

$$2 \cdot {}^n C_2 \left(\frac{1}{2}\right)^n = ({}^n C_1 + {}^n C_3) \left(\frac{1}{2}\right)^n$$

2 m

$$\Rightarrow n = 2 \text{ or } 7$$

½ m

n can not be 2 Hence $n = 7$