COMMON PRE-BOARD EXAMINATION

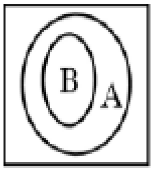
MATHEMATICS-Code No. 041

Class-XII-(2025-26)

SET: 3

MARKING SCHEME

Q. No.	Questions	Marks
1.	**(B) y = $\boldsymbol{cos^{-1}x}$** The graph represents y = $cos^{-1}x$ whose domain is [-1, 1] and range is [0, π].	1
2.	**(B) $\vec{a} \perp \vec{b}$** Since $\vec{a}.\vec{b} = 0$ => $\vec{a} \perp \vec{b}$	1
3.	**(C) 3** The given differential equation is $4\left(\frac{dy}{dx}\right)^3 \frac{d^2y}{dx^2} = 0$. Here m = 2 and n = 1. So m + n = 3	1
4.	**(B) 5^2** $\lvert A\rvert = 5, \lvert B^{-1}AB\rvert^2 = \left(\lvert B^{-1}\rvert\lvert A\rvert\lvert B\rvert\right)^2 = \lvert A\rvert^2 = 5^2$.	1
5.	**(B) $2x+y \geq 2$** The points (1,0) and (0,2) satisfy the equation $2x+y=2$ and the shaded region shows that (0,0) doesn't lie in the feasible solution region So, the inequality is $2x+y \geq 2$	1
6.	**(B) ± 3** $\pm 9 = \frac{1}{2}\begin{vmatrix} -3 & 0 & 1 \\ 3 & 0 & 1 \\ 0 & k & 1 \end{vmatrix}$ expanding along C_2, we get $\Rightarrow k = \pm 3$	1
7.	**(B)** $\begin{bmatrix} \frac{1}{3} & 0 & 0 \\ 0 & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{5} \end{bmatrix}$	1

8.	**(C)** $a_{ij} = 0$**, where i = j** In a skew-symmetric matrix, the (i, j)th element is negative of the (j, i)th element. Hence, the (i, i)th element = 0	1
9.	**(C)** $\frac{1}{2}\log 2$ $\int_2^3 \frac{x}{x^2+1} = \frac{1}{2}[log(x^2+1)]_2^3 = \frac{1}{2}(log10 - log5) = \frac{1}{2}log\left(\frac{10}{5}\right) = \frac{1}{2}log2$	1
10.	(B)  , Since every differential functions will be continuous.	1
11.	**(B)** $\frac{1}{2}\lvert\overrightarrow{\mathbf{AB}} \times \overrightarrow{\boldsymbol{AC}}\rvert$ The area of the parallelogram with adjacent sides AB and AC = $\lvert\overrightarrow{\mathbf{AB}} \times \overrightarrow{\boldsymbol{AC}}\rvert$ **.** Hence, the area of the triangle with vertices A, B, C is $\frac{1}{2}\lvert\overrightarrow{\mathbf{AB}} \times \overrightarrow{\boldsymbol{AC}}\rvert$ **.**	1
12.	**(A) π/6** $\vec{a}+\vec{b}+\vec{c}=0$ => $\vec{a} = -(\vec{b}+\vec{c})$ => $\lvert\vec{a}\rvert^2 = \lvert\vec{b}+\vec{c}\rvert^2$ => $37 = \lvert\vec{b}\rvert^2 + \lvert\vec{c}\rvert^2 + 2\vec{b}\cdot\vec{c}$ => $\vec{b}\cdot\vec{c} = 6$ $\vec{b}\cdot\vec{c} = \lvert\vec{b}\rvert\lvert\vec{c}\rvert\cos\theta$ => $\cos\theta = \frac{6}{12} = \frac{1}{2}$ => $\theta = 60^\circ$	1
13.	**(A)** $\frac{-1}{\log 2}$ $\int \frac{2^{\frac{1}{x}}}{x^2}\,dx = \frac{-1}{\log 2}.2^{\frac{1}{x}} + C$	1
14.	**(A) 0** $\begin{vmatrix}\cos 67^o & \sin 67^o \\ \sin 23^o & \cos 23^o\end{vmatrix} = \cos 67^o \cos 23^o - \sin 67^o \sin 23^o$ $= \cos(67^o + 23^o)$ $= \cos 90^o = 0$	1
15.	**(D) Parallel** The vectors $2\vec{i} + 3\vec{j} - 6\vec{k}$ and $6\vec{i} + 9\vec{j} - 18\vec{k}$ are parallel.	1
16.	**(B) Maximum value of *Z* is at *Q* (30,20)** The maximum value is 180.	1
17.	**(B) 2 sq. units** Since $\frac{dV}{dt} = 2\frac{dr}{dt}$ => $r^2 = \frac{1}{2\pi}$ => $S = 2\ sq.units$	1

18.	**(C) 2/3** $P(E) = 2/3$, $P(F) = 3/7 \Rightarrow P(F^I) = 4/7$ Since E and F^I are independent, $P(E \mid F^I) = \frac{P(E)P(F^I)}{P(F^I)} = P(E) = 2/3$	1
19.	**(D) Assertion (A) is false but Reason (R) is true.**	1
20.	**(C) Assertion (A) is true but Reason (R) is false.** $\sec^{-1}x$ is defined if $x \le -1$ *or* $x \ge 1$. Hence, $\sec^{-1}2x$ will be defined if $x \le -\frac{1}{2}$ *or* $x \ge \frac{1}{2}$. Hence **A** is true. The range of the function $\sec^{-1}x$ is $[0, \pi] - \{\frac{\pi}{2}\}$. Hence **R** is false.	1
SECTION B [2 x 5 = 10]		
21.	Let $u = 2^{\cos^2 x} \Rightarrow \frac{du}{dx} = 2^{\cos^2 x}(-2\cos x \sin x)\log 2$ Let $v = \cos^2 x \Rightarrow \frac{dv}{dx} = -2\cos x \sin x$ Now $\frac{du}{dv} = \frac{\left(\frac{du}{dx}\right)}{\left(\frac{dv}{dx}\right)} = 2^{\cos^2 x}\log 2$	1 ½ ½
22.	(a) $\sin^{-1}\left(\cos\left(\frac{33\pi}{5}\right)\right) = \sin^{-1}\cos\left(6\pi + \frac{3\pi}{5}\right)$ $= \sin^{-1}\cos\left(\frac{3\pi}{5}\right)$ $= \sin^{-1}\sin\left(\frac{\pi}{2} - \frac{3\pi}{5}\right)$ $= \frac{\pi}{2} - \frac{3\pi}{5}$ $= -\frac{\pi}{10}$ **OR** (b) $-1 \le (x^2 - 4) \le 1 \Rightarrow 3 \le x^2 \le 5$ $\Rightarrow \sqrt{3} \le \lvert x \rvert \le \sqrt{5}$ $\Rightarrow x \in [-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$ So, required domain is $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$	½ ½ ½ ½ ½ ½ 1

23.	$e^y(x+1)=1 \Rightarrow e^y=\frac{1}{x+1}$ $\Rightarrow y=-\log(x+1)$ $\Rightarrow \frac{dy}{dx}=-\frac{1}{x+1}$ $=-e^y \qquad \left[\because \frac{1}{x+1}=e^y\right]$	½ ½ ½ ½
24.	(a) Let $f(x)=\log\left(\frac{2-x}{2+x}\right)$ We have, $f(-x)=\log\left(\frac{2+x}{2-x}\right)=-\log\left(\frac{2-x}{2+x}\right)=-f(x)$ **So, $f(x)$ is an odd function.** $\therefore \int_{-1}^{1}\log\left(\frac{2-x}{2+x}\right)dx=0.$ **OR** (b) $\int \frac{(x-3)e^x}{(x-1)^3}\,dx = \int \frac{(x-1-2)e^x}{(x-1)^3}\,dx$ $= \int \left(\frac{1}{(x-1)^2}-\frac{2}{(x-1)^3}\right)e^x\,dx$ $= \int \left(\frac{1}{(x-1)^2}+\frac{d}{dx}\left(\frac{1}{(x-1)^2}\right)\right)e^x\,dx$ $= \frac{e^x}{(x-1)^2} + C$	1 1 ½ ½ ½ ½
25.	$\frac{QR}{QP}=\frac{3}{2}$ => R divides PQ, externally, in the ratio 1:3. The Position vector of R = $\vec{x} = \frac{\vec{\beta}-3\vec{\alpha}}{1-3} = \frac{3\vec{\alpha}-\vec{\beta}}{2}$	1 1
SECTION C [3 x 6 = 18]		
26.	(a) $x\sqrt{1+y}+y\sqrt{1+x}=0 \quad \Rightarrow x\sqrt{1+y}=-y\sqrt{1+x}$ $\Rightarrow x^2(1+y)=y^2(1+x)$ $\Rightarrow (x-y)(x+y)+xy(x-y)=0$ $\Rightarrow (x-y)(x+y+xy)=0$ $x \neq y \Rightarrow x+y+xy=0$ $\Rightarrow y=\frac{-x}{1+x}$ $\Rightarrow \frac{dy}{dx}=\frac{-1}{(1+x)^2}$	½ 1 ½ 1

OR

(b) $\frac{dx}{d\theta} = a(1 - \cos\theta\ ),\ \frac{dy}{d\theta} = a(0 + \sin\theta),$

$$\Rightarrow \frac{dy}{dx} = \frac{\frac{dy}{d\theta}}{\frac{dx}{d\theta}} = \frac{a\sin\theta}{a(1-\cos\theta\ )}$$ ½

$$= \frac{2\sin\left(\frac{\theta}{2}\right)\cos\left(\frac{\theta}{2}\right)}{2sin^2\left(\frac{\theta}{2}\right)} = \cot\frac{\theta}{2}$$ ½

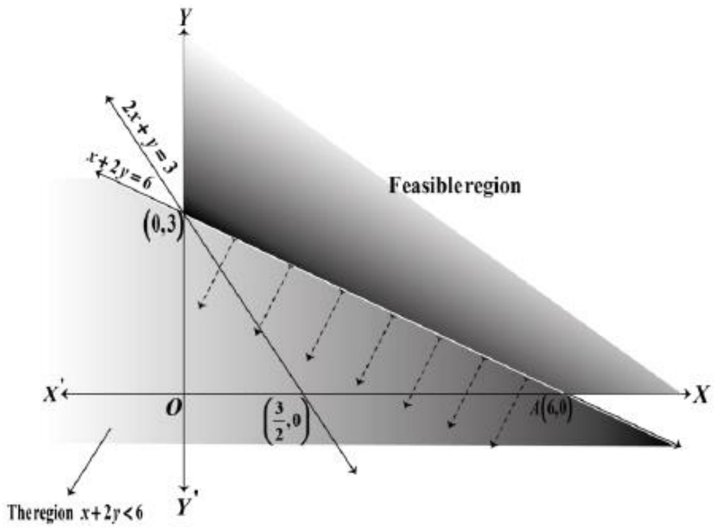
$$\Rightarrow \frac{d^2y}{dx^2} = -\frac{1}{2}cosec^2\left(\frac{\theta}{2}\right)\frac{d\theta}{dx}$$ ½

$$= -\frac{1}{2a}cosec^2\left(\frac{\theta}{2}\right)\frac{1}{2sin^2\left(\frac{\theta}{2}\right)}$$ ½

$$= -\frac{1}{4a}cosec^4\left(\frac{\theta}{2}\right)$$ ½

½

27.



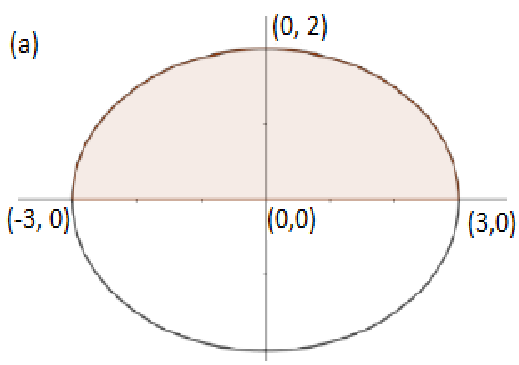
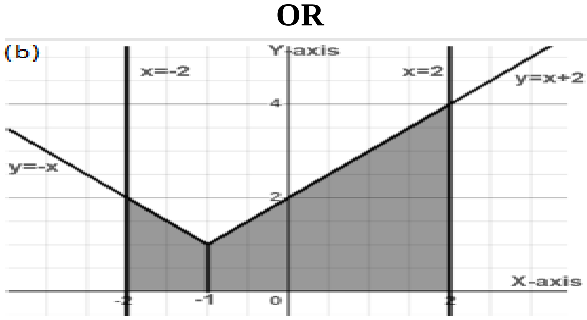
1 ½

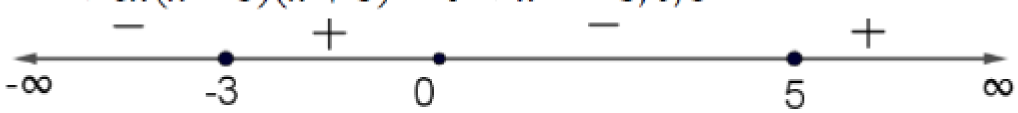
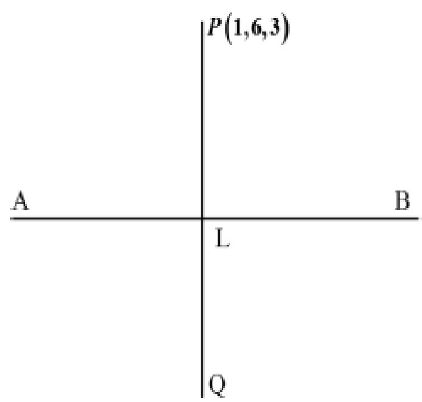
Corner point	Value of the objective function $Z = x + 2y$
$A(6,0)$	6
$B(0,3)$	6

½

½

½

	We observe the region $x+2y<6$ have no points in common with the unbounded feasible region. Hence the minimum value of $z=6$. It can be seen that the value of Z at points **A** and **B** is same. If we take any other point on the line $x+2y=6$ such as (2,2) on line $x+2y=6$, then $Z=6$. Thus, the minimum value of Z occurs for more than **2** points, and is equal to 6.	
28.	(a) $\theta = \cos^{-1}\left(\frac{\vec{l_1}.\vec{l_2}}{\lvert\vec{l_1}\rvert.\lvert\vec{l_2}\rvert}\right) = \cos^{-1}\left(\frac{(\hat{i}-2\hat{j}+3\hat{k}).(3\hat{i}-2\hat{j}+\hat{k})}{\lvert(\hat{i}-2\hat{j}+3\hat{k})\rvert\lvert(3\hat{i}-2\hat{j}+\hat{k})\rvert}\right)$ $= \cos^{-1}\left(\frac{3+4+3}{\sqrt{1+4+9}\sqrt{9+4+1}}\right) = \cos^{-1}\left(\frac{10}{14}\right) = \cos^{-1}\left(\frac{5}{7}\right).$ Scalar projection of $\vec{l_1}$ on $\vec{l_2}$ $= \frac{\vec{l_1}.\vec{l_2}}{\lvert\vec{l_2}\rvert} = \frac{(\hat{i}-2\hat{j}+3\hat{k}).(3\hat{i}-2\hat{j}+\hat{k})}{\lvert(3\hat{i}-2\hat{j}+\hat{k})\rvert}$ $= \frac{3+4+3}{\sqrt{9+4+1}} = \frac{10}{\sqrt{14}}.$ **OR** (b) Line perpendicular to the lines $\vec{r} = 2\hat{i}+\hat{j}-3\hat{k}+\lambda(\hat{i}+2\hat{j}+5\hat{k})$ and $\vec{r} = 3\hat{i}+3\hat{j}-7\hat{k}+\mu(3\hat{i}-2\hat{j}+5\hat{k})$ has a vector parallel it is given by $\vec{b} = \vec{b_1}\times\vec{b_2} = \begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ 1 & 2 & 5\\ 3 & -2 & 5\end{vmatrix} = 20\hat{i}+10\hat{j}-8\hat{k}$ $\therefore$ equation of line in vector form is $\vec{r} = -\hat{i}+2\hat{j}+7\hat{k}+a(10\hat{i}+5\hat{j}-4\hat{k})$ And equation of line in cartesian form is $\frac{x+1}{10} = \frac{y-2}{5} = \frac{z-7}{-4}$	1 ½ 1 ½ 1 1 1
29.	(a)  $A = 2\times\frac{2}{3}\int_0^3\sqrt{9-x^2}\,dx$ $= \frac{4}{3}\left[\frac{x}{2}\sqrt{9-x^2}+\frac{9}{2}\sin^{-1}\left(\frac{x}{3}\right)\right]_0^3$ $= \frac{4}{3}\left[\left(0+\frac{9}{2}\sin^{-1}1\right)-0\right]$ $= 3\pi$	Fig. 1 ½ ½ ½ ½
	OR  $A = \int_{-2}^{-1}(-x)\,dx + \int_{-1}^{2}(x+2)\,dx$ $= -\frac{1}{2}[x^2]_{-2}^{-1} + \left[\frac{1}{2}x^2+2x\right]_{-1}^{2}$ $= 9$	Fig.1 1 ½ ½

30.	A = { (3, 6), (4, 5), (5, 4), (6, 3)} P(A) = 1/9 , P(B) = 5/6 P(A ∩ B) = 1/12 P(A ∩ B) ≠ P(A) P(B) Therefore A and B are not Independent. Since A ∩ B≠ ∅, A and B are not mutually Exclusive.	 ½ + ½ ½ ½ 1
31.	$f(x) = \frac{3}{2}x^4 - 4x^3 - 45x^2 + 51$ $\Rightarrow f'(x) = 6x^3 - 12x^2 - 90x$ For critical points $f'(x) = 0$ $\Rightarrow 6x^3 - 12x^2 - 90x = 0$ $\Rightarrow 6x(x^2 - 2x - 15) = 0$ $\Rightarrow 6x(x-5)(x+3) = 0 \Rightarrow x = -3, 0, 5$  $f(x)$ is strictly increasing in $(-3,0)$ *and* $(5,\infty)$ $(f(x)$ is strictly decreasing in $(-\infty,-3)$ *and* $(0,5)$	 1 1 1
	SECTION D [5 x 4 = 20]	
32.	Let $P(1,6,3)$ be the given point, and let $'L'$ be the foot of the perpendicular from $'P'$ to the given line AB (as shown in the figure below). The coordinates of a general point on the given line are given by  $\frac{x-0}{1} = \frac{y-1}{2} = \frac{z-2}{3} = \lambda;$ Let the coordinates of L be $(\lambda, 2\lambda+1, 3\lambda+2)$. So, direction ratios of PL are $\lambda-1,\ 2\lambda-5$ and $3\lambda-1.$ Direction ratios of the given line are $1, 2$ and $3,$ which is perpendicular to PL. Therefore, $(\lambda-1)1+(2\lambda-5)2+(3\lambda-1)3=0 \Rightarrow \lambda=1$ So, coordinates of L are $(1,3,5)$. Let $Q(x_1, y_1, z_1)$ be the image of $P(1,6,3)$ in the given line. Then, L is the mid-point of PQ. Therefore, $\frac{(x_1+1)}{2} = 1, \frac{(y_1+6)}{2} = 3$ and $\frac{(z_1+3)}{2} = 5$ $\Rightarrow x_1 = 1, y_1 = 0$ and $z_1 = 7$	 ½ ½ ½ ½ ½ ½ ½

	Hence, the image of $P(1,6,3)$ in the given line is $(1,0,7)$. **Now, the distance of the point $(1,0,7)$ from the $y-$axis is $\sqrt{1^2+7^2}=\sqrt{50}$ *units*.**	½ 1
33.	(a) Given differential equation can be written as $\frac{dy}{dx}=\frac{yx^2}{x^3+y^3}$ Put y = vx, so $\frac{dy}{dx}=v+x\frac{dv}{dx}$ Therefore, $v+x\frac{dv}{dx}=\frac{vx^3}{x^3+v^3x^3}=\frac{v}{1+v^3}$ $x\frac{dv}{dx}=\frac{-v^4}{1+v^3}$ $(\frac{1}{v^4}+\frac{1}{v})dv=\frac{-dx}{x}$ Integrating we get $\frac{-1}{3v^3}+\log\|v\|=-\log\|x\|+C$ $\frac{-x^3}{3y^3}+\log\|y\|=C$ **OR** (b) **The given differential equation can be written as:** $\frac{dy}{dx}+2y=\cos x$ **Taking $P=2, Q=\cos x$, Integrating factor is given by, $I=e^{\int 2dx}=e^{2x}$** **$\therefore$ The solution is, $y\cdot e^{2x}=\int e^{2x}\cos x dx$** **Let, $I_1=\int \cos x\cdot e^{2x}dx$** $=\cos x\frac{e^{2x}}{2}-\int(-\sin x)\frac{e^{2x}}{2}dx$ $=\frac{e^{2x}\cos x}{2}+\frac{1}{2}\left[\sin x\cdot\frac{e^{2x}}{2}-\int\cos x\cdot\frac{e^{2x}}{2}dx\right]$ $\Rightarrow I_1=\frac{e^{2x}\cos x}{2}+\frac{e^{2x}\sin x}{4}-\frac{1}{4}I_1$ $\Rightarrow I_1=\frac{e^{2x}}{5}(2\cos x+\sin x)$ **$\therefore$ The solution of the differential equation is** $y\cdot e^{2x}=\frac{e^{2x}}{5}(2\cos x+\sin x)+C$ $\Rightarrow y=\frac{1}{5}(2\cos x+\sin x)+Ce^{-2x}$	½ 1 ½ 1 ½ 1 ½ ½ ½ ½ 1 ½ 1 ½ ½
34.	(a) $I=\int_0^{3/2}\|x\cos\pi x\|dx$	

	$= \int_0^{1/2} x\cos \pi x\, dx - \int_{1/2}^{3/2} x\cos \pi x\, dx \quad \ldots (1)$ Consider $\int x\cos \pi x\, dx$ $= \frac{x\sin \pi x}{\pi} - \int \frac{\sin \pi x}{\pi} dx$ $= \frac{x\sin \pi x}{\pi} + \frac{\cos \pi x}{\pi^2} \quad \ldots(2)$ $\therefore$ I $= \left[\frac{x\sin \pi x}{\pi} + \frac{\cos \pi x}{\pi^2}\right]_0^{1/2} - \left[\frac{x\sin \pi x}{\pi} + \frac{\cos \pi x}{\pi^2}\right]_{1/2}^{3/2}$ using (2) in (1), $= \left(\frac{1}{2\pi} - \frac{1}{\pi^2}\right) - \left(-\frac{3}{2\pi} - \frac{1}{2\pi}\right)$ $= \frac{5}{2\pi} - \frac{1}{\pi^2}$ **OR** (b) $\frac{x^2+x+1}{(x+2)(x^2+1)} = \frac{A}{(x+2)} + \frac{Bx+c}{x^2+1}$ Getting $A = \frac{3}{5}, B = \frac{2}{5}, C = \frac{1}{5}$ $\therefore \int \frac{x^2+x+1}{(x+2)(x^2+1)} dx = \frac{3}{5}\int \frac{1}{x+2}dx + \frac{1}{5}\int \frac{2x}{x^2+1}dx + \frac{1}{5}\int \frac{1}{x^2+1}dx$ $= \frac{3}{5}\log\lvert x+2\rvert + \frac{1}{5}\log(x^2+1) + \frac{1}{5}tan^{-1}x + C$	1 1 1 1 ½ ½ 1 1 1 ½ 1 ½
35.	$y = ax^2 + bx + c$ => The required equations are $15 = 4a + 2b + c$ $25 = 16a + 4b + c$ $15 = 196a + 14b + c$ The set of equations can be represented in the matrix form as $AX = B$, $\Rightarrow \begin{bmatrix} 4 & 2 & 1 \\ 16 & 4 & 1 \\ 196 & 14 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 15 \\ 25 \\ 15 \end{bmatrix}$ where $A = \begin{bmatrix} 4 & 2 & 1 \\ 16 & 4 & 1 \\ 196 & 14 & 1 \end{bmatrix}$, $X = \begin{bmatrix} a \\ b \\ c \end{bmatrix}$ and $B = \begin{bmatrix} 15 \\ 25 \\ 15 \end{bmatrix}$	1 ½

	$\|A\| = 4(4-14) - 2(16-196) + (224-784)$ $= -240 \neq 0.$ Hence A^{-1} exists. Now, $adj(A) = \begin{bmatrix} -10 & 12 & -2 \\ 180 & -192 & 12 \\ -560 & 336 & -16 \end{bmatrix}$ $\begin{bmatrix} a \\ b \\ c \end{bmatrix} = -\frac{1}{240}\begin{bmatrix} -10 & 12 & -2 \\ 180 & -192 & 12 \\ -560 & 336 & -16 \end{bmatrix}\begin{bmatrix} 15 \\ 25 \\ 15 \end{bmatrix}$ $= \begin{bmatrix} -1/2 \\ 8 \\ 1 \end{bmatrix}$ $\therefore a = -\frac{1}{2}, b = 8, c = 1$ So, the equation becomes $y = -\frac{1}{2}x^2 + 8x + 1$	½ 1 1 ½ ½
SECTION- E [4 x 3 =12]		
36.	Let E_1 be the event that one parrot and one owl flew from cage –I E_2 be the event that two parrots flew from Cage-I A be the event that the owl. (i) Probability that the owl is still in cage –I = $P(E_1 \cap A) + P(E_2 \cap A)$ $= \frac{(5_{C_1} \times 1_{C_1})(7_{C_1} \times 1_{C_1}) + (5_{C_2})(8_{C_2})}{(5_{C_1} \times 1_{C_1})(7_{C_1} \times 1_{C_1}) + (5_{C_1} \times 1_{C_1})(7_{C_2}) + (5_{C_2})(8_{C_2})}$ $= \frac{35+280}{35 + 105 + 280} = \frac{315}{420} = \frac{3}{4}$ (ii) The probability that one parrot and the owl flew from Cage-I to Cage-II given that the owl is still in cage-I is $P(E_1/A)$ $P\left(E_1/A\right) = \frac{P(E_1 \cap A)}{P(E_1 \cap A) + P(E_2 \cap A)} = \frac{\frac{35}{420}}{\frac{315}{420}} = \frac{1}{9}$	½ 1 ½ ½ ½ + 1
37.	(i) Traffic flow is not reflexive as $(A, A) \notin R$ (or no major spot is connected with itself) (ii) Traffic flow is not transitive as $(A, B) \in R$ and $(B, E) \in R$, but $(A, E) \notin R$ (iii) (a). $R = \{(A, B), (A, C), (A, D), (B, C), (B, E), (C, E), (D, E), (D, C)\}$ Domain = $\{A, B, C, D\}$ Range = $\{B, C, D, E\}$ **OR** (b) No, the traffic flow doesn't represent a function as A has three images.	1 1 1 ½ ½ 2

38.	$(i)\ 2x+3y=300$	1
	$(ii)\ A=xy=\frac{x}{3}(300-2x)$	1
	$(iii)(a)\ A=\frac{x}{3}(300-2x)=\frac{1}{3}(300x-2x^2)$	½
	$\Rightarrow \frac{dA}{dx}=\frac{1}{3}(300-4x)$	
	For critical points, put $\frac{dA}{dx}=0 \Rightarrow x=75$	½
	Also, $\frac{d^2A}{dx^2}=-\frac{4}{3}<0$. So, A is maximum at $x=75$	½
	Also, maximum area is $A=\frac{75}{3}(300-150)=3750\text{ m}^2$	½
	OR	
	$(iii)(b)\ A=\frac{x}{3}(300-2x)=\frac{1}{3}(300x-2x^2)$	
	$\Rightarrow \frac{dA}{dx}=\frac{1}{3}(300-4x)$	½
	For critical points, put $\frac{dA}{dx}=0 \Rightarrow x=75$	½
	As $\frac{dA}{dx}$ changes its sign from positive to negative as x passes through $x=75$ from left to right, which means $x=75$ is the point of maximum.	½
	Also, maximum area is $A=\frac{75}{3}(300-150)=3750\text{ m}^2$	½