GOVERNMENT OF KARNATAKA
KARNATAKA STATE PRE-UNIVERSITY EDUCATION EXAMINATION BOARD
II YEAR PUC EXAMINATION APRIL/MAY--2022
SCHEME OF VALUATION

Subject: MATHEMATICS **SUBJECT CODE: Code: 35**

INSTRUCTIONS:

I) Strictly follow the scheme of valuation to maintain uniformity.

ii) Answer by alternate method should be valued and suitably awarded.

iii) All answers including extra, strike off and repeated should be valued. Answers with maximum marks awarded must be considered.

iv) Highlight the mistakes in the answer by underlining or circling them and suitable award marks.

v) Write the question number if not written or rewrite if written wrong.

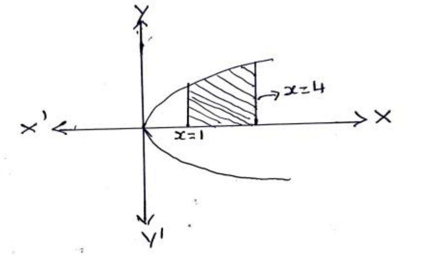
vi) In part A, award marks for direct answers.

Q. No	PART-A	Marks
1	$(1,2) \in R$ and $(2,3) \in R$, but $(1,3) \notin R$ $\therefore$ R is not transitive.	1
2	Writing $5 \star 7 = 35$ OR L.C.M. of 5 and 7 is 35.	1
3	Writing $(0, \pi)$	1
4	Writing $\cos\frac{\pi}{2} = 0$	1
5	A square matrix is said to be diagonal matrix, if all its non-diagonal elements are zero.	1
6	Getting x=2	1
7	Getting $\frac{dy}{dx} = a\cos(ax+b)$ OR $\cos(ax+b)\,a$	1
8	Getting $\frac{dy}{dx} = 3x^2 e^{x^3}$ OR $e^{x^3} \times 3x^2$	1
9	Getting I=tanx+secx+C	1
10	Getting $\frac{19}{3}$	1
11	Writing $\hat{a} = \frac{2\hat{\imath}+3\hat{\jmath}+\hat{k}}{\sqrt{14}}$ OR $\frac{2}{\sqrt{14}}\hat{\imath} + \frac{3}{\sqrt{14}}\hat{\jmath} + \frac{1}{\sqrt{14}}\hat{k}$	1
12	Two or more vectors are said to be collinear, if they are parallel to the same line irrespective of their magnitude and direction	1
13	Writing 0, 1, 0 OR $cos90^0$, $cos0^0$, $cos90^0$	1
14	The common region determined by all the constraints including non-negative constraints of a LPP	1
15	Getting $P(A\|B) = \frac{0.2}{0.3} = \frac{2}{3}$	1

	PART B	
16	Getting $a \star (b \star c) = \frac{abc}{4}$	1
	Getting $(a \star b) \star c = \frac{abc}{4}$ and $\star$ is associative	1
17	Substitute $x = sin\theta \implies \theta = \sin^{-1} x$	1
	Getting $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = \sin^{-1}(sin2\theta) = 2\theta = 2\sin^{-1} x$	1
18	Getting $\tan^{-1}\sqrt{3} = \frac{\pi}{3}$ or $\cot^{-1}\left(-\sqrt{3}\right) = \frac{5\pi}{6}$	1
	Getting $\tan^{-1}\sqrt{3} - \cot^{-1}\left(-\sqrt{3}\right) = -\frac{\pi}{2}$	1
19	Getting $X = \begin{bmatrix} 5 & 0 \\ 1 & 4 \end{bmatrix}$	1
	Getting $Y = \begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$	1
20	Writing Area of △le $= \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$ or $\frac{1}{2}\begin{vmatrix} 2 & 7 & 1 \\ 1 & 1 & 1 \\ 10 & 8 & 1 \end{vmatrix}$	1
	Getting Area of △le $= \frac{47}{2}$ sq. units (units not compulsory)	1
21	Getting $2 + 3\frac{dy}{dx} = cosx$	1
	Getting $\frac{dy}{dx} = \frac{cosx-2}{3}$	1
22	Writing $logy = \log x^{sinx} = sinx\ logx$ OR Writing $\frac{d}{dx}(u^v) = u^v\left(\frac{v}{u}\frac{d}{dx}(u) + logu\frac{d}{dx}(v)\right)$	1
	Getting $\frac{dy}{dx} = y\left[\frac{sinx}{x} + logx\ cosx\right]$ or $\frac{dy}{dx} = x^{sinx}\left[\frac{sinx}{x} + logx\ cosx\right]$	1
23	Writing $y = \log_7(logx) = \frac{\log(logx)}{log7}$	1
	Getting $\frac{dy}{dx} = \frac{1}{log7}\left(\frac{1}{xlogx}\right)$	1
24	Writing $f(x) = \sqrt{x}$ and $f'(x) = \frac{1}{2\sqrt{x}}$	1
	Getting approximate value 5.03	1
25	*Writing* $\int x^2 logxdx = logx\left(\frac{x^3}{3}\right) - \int\left(\frac{1}{x}\right)\left(\frac{x^3}{3}\right)dx$	1
	Getting $logx\left(\frac{x^3}{3}\right) - \frac{1}{3}\left(\frac{x^3}{3}\right) + C$ OR $logx\left(\frac{x^3}{3}\right) - \frac{x^3}{9} + C$	1
26	Writing $\int\frac{\sin^2 x}{1+cosx}dx = \int(1-cosx)\,dx$	1
	Getting I= x-sinx+C	1
27	Getting $\int_0^{\frac{\pi}{4}} sin2xdx = \left[-\frac{cos2x}{2}\right]_0^{\frac{\pi}{4}}$	1
	Getting $\int_0^{\frac{\pi}{4}} sin2xdx = \frac{1}{2}$	1
28	Order is 2	1
	Degree is not defined	1
29	Writing $\overrightarrow{OP} = \hat{\imath} + 2\hat{\jmath} - \hat{k},\ \overrightarrow{OQ} = -\hat{\imath} + \hat{\jmath} + \hat{k}$ OR Writing $\overrightarrow{OR} = \frac{m\overrightarrow{OQ}+n\overrightarrow{OP}}{m+n}$	1
	Getting $\overrightarrow{OR} = \frac{-\hat{\imath}+4\hat{\jmath}+\hat{k}}{3}$ or $\overrightarrow{OR} = -\frac{1}{3}\hat{\imath} + \frac{4}{3}\hat{\jmath} + \frac{1}{3}\hat{k}$	1

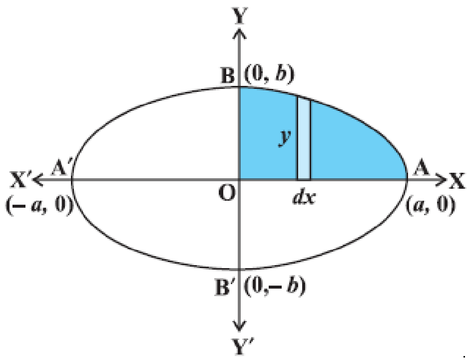
30	Getting $\vec{a}\times\vec{b} = \begin{vmatrix}\hat{\imath} & \hat{\jmath} & \hat{k}\\ 3 & 1 & 4\\ 1 & -1 & 1\end{vmatrix} = 5\hat{\imath}+\hat{\jmath}-4\hat{k}$	1
	Getting Area of parallelogram = $\sqrt{42}$ sq. units (unit is not compulsory)	1
31	Writing Distance $=\frac{\lvert Ax_1+by_1+Cz_1-D\rvert}{\sqrt{A^2+B^2+C^2}}$ OR Distance$=\left\lvert\frac{6+2+2+3}{\sqrt{4+1+4}}\right\rvert$	1
	Getting Distance $=\frac{13}{3}$	1
32	Writing $cos\theta = \left\lvert\frac{\vec{b_1}\cdot\vec{b_2}}{\lvert\vec{b_1}\rvert\lvert\vec{b_2}\rvert}\right\rvert$ OR Getting $\vec{b_1}\cdot\vec{b_2} = 19$ OR $\lvert\vec{b_1}\rvert = 3$ and $\lvert\vec{b_2}\rvert = 7$	1
	Getting $\theta = \cos^{-1}\left(\frac{19}{21}\right)$	1
33	Writing $\sum P(X) = 1$	1
	Getting $k = \frac{1}{6}$	1
	PART C	
34	Reflexive: 2 divides a-a $\forall\ a \in Z$	1
	Symmetric: 2 divides a-b $\Longrightarrow$ 2 divides b-a	1
	Transitive: 2 divides a-b and 2 divides b-c $\Longrightarrow$ 2 divides a-b+b-c=a-c Thus R is is an equivalence Relation	1
35	Writing $\tan^{-1}2x+\tan^{-1}3x = \tan^{-1}\left(\frac{2x+3x}{1-(2x)(3x)}\right) = \frac{\pi}{4}$ Or $\tan^{-1}x+\tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$	1
	Getting $6x^2+5x-1=0$	1
	Getting x=-1 or $\frac{1}{6}$ OR writing $x=\frac{1}{6}$ is the only solution	1
36	Getting $(A+A') = \begin{bmatrix}2 & 4\\ 4 & 4\end{bmatrix}$ OR $\frac{1}{2}(A+A') = \begin{bmatrix}1 & 2\\ 2 & 2\end{bmatrix}$	1
	Getting $(A-A') = \begin{bmatrix}0 & 6\\ -6 & 0\end{bmatrix}$ OR $\frac{1}{2}(A-A') = \begin{bmatrix}0 & 3\\ -3 & 0\end{bmatrix}$	1
	Getting $\frac{1}{2}(A+A')+\frac{1}{2}(A-A') = \begin{bmatrix}1 & 5\\ -1 & 2\end{bmatrix} = A$	1
37	Let $\triangle = \begin{vmatrix}2 & 7 & 65\\ 3 & 8 & 75\\ 5 & 9 & 86\end{vmatrix}$ and Applying $C_3 \to C_3 - 9C_2$ OR Applying $C_3 \to c_3 - C_2$	1
	Getting $\triangle = \begin{vmatrix}2 & 7 & 2\\ 3 & 8 & 3\\ 5 & 9 & 5\end{vmatrix}$ OR Getting $\triangle = \begin{vmatrix}2 & 7 & 63\\ 3 & 8 & 72\\ 5 & 9 & 81\end{vmatrix}$	1
	Since C_1 and C_3 are identical $\therefore \triangle = 0$	1

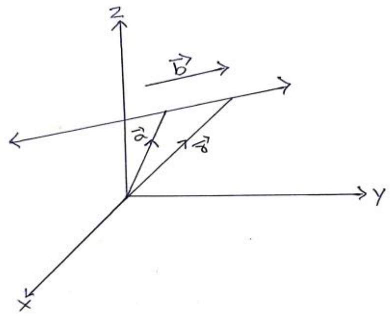
	OR $\triangle = 9\begin{vmatrix}2 & 7 & 7\\3 & 8 & 8\\5 & 9 & 9\end{vmatrix}$ ($C_1 and\ C_3$ are identical $\therefore\ \triangle = 0$)	
38	Substituting $x = tan\theta \Longrightarrow \theta = \tan^{-1} x$	1
	Getting $y = \cos^{-1}(cos2\theta) = 2\theta = 2\tan^{-1} x$	1
	Getting $\frac{dy}{dx} = \frac{2}{1+x^2}$	1
39	Getting $\frac{dx}{d\theta} = a(1 - cos\theta)$	1
	Getting $\frac{dy}{d\theta} = -asin\theta$	1
	Getting $\frac{dy}{dx} = \frac{-asin\theta}{a(1-cos\theta)}$ OR $\frac{dy}{dx} = -\cot\frac{\theta}{2}$	1
40	Writing f(x) is continuous in [2, 4] and differentiable in (2, 4) OR Getting $f'(x) = 2x$	1
	Writing $f'(c) = \frac{f(b)-f(a)}{b-a}$ OR $f'(c) = \frac{16-4}{4-2}$	1
	Writing $c = 3 \in (2, 4)$	1
41	Writing $f'(x) = 2x - 4$ OR Getting Critical point x=2	1
	Increasing in the interval $(2, \infty)$	1
	Decreasing in the interval $(-\infty, 2)$	1
42	Writing $\frac{x}{(x+1)(x+2)} = \frac{A}{x+1} + \frac{B}{x+2}$	1
	Getting A=-1 and B=2	1
	Getting –log|x+1|+2log|x+2|+C OR $\log\left\|\frac{(x+2)^2}{x+1}\right\| + C$	1
43	Writing $\tan^{-1} x = t \Longrightarrow \frac{1}{1+x^2}\,dx = dt$	1
	When x=1, $t = \frac{\pi}{4}$ and when x=0, t=0 OR $\int_0^1 \frac{\tan^{-1} x}{1+x^2}dx = \int_0^1 tdt = \left[\frac{t^2}{2}\right]_0^1 = \frac{1}{2}[(\tan^{-1} x)^2]_0^1$ OR $\int_0^{\frac{\pi}{4}} tdt = \left[\frac{t^2}{2}\right]_0^{\frac{\pi}{4}}$	1
	Getting $I = \frac{\pi^2}{32}$	1

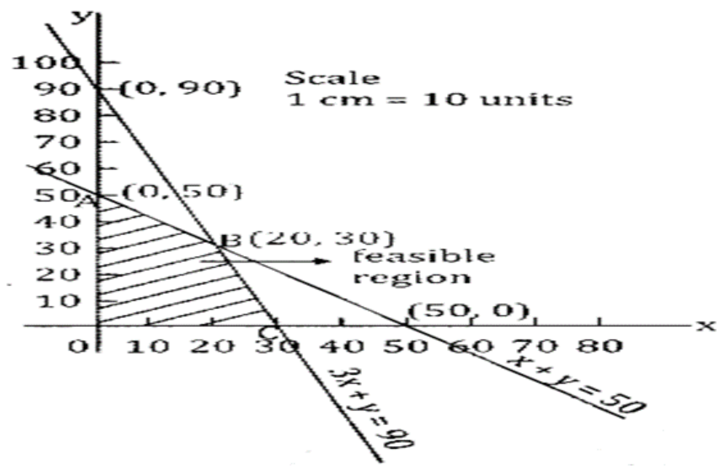
44	Writing $\int e^x\left[\frac{(x-1)-2}{(x-1)^3}\right]dx$	1
	Writing $\int e^x\left[\frac{1}{(x-1)^2}+\left(\frac{-2}{(x-1)^3}\right)\right]dx$	1
	Getting $e^x\left(\frac{1}{(x-1)^2}\right)+C$	1
45	Writing $y=\sqrt{x}$, x=1, x=4 OR Writing Area , A = $\int_1^4 \sqrt{x}\,dx$ OR 	1
	writing Area=$\frac{2}{3}\left[x^{\frac{3}{2}}\right]_1^4$	1
	Getting Area=$\frac{14}{3}$	1
46	writing the equation $y^2=4ax$	1
	writing $2y\frac{dy}{dx}=4a$	1
	Writing $2y\frac{dy}{dx}=\frac{y^2}{x}$ OR $2xy\frac{dy}{dx}-y^2=0$ OR $y=2x\frac{dy}{dx}$	1
47	Writing $dy=\left(\frac{2x^2+1}{x}\right)dx$	1
	$\int dy=\int\left(\frac{2x^2+1}{x}\right)dx+C$ and $\int dy=\int\left(2x+\frac{1}{x}\right)dx+C$	1
	Getting $y=x^2+\log\lvert x\rvert+C$ and getting $C=0$ Writing equation of the curve $y=x^2+\log\lvert x\rvert$	1
48	Writing $\lvert\vec{a}+\vec{b}+\vec{c}\rvert^2=\lvert\vec{a}\rvert^2+\lvert\vec{b}\rvert^2+\lvert\vec{c}\rvert^2+2(\vec{a}\cdot\vec{b}+\vec{b}\cdot\vec{c}+\vec{c}\cdot\vec{a})$	1
	Writing $0=1+16+4+2\mu$	1
	Getting $\mu=-\frac{21}{2}$	1
49	Writing $[\vec{a},\vec{b},\ \vec{c}+\vec{d}\,]=\vec{a}\cdot[\vec{b}\times(\vec{c}+\vec{d})]$	1
	Writing $\vec{a}\cdot[\vec{b}\times\vec{c}+\vec{b}\times\vec{d}]$	1
	Writing $\vec{a}\cdot(\vec{b}\times\vec{c}\,)+\vec{a}\cdot(\vec{b}\times\vec{d})=[\vec{a},\vec{b},\vec{c}]+[\vec{a},\vec{b},\vec{d}]$	1
50	Writing $(3x-y+2z-4)+\lambda(x+y+z-2)=0$	1
	Getting $\lambda=-\frac{2}{3}$	1
	Getting equation of the plane 7x-5y+4z-8=0	1

51	Writing S={H1,H2,H3,H4,H5,H6,T1,T2,T3,T4,T5,T6} A={H1,H2,H3,H4,H5,H6} and B={H3,T3} OR Getting $P(A)=\frac{1}{2}$ *and* $P(B)=\frac{1}{6}$	1
	Getting $P(A\cap B)=\frac{1}{12}$	1
	Showing $P(A\cap B)=P(A)P(B)$	1
	PART-D	
52	Writing $f(x_1)=f(x_2)\Longrightarrow 1+x_1^2=1+x_2^2$, $x_1,x_2\in R$ OR Getting f(1)=f(-1)=2 or taking any example	1
	Getting $x_1=\pm x_2$ $\therefore$ f is is not one-one OR $1\neq -1$ $\therefore$ f is is not one-one	1
	$y=1+x^2 \Longrightarrow x=\sqrt{y-1}$ OR Writing codomain=R and Range $[1,\infty)$	1
	For $y<1, x=\sqrt{y-1}\notin R$ $\therefore$ f is not onto OR Any particular value of y such that $x=\sqrt{y-1}\notin R$ OR Codomain $\neq$Range	1
	Writing f is not bijective	1
53	Writing f(x)=y=4x+3 $x\in R$ and getting $x=\frac{y-3}{4}=g(y)$ OR $f(x_1)=f(x_2)\Longrightarrow 4x_1+3=4x_2+3$	1
	Showing $g\circ f(x)=g(4x+3)=\frac{4x+3-3}{4}=x$ OR Proving $x_1=x_2$ $\therefore$ f is one-one	1
	Showing $f\circ g(y)=f\left(\frac{y-3}{4}\right)=4\left(\frac{y-3}{3}\right)+3=y$ OR For all $y\in R$, there exists $x=\frac{y-3}{4}\in R$	1
	Writing $g\circ f=I_R$ *and* $f\circ g=I_R$ OR Showing $f(x)=4x+3=4\left(\frac{y-3}{4}\right)+3=y$ $\therefore$ f is on to	1
	Writing f is invertible and getting $f^{-1}(x)=\frac{x-3}{4}$	1

54	Getting $A+B=\begin{bmatrix}4 & 1 & -1\\ 9 & 2 & 7\\ 3 & -1 & 4\end{bmatrix}$	1
	Getting $B-C=\begin{bmatrix}-1 & -2 & 0\\ 4 & -1 & 3\\ 1 & 2 & 0\end{bmatrix}$	1
	$(A+B)-C=\begin{bmatrix}0 & 0 & -3\\ 9 & -1 & 5\\ 2 & 1 & 1\end{bmatrix}$	1
	$A+(B-C)=\begin{bmatrix}0 & 0 & -3\\ 9 & -1 & 5\\ 2 & 1 & 1\end{bmatrix}$	1
	Conclusion: $(A+B)-C=A+(B-C)$	1
55	Writing $A=\begin{bmatrix}3 & -2 & 3\\ 2 & 1 & -1\\ 4 & -3 & 2\end{bmatrix}, X=\begin{bmatrix}x\\ y\\ z\end{bmatrix}, B=\begin{bmatrix}8\\ 1\\ 4\end{bmatrix}$ OR Getting |A|= -17 Note: Award a mark, if student writes directly |A|= -17	1
	Getting $Adj=\begin{bmatrix}-1 & -5 & -1\\ -8 & -6 & 9\\ -10 & 1 & 7\end{bmatrix}$ Note: If any 4 cofactors are correct award 1 mark.	2
	Writing $X=A^{-1}B=\frac{1}{\|A\|}(adjA)(B)$ OR $X=-\frac{1}{17}\begin{bmatrix}-1 & -5 & -1\\ -8 & -6 & 9\\ -10 & 1 & 7\end{bmatrix}\begin{bmatrix}8\\ 1\\ 4\end{bmatrix}$	1
	Getting x=1, y=2 and z=3	1
56	Getting $\frac{dy}{dx}=\frac{2\tan^{-1}x}{1+x^2}$ OR $y_1=\frac{2\tan^{-1}x}{1+x^2}$	1
	Writing $(1+x^2)\frac{dy}{dx}=2\tan^{-1}x$ OR $(1+x^2)y_1=2\tan^{-1}x$	1
	Getting $(1+x^2)\frac{d^2y}{dx^2}+\frac{dy}{dx}(2x)=\frac{2}{1+x^2}$ OR $(1+x^2)y_2+2xy_1=\frac{2}{1+x^2}$ Note: For LHS award 1 mark and for RHS award 1 mark	1+1
	Getting $(1+x^2)^2\frac{d^2y}{dx^2}+2x(1+x^2)\frac{dy}{dx}=2$ OR $(1+x^2)^2y_2+2x(1+x^2)y_1=2$	1
57	Writing $\frac{dx}{dt}=-3\ cm/\min$, $\frac{dy}{dt}=2cm/min$	1

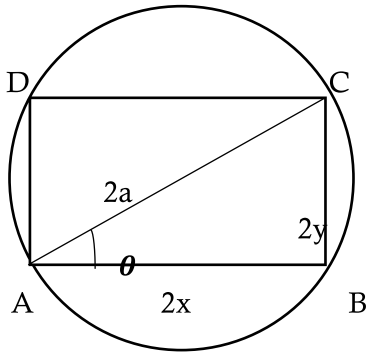
	Writing P=2x+2y OR Getting $\frac{dp}{dt} = 2\frac{dx}{dt} + 2\frac{dy}{dt}$	1
	Getting $\frac{dp}{dt} = -2cm/min$(Unit is not compulsory)	1
	Writing A=xy OR Getting $\frac{dA}{dt} = x\frac{dy}{dt} + y\frac{dx}{dt}$	1
	Getting $\frac{dA}{dt} = 2\ cm^2/min$ (Unit is not compulsory)	1
	Writing $I = \int \frac{1}{(x-a)(x+a)} dx$	1
	$I = \frac{1}{2a}\int \frac{(x+a)-(x-a)}{(x-a)(x+a)} dx$	1
58	Getting $I = \frac{1}{2a}\left[\int \frac{1}{x-a} dx - \int \frac{1}{x+a} dx\right]$	1
	Getting $I = \frac{1}{2a}[\log\lvert x-a\rvert - \log\ \lvert x+a\rvert]$ OR $I = \frac{1}{2a}\log\left\lvert\frac{x-a}{x+a}\right\rvert$	1
	Writing $I = \int \frac{1}{x^2-4^2}\ dx$ and Getting $I = \frac{1}{8}\log\left\lvert\frac{x-4}{x+4}\right\rvert$	1
	 Correct figure	1
59	Writing $y = \frac{b}{a}\ \sqrt{a^2 - x^2}$ and x=0 and x=a	1
	Writing $A = \frac{4b}{a}\int_0^a \sqrt{a^2 - x^2}\ dx$	1
	Writing $A = \frac{4b}{a}\left[\frac{x}{2}\sqrt{a^2 - x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a}\right]_0^a$	1
	Showing $A = \pi ab$ sq units (Unit is not compulsory)	1

60	Getting $\frac{dy}{dx} + (\sec^2 x)y = tanx \sec^2 x$ OR Writing P=$\sec^2 x$, $Q = tanx \sec^2 x$	1
	Getting I F=$e^{\int pdx} = e^{\int \sec^2 x\, dx = e^{tanx}}$	1
	Writing y(IF)=$\int Q(IF)dx + C$ OR $y\, e^{tanx} = \int tanx(\sec^2 x) \cdot e^{tanx} dx + C$	1
	Put tanx=t$\Longrightarrow \sec^2 x\, dx = dt$ OR $ye^{tanx} = \int te^t dt$	1
	Getting general solution $ye^{tanx} = tanx \cdot e^{tanx} - e^{tanx} + C$ OR $y = tanx - 1 + C\, e^{-tanx}$ If C is not written, deduct one mark	1
61	Correct figure Note; No figure carries no marks 	1
	Writing $\overrightarrow{AP}$ is parallel to the vector $\vec{b}$ $\Longrightarrow \overrightarrow{AP} = \lambda\vec{b}$, $\lambda \in R$	1
	Getting $\overrightarrow{AP} = \overrightarrow{OP} - \overrightarrow{OA}$ and writing $\lambda\vec{b} = \vec{r} - \vec{a}$ or $\vec{r} = \vec{a} + \lambda\vec{b}$	1
	Writing $\overrightarrow{OA} = x_1\hat{\imath} + y_1\hat{\jmath} + z_1\hat{k}$, $\overrightarrow{OP} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$ And $\vec{b} = a\hat{\imath} + b\hat{\jmath} + c\hat{k}$	1
	Getting $\frac{x-x_1}{a} = \frac{y-y_1}{b} = \frac{z-z_1}{c}$	1
62	Writing $P(E_1) = \frac{1}{2}$, and $P(E_2) = \frac{1}{2}$	1
	Writing $P(A\|E_1) = \frac{4}{8}$ or $\frac{1}{2}$ and $P(A\|E_2) = \frac{2}{8}$ or $\frac{1}{4}$	1
	Writing $P(E_1\|A) = \frac{P(E_1) \cdot P(A\|E_1)}{P(E_1) \cdot P(A\|E_1) + P(E_2) \cdot P(A\|E_2)}$	1
	Writing $P(E_1\|A) = \frac{\frac{1}{2} \times \frac{1}{2}}{\left(\frac{1}{2} \times \frac{1}{2}\right) + \left(\frac{1}{2} \times \frac{1}{4}\right)}$	1
	Getting $P(E_1\|A) = \frac{2}{3}$	1

63	Writing n=10 and $p=\frac{1}{2}, q=1-\frac{1}{2}=\frac{1}{2}$	1
	Writing $P(X=x)=10C_x\left(\frac{1}{2}\right)^{10-x}\left(\frac{1}{2}\right)^{x}=10C_x\left(\frac{1}{2}\right)^{10}$ OR $P(X=x)=nC_x q^{n-x}p^x$	1
	Getting $P(X=6)=10C_6\left(\frac{1}{2}\right)^{10}=\frac{10!}{4!\times 6!}\times\frac{1}{2^{10}}$ OR Getting $P(X=6)=\frac{105}{512}$	1
	$P(X\geq 6)=P(X=6)+P(X=7)+P(X=8)+P(X=9)+P(X=10)$	1
	Getting $P(X\geq 6)=\left[\frac{10!}{6!4!}+\frac{10!}{7!3!}+\frac{10!}{8!2!}+\frac{10!}{9!1!}+\frac{10!}{10!}\right]\frac{1}{2^{10}}=\frac{193}{512}$	1
64(a)	**PART-E**	
	Getting the points (0,50) , (50,0) and (0,90) , (30,0)	1
	 Note :If feasible region is not identified then deduct 1 mark	2
	Identifying feasible region and writing corner points O(0,0) , C(30,0) , B(20,30) , A(0,50)	1
	Finding Z at each Corner point <table><tr><td>Corner point</td><td>Z=4x+y</td></tr><tr><td>O(0 , 0)</td><td>Z=0</td></tr><tr><td>C(30 , 0)</td><td>Z=120 -> MAX</td></tr><tr><td>B(20 , 30)</td><td>Z=110</td></tr><tr><td>A(0 , 50)</td><td>Z=50</td></tr></table>	1
	Writing maximum value of Z is 120 at (30 , 0)	1

64(b)	Writing I = $-A^2 + 4A$	1
	Writing $A^{-1} I = -A^{-1}A^2 + 4A^{-1}A$	1
	Writing $A^{-1} = -A + 4I$	1
	Getting $A^{-1} = \begin{bmatrix} \mathbf{2} & \mathbf{-3} \\ \mathbf{-1} & \mathbf{2} \end{bmatrix}$	1

65(a)	Putting x=a-t then dx = -dt and x=0 then t=a and x=a then t=0	1
	Writing $I = \int_0^a f(x)dx = -\int_a^0 f(a-t)dt$	1
	Getting $I = \int_0^a f(a-x)dx$	1
	Writing $I = \int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin(\frac{\pi}{2}-x)}}{\sqrt{\sin(\frac{\pi}{2}-x)}+\sqrt{\cos(\frac{\pi}{2}-x)}} dx$	1
	Getting $2I = \int_0^{\frac{\pi}{2}} 1\, dx$	1
	Getting $I = \frac{\pi}{4}$	1
65(b)	Finding LHL = $K\pi + 1$ or RHL = -1	1
	Writing $f(\pi) = K\pi + 1$	1
	Writing LHL = RHL = $f(\pi)$	1
	Getting $K = -\frac{2}{\pi}$	1

66(a)	Writing the figure  And Writing $2x = 2a\cos\boldsymbol{\theta}$ $2y = 2a\sin\boldsymbol{\theta}$	1
	Writing A= Area = $(2x)(2y) = 4a^2\sin\boldsymbol{\theta}\cos\boldsymbol{\theta} = 2a^2\sin2\boldsymbol{\theta}$	1
	Getting $\frac{dA}{d\theta} = 4a^2\cos2\boldsymbol{\theta}$	1
	For getting critical point $\frac{dA}{d\theta} = \mathbf{0} \Rightarrow \boldsymbol{\theta} = \frac{\pi}{4}$	1
	$\left(\frac{d^2A}{d\theta^2}\right) = -8\,a^2\sin2\theta = -8a^2 < 0$, $\boldsymbol{\theta} = \frac{\pi}{4} \Rightarrow$ **Area is maximum**	1
	Getting length = $2x = \sqrt{2}a$ and breadth = $2y = \sqrt{2}a$ and Conclusion	1
66(b)	Writing $R_1 \rightarrow R_1 - R_2$ and $R_2 \rightarrow R_2 - R_3$	1
	Getting $\Delta = \begin{vmatrix} 0 & a-b & a^2-b^2 \\ 0 & b-c & b^2-c^2 \\ 1 & c & c^2 \end{vmatrix}$	1
	Getting $\Delta = (a-b)(b-c)\begin{vmatrix} 0 & 1 & a+b \\ 0 & 1 & b+c \\ 1 & c & c^2 \end{vmatrix}$	1
	Expanding and we get $\Delta = (a-b)\,(b-c)\,[0 - 1\,\{-(b+c)\} + (a+b)(-1)]$ $\Delta = (a-b)(b-c)(c-a)$	1