SUMMER – 2013 EXAMINATION

MODEL ANSWER

Subject: BASIC MATHEMATICS

Subject Code: 12003

Important Instructions to examiners:

- The model answer shall be the complete solution for each and every question on the question paper.
- Numericals shall be completely solved in a step by step manner along with step marking.
- All alternative solutions shall be offered by the expert along with self-explanatory comments from the expert.
- In case of theoretical answers, the expert has to write the most acceptable answer and offer comments regarding marking scheme to the assessors.
- In should offer the most convincing figures / sketches / circuit diagrams / block diagrams / flow diagrams and offer comments for step marking to the assessors.
- In case of any missing data, the expert shall offer possible assumptions / options and the ensuing solutions along with comments to the assessors for effective assessment.
- In case of questions which are out of the scope of curricular requirement, the expert examiner shall solve the question and mention the marking scheme in the model answer. However, the experts are requested to submit their clear cut opinion about the scope of such question in the paper separately to the coordinator.
- Experts shall cross check the DTP of the final draft of the model answer prepared by them.

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
1.		**Attempt any TEN of the following:**		
	a)	what is the value of N if, $\log_{32} N = \frac{-3}{5}$		
	Ans.	$\log_{32} N = \frac{-3}{5}$		
		N = $(32)^{\frac{-3}{5}}$	½	
		N = $(2^5)^{\frac{-3}{5}}$	½	
		$= 2^{-3} = \frac{1}{2^3}$	1	
		N $= \frac{1}{8}$		02
	b)	Resolve into partial fraction , $\frac{1}{x^2+3x+2}$		
	Ans.	$\frac{1}{x^2+3x+2} = \frac{1}{(x+2)(x\_+1)}$		
		$\frac{1}{x^2+3x+2} = \frac{A}{(x+2)} + \frac{B}{(x\_+1)}$	½	
		$1 = A\,(x+1) + B\,(x+2)$		
		Put $x = -1$		
		B = 1	½	
		Put $x = -2$		
		$1 = A(-2+1)$	½	02
		$A = -1$		
		$\frac{1}{x^2+3x+2} = \frac{-1}{(x+2)} + \frac{1}{(x+1)}$	½	
	c)	If $A = \begin{bmatrix} 2 & 1 & 3 \\ 3 & -1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 4 & 3 \\ 2 & 1 & 4 \end{bmatrix}$ find 3A+2B		
	Ans.	Consider $3A + 2B = 3\begin{bmatrix} 2 & 1 & 3 \\ 3 & -1 & 4 \end{bmatrix} + 2\begin{bmatrix} 5 & 4 & 3 \\ 2 & 1 & 4 \end{bmatrix}$		
		$= \begin{bmatrix} 6 & 3 & 9 \\ 9 & -3 & 12 \end{bmatrix} + \begin{bmatrix} 10 & 8 & 6 \\ 4 & 2 & 8 \end{bmatrix}$	1	
		$= \begin{bmatrix} 16 & 11 & 15 \\ 13 & -1 & 20 \end{bmatrix}$	1	02

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
1.	d)	Find x , if $\begin{vmatrix} x & 2 \\ 9 & 1 \end{vmatrix} = 0$		
	Ans.	Given		
		$\begin{vmatrix} x & 2 \\ 9 & 1 \end{vmatrix} = 0$		
		$x - 18 = 0$	1	02
		$x = 18$	1	
	e)	Prove that $cosec^2\theta - cos^2\theta\ cosec^2\theta = 1$		
	Ans.	Consider		
		L.H.S. = $cosec^2\theta - cos^2\theta\ cosec^2\theta.$		
		$= cosec^2\theta\ (1 - cos^2\theta\ )$	1	
		$= cosec^2\theta\ \ sin^2\theta$		
		$= \frac{1}{sin^2\theta} sin^2\theta$	½	02
		$= 1$	½	
	f)	Find the slope and intercept on Y-axis for line $\frac{x}{2} - \frac{y}{3} = \frac{1}{4}$		
	Ans.	Given line is		
		$\frac{x}{2} - \frac{y}{3} = \frac{1}{4}$		
		Slope = $\frac{-a}{b}$		
		$= \frac{\frac{-1}{2}}{\frac{-1}{3}}$		
		$= \frac{3}{2}$	1	
		Y-intercept is $= -\frac{c}{b}$		
		$= -\frac{\left(\frac{-1}{4}\right)}{\left(\frac{-1}{3}\right)}$		
		$= -\frac{3}{4}$	1	02
	g)	Find $\cos 3\alpha\ , if \cos\alpha = 0.4$		
	Ans.	Given , $\cos\alpha = 0.4$		
		$cos3\alpha\ = 4cos^3\alpha - 3cos\alpha$	½	
		$= 4\ (0.4)^3 - 3(0.4)$	½	
		$= -0.944$	1	02

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
1.	h)	Prove that $\sin(45^\circ + A) \cdot \sin(45^\circ - A) = \frac{1}{2}\cos 2A$		
	Ans.	Consider ,		
		$L.H.S. = \sin(45 + A) \cdot \sin(45 - A)$		
		$= \sin^2 45 - \sin^2 A$	½	
		$= \left(\frac{1}{\sqrt{2}}\right)^2 - 1 + \cos^2 A$	½	
		$= -\frac{1}{2} + \cos^2 A$	½	
		$= \frac{2\cos^2 A - 1}{2} = \frac{1}{2}\cos 2A$	½	02
	i)	Find the principle value of $cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$		
	Ans.	Let $cos^{-1}\left(-\frac{1}{\sqrt{2}}\right) = \theta$		
		$cos\ \theta = -\frac{1}{\sqrt{2}}$		
		$-\cos\theta = \frac{1}{\sqrt{2}}$	½	
		$\cos(\pi - \theta) = \frac{1}{\sqrt{2}}$		
		$\cos(\pi - \theta) = \cos\frac{\pi}{4}$	½	
		$\pi - \theta = \frac{\pi}{4}$	½	
		$\theta = \pi - \frac{\pi}{4}$		02
		$\theta = \frac{3\pi}{4}$	½	
		The principal value of $cos^{-1}\left(\frac{-1}{\sqrt{2}}\right) = \frac{3\pi}{4}$		
	j)	If one end of a diameter of a circle whose center is $(4, 3)$ *is* $(2, 1)$. *Find other end of the diameter* .		
	Ans.	Let other end of diameter is (x, y)		
		By mid point formula		
		$4 = \frac{x+2}{2}$; $3 = \frac{y+1}{2}$	1	
		$x = 6$; $y = 5$	1	02
		Other end of the diameter is $(6, 5)$		

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
1.	k)	Find the distance between two parallel lines		
		$3x + 2y - 6 = 0 \quad and \; 3x + 2y - 12 = 0$		
	Ans.	Distance between two parallel line is $= \left\|\frac{c_2 - c_1}{\sqrt{a^2+b^2}}\right\|$		
		$= \left\|\frac{-6+12}{\sqrt{9+4}}\right\|$	1	
		$= \left\|\frac{6}{\sqrt{13}}\right\|$	1	02
	l)	Find the center and radius of circle		
		$2x^2 + 2y^2 + 5x - 6y + 3 = 0$		
	Ans.	$2x^2 + 2y^2 + 5x - 6y + 3 = 0$		
		$x^2 + y^2 + \frac{5}{2}x - 3y + \frac{3}{2} = 0$		
		Comparing above equation with		
		$x^2 + y^2 + 2gx + 2fy + c = 0$		
		$2g = \frac{5}{2} \quad ; \quad 2f = -3 \quad ; c = \frac{3}{2}$		
		$g = \frac{5}{4} \quad ; \quad f = -\frac{3}{2} \; ; \quad c = \frac{3}{2}$	1	
		Center is $(-g, -f) = \left(-\frac{5}{4}, \frac{3}{2}\right)$		
		$radius = \sqrt{g^2 + f^2 - c}$	½	
		$= \sqrt{\frac{25}{16} + \frac{9}{4} - \frac{3}{2}}$		
		$= \sqrt{\frac{25+36-24}{16}}$		
		$= \frac{\sqrt{37}}{4}$	½	02
	m)	Expand $(x + 3y)^4$ using binomial theorem.		
	Ans.	$(x + 3y)^4 = 4_{c_0}\, x^4(3y)^0 + 4_{c_1}x^3(3y)^1 + 4_{c_2}x^2\,(3y)^2 + 4_{c_3}x^1(3y)^3 + 4_{c_4}\,x^0(3y)^4$	1	
		$= x^4 + 4x^3.3y + 6\,x^2 9y^2 + 4x.27\,y^3 + 81\,y^4$	½	
		$= x^4 + 12x^3y + 54\,x^2y^2 + 108\,xy^3 + 81\,y^4$	½	02

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
1.	n)	If $\sin\theta = \frac{3}{5}$ and $\cos\theta = \frac{4}{5}$ $find$ $\tan\theta$ and $\cot\theta$		
	Ans.	$sin\theta = \frac{3}{5}$, $cos\theta = \frac{4}{5}$		
		$\tan\theta = \frac{\sin\theta}{\cos\theta}$		
		$= \frac{\frac{3}{5}}{\frac{4}{5}} = \frac{3}{4}$	1	
		$\cot\theta = \frac{\cos\theta}{\sin\theta}$		
		$= \frac{\frac{4}{5}}{\frac{3}{5}} = \frac{4}{3}$	1	02
2.		**Attempt any FOUR of the following:**		
	a)	Resolve into partial fraction $\frac{x-5}{x^3+x^2-5x}$		
	Ans.	$\therefore \frac{x-5}{x^3+x^2-5} = \frac{x-5}{x\left(x^2+x-5\right)}$		
		$\frac{x-5}{x\left(x^2+x-5\right)} = \frac{A}{x} + \frac{Bx+c}{x^2+x-5}$	½	
		$\therefore x-5 = A\left(x^2+x-5\right)+\left(Bx+C\right)x$		
		$x=0$		
		$-5 = A(-5)$		
		$\therefore A=1$	1	
		$x=1, A=1$		
		$\therefore 1-5 = 1(1+1-5)+(B+C)$		
		$\therefore -4 = -3+B+C$ $\therefore$ B+C$=-1$ ....(1)	½	
		$x=-1, A=1$		
		$-1-5 = 1(1-1-5)+(-B+C)(-1)$		
		$-6 = -5+B-C$	½	
		$\therefore B-C=-1$ ......(2)		
		$(1)+(2)$		
		$B+C=-1$		
		$B-C=-1$		
		2B$=-2$	1	
		$\therefore$ B$=-1$		
		$\therefore$ C=0		

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
2.		$\therefore \frac{x-5}{x\left(x^2+x-5\right)} = \frac{1}{x} - \frac{x}{x^2+x-5}$	½	04
	b)	Resolve into partial fraction $\frac{13x+19}{(x+3)(x-2)(x+1)}$		
	Ans.	Let $\frac{13x+19}{(x+3)(x-2)(x+1)} = \frac{A}{x+3} + \frac{B}{x-2} + \frac{c}{x+1} \rightarrow (1)$	½	
		$13x+19 = A(x-2)(x+1) + B(x+3)(x+1)$ $+ c\,(x+3)(x-2)$		
		Put $x=-3$		
		$13(-3)+19 = A\,(-3-2)(-3+1)$		
		$-39+19 = 10\,A$		
		$10A = -20$		
		$A = -2$	1	
		$put\ \ x = 2$		
		$13(2)+19 = B(2+3)(2+1)$		
		$45 = 15\,B$		
		$B = 3$	1	
		$put\ x = -1$		
		$13(-1)+19 = c(-1+3)(-1-2)$		
		$6 = -6c$		
		$c = -1$	1	
		$\frac{13x+19}{(x+3)(x-2)(x+1)} = \frac{-2}{x+3} + \frac{3}{x-2} + \frac{-1}{x+1}$	½	04
	c)	Find 7th term of $\left(\frac{x}{y} - \frac{y}{x}\right)^{10}$		
	Ans.	Let $r = 6$, here		
		$a = \frac{x}{y}$; $b = -\frac{y}{x}$; $n = 10$		
		$T_{r+1} = 10_{c_r} \left(\frac{x}{y}\right)^{10-6} \left(\frac{-y}{x}\right)^6$	1	
		$= 210\ \frac{x^4}{y^4}\ \frac{y^6}{x^6}$	2	
		$= 210\ \frac{y^2}{x^2}$	1	04

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
2.	d)	The current I_1, I_2 *and* I_3 in three loops gave the following Equations. $2I_1 - I_2 + I_3 = 0, 4I_1 - I_3 = 2, 2I_2 + I_3 = 2$ Find the values of I_1, I_2, I_3 .		
	Ans.	$D = \begin{vmatrix} 2 & -1 & 1 \\ 4 & 0 & -1 \\ 0 & 2 & 1 \end{vmatrix}$ $= 2(0+2) + 1(4-0) + 1(8-0)$ $= 16$	1	
		$D_{I_1} = \begin{vmatrix} 0 & -1 & 1 \\ 2 & 0 & -1 \\ 2 & 2 & 1 \end{vmatrix}$ $= 0(0+2) + 1\,(2+2) + 1(4-0)$ $= 8$	1	
		$D_{I_2} = \begin{vmatrix} 2 & 0 & 1 \\ 4 & 2 & -1 \\ 0 & 2 & 1 \end{vmatrix}$ $= 2\,(2+2) - 0 + 1(8-0)$ $= 8 + 8$ $= 16$	1	
		$D_{I_3} = \begin{vmatrix} 2 & -1 & 0 \\ 4 & 0 & 2 \\ 0 & 2 & 2 \end{vmatrix}$ $= 2\,(0-4) + (8-0) + 0$ $= 0$	1	
		By Cramer's rule $I_1 = \frac{8}{16} = \frac{1}{2}$ $I_2 = \frac{D_{I_2}}{D} = \frac{16}{16} = 1$ $I_3 = \frac{D_{I_3}}{D} = \frac{0}{16} = 0$		04
	c)	Using binomial Theorem , prove that $\left(1+\sqrt{3}\right)^4 + \left(1-\sqrt{3}\right)^4 = 56$		
	Ans.	$\left(1+\sqrt{3}\right)^4 = 4_{c_0}\,1^4\left(\sqrt{3}\right)^0 + 4_{c_1}1^3\left(\sqrt{3}\right)^1 + 4_{c_2}1^2\,\left(\sqrt{3}\right)^2 + 4_{c_3}1^1\left(\sqrt{3}\right)^3 + 4_{c_4}\,1^0\left(\sqrt{3}\right)^4$ $= 1 + 4\sqrt{3} + 18 + 4.3\sqrt{3} + 9$	1	

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
2.		$= 1 + 4\sqrt{3} + 18 + 12\sqrt{3} + 9$	1	
		$(1-\sqrt{3})^4 = 1 - 4\sqrt{3} + 18 - 12\sqrt{3} + 9$	1	
		$L.H.S. = (1+\sqrt{3})^4 + (1-\sqrt{3})^4$		04
		$= 1 + 4\sqrt{3} + 18 + 12\sqrt{3} + 9 - (1 - 4\sqrt{3} + 18 - 12\sqrt{3} + 9)$		
		$= 56$	1	
	f)	If $\log\left(\frac{m+n}{3}\right) = \frac{1}{2}(\log m + \log n)$ then show that $\frac{m}{n} + \frac{n}{m} = 7$		
	Ans.	Given that ,		
		$\log\left(\frac{m+n}{3}\right) = \frac{1}{2}(\log m + \log n)$		
		$\log\left(\frac{m+n}{3}\right) = \frac{1}{2}(\log\ m\,n)$	½	
		$\log\left(\frac{m+n}{3}\right) = \log(mn)^{\frac{1}{2}}$	½	
		$\left(\frac{m+n}{3}\right) = (mn)^{\frac{1}{2}}$	1	
		$\left(\frac{m+n}{3}\right)^2 = mn$		
		$\frac{m^2+2mn+n^2}{9} = mn$	1	
		$m^2 + 2mn + n^2 = 9mn$		
		$m^2 + n^2 = 7mn$		04
		$\frac{m}{n} + \frac{n}{m} = 7$	1	
3.		**Attempt any FOUR of the following:**		
	a)	Find the adjoint of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{bmatrix}$		
	Ans.	Matrix of minors $= \begin{bmatrix} \begin{vmatrix} 3 & 5 \\ 5 & 12 \end{vmatrix} & \begin{vmatrix} 1 & 5 \\ 1 & 12 \end{vmatrix} & \begin{vmatrix} 1 & 3 \\ 1 & 5 \end{vmatrix} \\ \begin{vmatrix} 2 & 3 \\ 5 & 12 \end{vmatrix} & \begin{vmatrix} 1 & 3 \\ 1 & 12 \end{vmatrix} & \begin{vmatrix} 1 & 2 \\ 1 & 5 \end{vmatrix} \\ \begin{vmatrix} 2 & 3 \\ 3 & 5 \end{vmatrix} & \begin{vmatrix} 1 & 3 \\ 1 & 5 \end{vmatrix} & \begin{vmatrix} 1 & 2 \\ 1 & 3 \end{vmatrix} \end{bmatrix}$	1	

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
3.		$= \begin{bmatrix} 11 & 7 & 2 \\ 9 & 9 & 3 \\ 1 & 2 & 1 \end{bmatrix}$	1	
		Matrix of cofactors $= \begin{bmatrix} 11 & -7 & 2 \\ -9 & 9 & -3 \\ 1 & -2 & 1 \end{bmatrix}$	1	
		Adj (A) $= \begin{bmatrix} 11 & -9 & 1 \\ -7 & 9 & -2 \\ 2 & -3 & 1 \end{bmatrix}$	1	04
	b)	If $A = \begin{bmatrix} 2 & 5 & 6 \\ 0 & 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 1 \\ 0 & 4 \\ 5 & 7 \end{bmatrix}$ verify that $(AB)' = B'A'$		
	Ans.	$AB = \begin{bmatrix} 2 & 5 & 6 \\ 0 & 1 & 2 \end{bmatrix} \begin{bmatrix} 6 & 1 \\ 0 & 4 \\ 5 & 7 \end{bmatrix}$		
		$= \begin{bmatrix} 12+0+30 & 2+20+42 \\ 0+0+10 & 0+4+14 \end{bmatrix}$	1	
		$= \begin{bmatrix} 42 & 64 \\ 10 & 18 \end{bmatrix}$		
		$(AB)' = \begin{bmatrix} 42 & 10 \\ 64 & 18 \end{bmatrix}$	1	
		$(A)' = \begin{bmatrix} 2 & 0 \\ 5 & 1 \\ 6 & 2 \end{bmatrix}$; $(B)' = \begin{bmatrix} 6 & 0 & 5 \\ 1 & 4 & 7 \end{bmatrix}$		
		$B'A' = \begin{bmatrix} 6 & 0 & 5 \\ 1 & 4 & 7 \end{bmatrix} \begin{bmatrix} 2 & 0 \\ 5 & 1 \\ 6 & 2 \end{bmatrix}$		
		$= \begin{bmatrix} 12+0+30 & 0+0+10 \\ 2+20+42 & 0+4+14 \end{bmatrix}$	1	
		$= \begin{bmatrix} 42 & 10 \\ 64 & 18 \end{bmatrix}$	1	04
		$Hence \quad (AB)' = B'A'$		
	c)	Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$		
	Ans.	$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$		

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<tr><th>Que. No.</th><th>Sub. Que.</th><th>Model answers</th><th>Marks</th><th>Total Marks</th></tr>
<tr><td>3.</td><td></td><td>

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{vmatrix}$$

$$= 1(24 - 25) - 2(12 - 15) + 3(10 - 12)$$

$$= -1$$

$$\neq 0$$

A^{-1} *exists*

$$\text{Matrix of minors} = \begin{bmatrix} \begin{vmatrix} 4 & 5 \\ 5 & 6 \end{vmatrix} & \begin{vmatrix} 2 & 5 \\ 3 & 6 \end{vmatrix} & \begin{vmatrix} 2 & 4 \\ 3 & 5 \end{vmatrix} \\ \begin{vmatrix} 2 & 3 \\ 5 & 6 \end{vmatrix} & \begin{vmatrix} 1 & 3 \\ 3 & 6 \end{vmatrix} & \begin{vmatrix} 1 & 2 \\ 3 & 5 \end{vmatrix} \\ \begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix} & \begin{vmatrix} 1 & 3 \\ 2 & 5 \end{vmatrix} & \begin{vmatrix} 1 & 2 \\ 2 & 4 \end{vmatrix} \end{bmatrix}$$

$$= \begin{bmatrix} -1 & -3 & -2 \\ -3 & -3 & -1 \\ -2 & -1 & 0 \end{bmatrix}$$

$$Matrix\ of\ cofactors = \begin{bmatrix} -1 & 3 & -2 \\ 3 & -3 & 1 \\ -2 & 1 & 0 \end{bmatrix}$$

$$Adj\ (A) = \begin{bmatrix} -1 & 3 & -2 \\ 3 & -3 & 1 \\ -2 & 1 & 0 \end{bmatrix}$$

$$A^{-1} = \frac{1}{|A|}\, adj(A)$$

$$= \frac{1}{-1}\begin{bmatrix} -1 & 3 & -2 \\ 3 & -3 & 1 \\ -2 & 1 & 0 \end{bmatrix}$$

OR

$$= \begin{bmatrix} 1 & -3 & 2 \\ -3 & 3 & -1 \\ 2 & -1 & 0 \end{bmatrix}$$

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1

1

1</td><td>04</td></tr>
<tr><td></td><td>d)

Ans.</td><td>

Solve the equation using matrix method $2x + 3y - z + 3 = 0$; $5x + y + 3z = 10$; $4x + 3y - 2z + 3 = 0$

$$A = \begin{bmatrix} 2 & 3 & -1 \\ 5 & 1 & 3 \\ 4 & 3 & -2 \end{bmatrix} ; X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \quad ; \quad B = \begin{bmatrix} -3 \\ 10 \\ -3 \end{bmatrix}$$

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Que. No.	Sub. Que.	Model answers	Marks	Total Marks
3.		$$\lvert A\rvert = \begin{vmatrix} 2 & 3 & -1 \\ 5 & 1 & 3 \\ 4 & 3 & -2 \end{vmatrix}$$		
		$= 2(-2-9) - 3(-10-12) - 1(15-4)$		
		$= 33$	1	
		$\neq 0$		
		A^{-1} $exists$		
		Matrix of minors $= \begin{bmatrix} \begin{vmatrix} 1 & 3 \\ 3 & -2 \end{vmatrix} & \begin{vmatrix} 5 & 3 \\ 4 & -2 \end{vmatrix} & \begin{vmatrix} 5 & 1 \\ 4 & 3 \end{vmatrix} \\ \begin{vmatrix} 3 & -1 \\ 3 & -2 \end{vmatrix} & \begin{vmatrix} 2 & -1 \\ 4 & -2 \end{vmatrix} & \begin{vmatrix} 2 & -3 \\ 4 & 3 \end{vmatrix} \\ \begin{vmatrix} 3 & -1 \\ 1 & 3 \end{vmatrix} & \begin{vmatrix} 2 & -1 \\ 5 & 3 \end{vmatrix} & \begin{vmatrix} 2 & 3 \\ 5 & 1 \end{vmatrix} \end{bmatrix}$	1	
		$= \begin{bmatrix} -11 & -22 & 11 \\ -3 & 0 & -6 \\ 10 & 11 & -13 \end{bmatrix}$		
		Matrix of cofactors $= \begin{bmatrix} -11 & 22 & 11 \\ 3 & 0 & 6 \\ 10 & -11 & -13 \end{bmatrix}$		
		$adj(A) = \begin{bmatrix} -11 & 3 & 10 \\ 22 & 0 & -11 \\ 11 & 6 & -13 \end{bmatrix}$	1	
		$A^{-1} = \frac{1}{\lvert A\rvert} adj(A)$		
		$A^{-1} = \frac{1}{33} \begin{bmatrix} -11 & 3 & 10 \\ 22 & 0 & -11 \\ 11 & 6 & -13 \end{bmatrix}$	1	
		$X = A^{-1}B$		
		$= \frac{1}{33} \begin{bmatrix} -11 & 3 & 10 \\ 22 & 0 & -11 \\ 11 & 6 & -13 \end{bmatrix} \begin{bmatrix} -3 \\ 10 \\ -3 \end{bmatrix} = \frac{1}{33} \begin{bmatrix} 33+30-30 \\ -66+0+33 \\ -33+60+39 \end{bmatrix}$		
		$= \frac{1}{33} \begin{bmatrix} 33 \\ -33 \\ 66 \end{bmatrix}$		
		$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix}$	1	
		Hence solution is , $x = 1$; $y = -1$; $z = 2$		04

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
3.	e)	Prove that $\frac{\sin 2A+2\sin 4A+\sin 6A}{\sin A+2\sin 3A+\sin 5A} = cosA + cot3A\ sinA$		
	Ans.	Consider		
		$L.H.S. = \frac{\sin 2A+2\sin 4A+\sin 6A}{\sin A+2\sin 3A+\sin 5A}$		
		$= \frac{2\sin\left(\frac{2A+6A}{2}\right).\cos\left(\frac{2A-6A}{2}\right)+2\sin 4A}{2\sin\left(\frac{A+5A}{2}\right).\cos\left(\frac{A-5A}{2}\right)+2\sin 3A}$	1	
		$= \frac{2\sin 4A.\cos(-2A)+2\sin 4A}{2\sin 3A.\cos(-2A)+2sin3A}$		
		$= \frac{2\sin 4A\,[\cos(-2A)+1]}{2\sin 3A\,[\cos(-2A+1)}$	½	
		$= \frac{\sin 4A}{\sin 3A}$	1	
		$= \frac{\sin(3A+A)}{sin3A}$	1	
		$= \frac{\sin 3A.cosA+cos3A.sinA}{\sin 3A}$		
		$= \cos A + \frac{cos3A}{sin3A}\sin A$		
		$= cosA + cot3A\ sinA$	½	04
	f)	Prove that : $sinA\sin(60^\circ - A)\sin(60^\circ + A) = \frac{1}{4}\ \sin 3\mathrm{A}$		
	Ans.	$L.H.S. = sinA\sin(60^\circ - A)\sin(60^\circ + A)$		
		$= \sin A\,[\,sin\,60^\circ cosA - \cos 60^\circ sinA\,]\ [\sin 60^\circ cosA + \cos 60^\circ\ sinA)$	½	
		$= \sin A\,[\frac{\sqrt{3}}{2}\ cosA - \frac{1}{2}sinA\,]\,[\frac{\sqrt{3}}{2}\cos A + \frac{1}{2}\ sinA]$		
		$= \ sinA\,[\ \left(\frac{\sqrt{3}}{2}\ cosA\right)^2 - \left(\frac{1}{2}\ sinA\right)^2\ ]$	1	
		$= sinA\left[\frac{3}{4}\ cos^2A - \frac{1}{4}\ sin^2A\ \right]$		
		$= \frac{1}{4}\sin A\,[3\,cos^2A - sin^2A]$	1	
		$= \frac{1}{4}\sin \mathrm{A}\,[3\,(\,1 - sin^2A) - sin^2A\,]$		
		$= \frac{1}{4}\sin \mathrm{A}\,[3 - 3sin^2A - sin^2A]$	1	
		$= \frac{1}{4}\ [3\sin \mathrm{A} - 3\sin^3 \mathrm{A}\ - \sin^3 \mathrm{A}\,]$		
		$= \frac{1}{4}\ [3\sin \mathrm{A} - 4\sin^3 \mathrm{A}]$	½	04
		$= \frac{1}{4}\ \sin 3\mathrm{A}$		

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
4.		**Attempt any TEN of the following:**		
	a)	Prove that $\sqrt{\frac{1-\sin A}{1+sinA}} = \sec A - \tan A$		
	Ans.	Consider		
		$L.H.S. = \sqrt{\frac{1-\sin A}{1+sinA}}$		
		$= \sqrt{\frac{1-\sin A}{1+sinA} \times \frac{1-\sin A}{1-\sin A}}$	1	
		$= \sqrt{\frac{(1-\sin A)^2}{1-sin^2A}}$	1	
		$= \sqrt{\frac{(1-\sin A)^2}{cos^2A}}$	1	
		$= \frac{1-\sin A}{\cos A}$	½	
		$= \frac{1}{cosA} - \frac{\sin A}{\cos A}$		
		$= \sec A - \tan A$	½	04
	b)	If $\tan(x+y) = \frac{3}{4}$ $and \tan(x-y)\ \frac{8}{15}$ $prove\ that \tan 2x = \frac{77}{36}$		
	Ans.	Consider		
		$2x = x + y + x - y$		
		$\tan(2x) = \tan(x+y+x-y)$		
		$= \tan((x+y) + (x-y))$	1	
		$= \frac{\tan(x+y)+\tan(x-y)}{1-\tan(x+y)\tan(x-y)}$	½	
		$= \frac{\frac{3}{4}+\frac{8}{15}}{1-\frac{3}{4}\cdot\frac{8}{15}}$	1	
		$= \frac{\frac{77}{60}}{\frac{36}{60}}$	1	
		$= \frac{77}{36}$	½	04
	c)	Prove that $\frac{\tan A}{sin^3A.\sec A + \sin A.\cos A} = 1$		
	Ans	Consider		
		$L.H.S. = \frac{\tan A}{sin^3A \sec A + \sin A.\cos A}$		

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
4.		$= \frac{\tan A}{\sin^3 A \frac{1}{\cos A} + \sin A . \cos A}$	½	
		$= \frac{\tan A}{\frac{\sin^3 A + \sin A . \cos^2 A}{\cos A}}$	1	
		$= \frac{\tan A}{\frac{\sin A(\sin^2 A + \cos^2 A)}{\cos A}}$	1	
		$= \frac{\tan A}{\frac{\sin A}{\cos A}}$	½	
		$= \frac{\tan A}{\tan A}$		
		$= 1$	1	04
		$= R.H.S.$		
	d)	Prove that $\frac{\cos A}{1-\sin A} = \frac{1+\tan\frac{A}{2}}{1-\tan\frac{A}{2}}$		
	Ans	Consider		
		$L.H.S. = \frac{\cos A}{1-\sin A}$		
		$= \frac{\cos A}{1-\sin A} \times \frac{1+\sin A}{1+\sin A}$	½	
		$= \frac{\cos A\,(1+\sin A)}{1-\sin^2 A}$	½	
		$= \frac{\cos A\,(1+\sin A)}{\cos^2 A}$		
		$= \frac{1+\sin A}{\cos A}$		
		$= \frac{\cos\frac{A}{2}+\sin\frac{A}{2}}{\cos\frac{A}{2}-\sin\frac{A}{2}}$	1	
		$= \frac{\left(\cos\frac{A}{2}+\sin\frac{A}{2}\right)^2}{\left(\cos\frac{A}{2}+\sin\frac{A}{2}\right)\left(\cos\frac{A}{2}-\sin\frac{A}{2}\right)}$		
		$= \frac{\sin^2\left(\frac{A}{2}\right)+\cos^2\left(\frac{A}{2}\right)+2\sin\left(\frac{A}{2}\right)\cos\left(\frac{A}{2}\right)}{\cos^2\left(\frac{A}{2}\right)-\sin^2\left(\frac{A}{2}\right)}$	1	
		$= \frac{1+\frac{\sin\frac{A}{2}}{\cos\frac{A}{2}}}{1-\frac{\sin\frac{A}{2}}{\cos\frac{A}{2}}}$		
		$= \frac{1+\tan\frac{A}{2}}{1-\tan\frac{A}{2}}$	1	04

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
4.	e)	Prove that $\frac{1-\tan 2\theta.\tan\theta}{1+\tan 2\theta\,.\tan\theta} = \frac{\cos 3\theta}{\cos\theta}$		
	Ans	Consider		
		$L.H.S. = \frac{1-\tan 2\theta.\tan\theta}{1+\tan 2\theta\,.\tan\theta}$		
		$= \frac{1-\frac{sin2\theta}{cos2\theta}.\frac{sin\theta}{\cos\theta}}{1+\frac{sin2\theta}{\cos 2\theta}.\frac{sin\theta}{cos\theta}}$	1	
		$= \frac{\frac{\cos 2\theta\,.\cos\theta-\sin 2\theta\,.\sin\theta}{\cos 2\theta\,.\cos\theta}}{\frac{\cos 2\theta\,.\cos\theta+\sin 2\theta\,.\sin\theta}{\cos 2\theta\,.\cos\theta}}$	1	
		$= \frac{\cos(2\theta+\theta)}{\cos(2\theta-\theta)}$	1	
		$= \frac{\cos 3\theta}{\cos\theta}$	1	04
		$= R.H.S.$		
	f)	Prove that $sec^{-1}\left(\frac{5}{4}\right) + tan^{-1}\left(\frac{3}{5}\right) = tan^{-1}\left(\frac{27}{11}\right)$		
	Ans.	Let		
		$sec^{-1}\left(\frac{5}{4}\right) = \theta$		
		$\sec\theta = \frac{5}{4}$		
		$sec^2\theta = \frac{25}{16}$	1	
		$1 + tan^2\theta = sec^2\theta$		
		$tan^2\theta = sec^2\theta - 1$		
		$tan^2\theta = \frac{25}{16} - 1$		
		$= \frac{9}{16}$		
		$\tan\theta = \frac{3}{4}$		
		$\theta = tan^{-1}\left(\frac{3}{4}\right)$	1	
		$sec^{-1}\left(\frac{5}{4}\right) = tan^{-1}\left(\frac{3}{4}\right)$		
		Consider ,		
		$L.H.S. = sec^{-1}\left(\frac{5}{4}\right) + tan^{-1}\left(\frac{3}{5}\right)$		
		$= tan^{-1}\left(\frac{3}{4}\right) + tan^{-1}\left(\frac{3}{5}\right)$		
		$= tan^{-1}\left(\frac{\frac{3}{4}+\frac{3}{5}}{1-\frac{3}{4}.\frac{3}{5}}\right)$	1	

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
4.		$= tan^{-1}\left(\frac{\frac{15+12}{20}}{\frac{20-9}{20}}\right)$		
		$= tan^{-1}\left(\frac{27}{11}\right)$		
		$= R.H.S$	1	04
5.		**Attempt any FOUR of the following:**		
	a)	Show that the points $A\,(-1,-4)\,,\ B(4,6)\,,c(-4,10)$ are vertices of a right angle triangle.		
	Ans.	Let		
		$A\,(-1,-4)\,,\ B(4,6)\,,c(-4,10)\ be\ the\ points$		
		$AB = \sqrt{(4+1)^2 + (6+4)^2}$		
		$= \sqrt{25+100}$		
		$= \sqrt{125}$	1	
		$BC = \sqrt{(-4-4)^2 + (10-6)^2}$		
		$= \sqrt{64+16}$	1	
		$= \sqrt{80}$		
		$AC = \sqrt{(-4+1)^2 + (10+4)^2}$		
		$= \sqrt{9+196}$		
		$= \sqrt{205}$	1	
		$\left(\sqrt{205}\right)^2 = \left(\sqrt{125}\right)^2 + \left(\sqrt{80}\right)^2$		
		$(AC)^2 = (AB)^2 + (BC)^2$	1	04
		This shows that the given points are vertices of right angled triangle.		
	b)	Find the ratio in which the point p$(-8,3)$ divides the join of $(2,-2)\ and\ (-4,1)$.		
	Ans.	Let the point P(-8, 3) divides the join of (2,-2) and (-4 ,1) in the ratio k:1		
		Therefore,		
		$-8 = \frac{-4k+2}{k+1}$ OR $3 = \frac{k-2}{k+1}$		
		$-8k-8 = -4k+2$! $3k+3 = k-2$	1	

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
5.		$-4k = 10$! $2k = -5$	1	
		$k = \frac{-10}{4}$! $k = \frac{-5}{2}$	1	
		$k = \frac{-5}{2}$!	1	04
		The point P divides the join of (2,-2) and (-4,-1) externally in the ratio 5: 2		
	c)	Find the angle between the lines		
		$3x - 2y + 4 = 0 \; and \; 2x - 3y - 7 = 0$		
	Ans.	Let $m_1 \; and \; m_2$ be slope of given lines		
		$m_1 = \frac{-3}{-2} = \frac{3}{2}$ & $m_2 = \frac{-2}{-3} = \frac{2}{3}$	1	
		$\tan\theta = \left\lvert\frac{m_1 - m_2}{1 + m_1 m_2}\right\rvert$		
		$= \left\lvert\frac{\frac{3}{2} - \frac{2}{3}}{1 + \frac{3}{2}\frac{2}{3}}\right\rvert$	1	
		$= \left\lvert\frac{\frac{9-4}{6}}{\frac{6+6}{6}}\right\rvert$	1	
		$= \left\lvert\frac{5}{12}\right\rvert$		04
		$\tan\theta = \frac{5}{12}$	1	
		$\theta = tan^{-1}\left(\frac{5}{12}\right)$		
		Which is the required angle .		
	d)	Find the equation of the lines which is perpendicular bisector of the line joining points $A(8, -2) \; and \; B(6,4)$		
	Ans.	Let $A(8, -2) \quad , B(6,4) \; be \; points$.		
		Therefore c $\left(\frac{8+6}{2}, \frac{-2+4}{2}\right)$ = c (7,1)		
		Slope of AB = $\frac{4+2}{6-8}$		
		$= \frac{6}{-2}$		
		$= -3$		
		Slope of perpendicular bisector = $\frac{-1}{slope \; of \; AB}$	1	
		$= \frac{-1}{-3} = \frac{1}{3}$	1	

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
5.		Equation of perpendicular bisector is		
		$y - y_1 = m\,(x - x_1)$	1	
		$y - 1 = \frac{1}{3}\,(x - 7)$		
		$3y - 3 = x - 7$		
		$x - 3y - 4 = 0$	1	04
	e)	Find the equation of line which passes through $(-3,8)$ and sum of the intercepts made by the line on the co ordinate axes is 7.		
	Ans.	Let $x - intercept = a$		
		$y - intercept = b$		
		Also given that ,		
		$a + b = 7$		
		$b = 7 - a$	1	
		Equation of line by double intercept form is ,		
		$\frac{x}{a} + \frac{y}{b} = 1$		
		$\frac{x}{a} + \frac{y}{7-a} = 1$		
		But line is passing through point (-3 ,8)	½	
		$\frac{-3}{a} + \frac{8}{7-a} = 1$		
		$\frac{-3\,(7-a) + 8a}{a\,(7-a)} = 1$		
		$-21 + 3a + 8a = 7a - a^2$	½	
		$a^2 + 4a - 21 = 0$		
		$a = -7 \;\; or \;\; a = 3$		
		When $a = -7$; $b = 14$		
		Line is ,		
		$\frac{x}{-7} + \frac{y}{14} = 1$		
		$-2x + y = 14$		
		$2x - y + 14 = 0$	1	
		When $a = 3$; $b = 4$		
		Line is,		

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
5.		$\frac{x}{3}+\frac{y}{4}=1$	1	
		$4x+3y=12$		04
		Which are required equations of line.		
	f)	Find the equation of the line passing through		
		$(2,5)$ *and the point of intersection of*		
		$x+y=0$ *and* $2x-y=0$		
		Consider ,		
	Ans.	$x+y=0 \rightarrow (1)$		
		$2x-y=9 \rightarrow (2)$		
		Adding (1) & (2) , we get		
		$3x=9$	1	
		$x=3$	1	
		$y=-3$		
		Point of intersection is $(3,-3)$		
		Equation of required line is ,		
		$\frac{y-y_1}{y_1-y_2}=\frac{x-x_1}{x_1-x_2}$		
		$\frac{y-5}{5+3}=\frac{x-2}{2-3}$	1	
		$\frac{y-5}{8}=\frac{x-2}{-1}$		
		$-y+5=8x-16$	1	04
		$8x+y-21=0$		
6.		**Attempt any FOUR of the following:**		
	a)	If A ,B,C are the three points		
		$A(-1,5), B(3,1)$ *and* $C(5,7)$ *respectively* and D,E,F		
		Are the mid points of BC , CA and AB respectively. Prove that area		
		of $\Delta ABC = 4 \times area\ of\ \Delta DEF$		
	Ans.	Given that ,		
		$A(-1,5), B(3,1), C(5,7)$ *be three points*		
		By mid point formula		
		$point\ D\left(\frac{3+5}{2},\frac{1+7}{2}\right)$	½	

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
6.		$=D\left(\frac{8}{2},\frac{8}{2}\right)$		
		$=D\ (4,4)$	½	
		Point E is		
		$E\ \left(\frac{-1+5}{2},\frac{5+7}{2}\right)$		
		$=E(2,6)$	½	
		Point F is ,		
		$F\ \left(\frac{-1+3}{2},\frac{1+7}{2}\right)=F(1,3)$	½	
		Area of $\Delta\, ABC\ =\frac{1}{2}\begin{vmatrix}-1 & 5 & 1\\ 3 & 1 & 1\\ 5 & 7 & 1\end{vmatrix}$		
		$=\frac{1}{2}\left(-1\ (1-7)-5\ (3-5)+1(21-5)\right)$		
		$=\frac{1}{2}\ 32$		
		$=16\ sq.unit\ \ \rightarrow\ (1)$	1	
		Area of $\Delta\, DEF\ =\frac{1}{2}\begin{bmatrix}4 & 4 & 1\\ 2 & 6 & 1\\ 1 & 3 & 1\end{bmatrix}$		
		$=\frac{1}{2}\ (4\ (6-3)-4\ (2-1)+1\ (6-6))$		
		$=\frac{1}{2}\ 8$		
		$=4\ \ sq.unit\ \ \rightarrow\ (2)$	1	04
		From (1) & (2) , we get		
		Area of $\Delta\, ABC\ =4\ \times$ Area of $\Delta\, DEF$		
		Hence proved.		
	b)	Find the equation of circle passing through the point $(2\ ,3\ )$		
		And concentric with the circle		
		$x^2+y^2+6x-4y-12=0.$		
	Ans.	$x^2+y^2+6x-4y-12=0\ comparing\ with$		
		$x^2+y^2+2gx+2\,fy+c=0$		
		$2g=6\ ;\ \ 2f=-4\ \ ;c=-12$		
		$g=3\ ;\ \ f=\ -2\ \ ;c=-12$		
		Center is $(\,-g\ ,-f)=(\,-3\ ,2)$	1	

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
6.		Radius = distance between $(-3,2)$ and $(2,3)$		
		$= \sqrt{(2+3)^2+(3-2)^2}$		
		$= \sqrt{25+1}$		
		$= \sqrt{26}$ unit	1	
		Equation of required circle is ,	1	
		$(x+3)^2+(y-2)^2=\left(\sqrt{26}\right)^2$		
		$x^2+\ 6x+9+y^2-4y+4=26$		
		$x^2+y^2\ +6x-4y-13=0$	1	04
		OR		
		Let required equation of be ,		
		$x^2+y^2\ +6x-4y+c=0$		
		But circle passing through point $(2,3)$	1	
		$2^2+3^2\ +6(2)-4(3)+c=0$	1	
		$4+9+12-12+c=0$		
		$c=\ -13$	1	
		Required equation of circle is ,	1	04
		$x^2+y^2\ +6x-4y-13=0$		
	c)	Find the equation of a circle which passes through the origin And cut-off positive intercept of 2 and 5 units on X-axis and Y-axis .		
	Ans.	$x-intercept=a=2$		
		$y-intercept=b=5$	1	
		Equation of circle is ,	1	
		$x^2+y^2-ax-by=0$	1	
		$x^2+y^2-2x-5y=0$	1	04
	d)	Given $\bar{a}=2\bar{\imath}+2\bar{\jmath}+\bar{k}$ and $\bar{b}=3\bar{\imath}+6\bar{\jmath}+2\,\bar{k}$ find acute angle between $\bar{a}$ and $\bar{b}$ .Also find projection of $\bar{b}$ on $\bar{a}$.		
	Ans.	$\bar{a}=2\bar{\imath}+2\bar{\jmath}+\bar{k}$; $\bar{b}=3\bar{\imath}+6\bar{\jmath}+2\,\bar{k}$		

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
6.		Consider ,		
		$\bar{a}\,.\bar{b} = \left(2\bar{\imath} + 2\bar{\jmath} + \bar{k}\right).\left(3\bar{\imath} + 6\bar{\jmath} + 2\,\bar{k}\right)$		
		$= 2(3) + 2(6) + 1(2)$		
		$= 6 + 12 + 2$		
		$\bar{a}.\bar{b} = 20$	1½	
		$a = \lvert\bar{a}\rvert = \sqrt{2^2 + 2^2 + 1^2}$		
		$= \sqrt{9}$		
		$a = 3$	½	
		$b = \lvert\bar{b}\rvert = \sqrt{3^2 + 6^2 + 2^2}$		
		$= \sqrt{9 + 36 + 4}$		
		$= \sqrt{49}$		
		$= 7$	½	
		$\cos\theta = \frac{\bar{a}.\bar{b}}{ab}$		
		$= \frac{20}{3\times 7}$		
		$\cos\theta = \frac{20}{21}$		
		$\theta = cos^{-1}\left(\frac{20}{21}\right)$	1	04
		Projection of $\bar{b}$ on $\bar{a}$ $= \frac{\bar{a}.\bar{b}}{a}$	½	
		$= \frac{20}{3}$		
	e)	A force of magnitude 7 units in the direction $3\bar{\imath} + 2\bar{\jmath} - 6\bar{k}$		
		Displaced a body from a point with positive vector $\bar{\imath} + \bar{\jmath} - \bar{k}$		
		$to\ a\ point$ with positive vector $2\bar{\imath} - \bar{\jmath} + 3\bar{k}. Find\ the\ work\ done$.		
	Ans.	Let $\bar{a} = 3\bar{\imath} + 2\bar{\jmath} - 6\bar{k}$		
		$\lvert\bar{a}\rvert = \sqrt{(3)^2 + (2)^2 + (-6)^2}$		
		$= \sqrt{9 + 4 + 36}$		
		$= \sqrt{49}$		
		$= 7$	½	
		Unit vector along $\bar{a}$ $= \frac{\bar{a}}{\lvert\bar{a}\rvert}$		
		$= \frac{3\bar{\imath} + 2\bar{\jmath} - 6\bar{k}}{7}$	½	

Que. No.	Sub. Que.	Model answers	Marks	Total Marks
6.		A force of magnitude 7 in the direction of $3\bar{\imath}+2\bar{\jmath}-6\bar{k}$ $=7\frac{3\bar{\imath}+2\bar{\jmath}-6\bar{k}}{7}$ $=3\bar{\imath}+2\bar{\jmath}-6\bar{k}$	1	
		A body is displaced from a point say A to B $\bar{d}=position\ vector\ of\ B-position\ vector\ of\ A$ $=(2\bar{\imath}-\bar{\jmath}+3\bar{k})-(\bar{\imath}+\bar{\jmath}-\bar{k})$ $=\bar{\imath}-2\bar{\jmath}+4\bar{k}$	1	
		Work done = $\bar{F}.\bar{d}$ $=(3\bar{\imath}+2\bar{\jmath}-6\bar{k}).(\bar{\imath}-2\bar{\jmath}+4\bar{k})$ $=3(1)+2(-2)+(-6)4$ $=3-4-24$ $=-25$	1	04
	f)	Two force $\bar{\imath}+\bar{\jmath}-\bar{k}$ and $-2\bar{\imath}-\bar{\jmath}+\bar{k}$ are applied at the point $3\bar{\imath}-\bar{\jmath}$. Find the moment of the force system about the point $2\bar{\imath}+\bar{\jmath}-2\bar{k}$.		
	Ans.	Let $\overline{F_1}=\bar{\imath}+\bar{\jmath}-\bar{k}$, $\overline{F_2}=-2\bar{\imath}-\bar{\jmath}+\bar{k}$ $\bar{F}=\overline{F_1}+\overline{F_2}$ $=(\bar{\imath}+\bar{\jmath}-\bar{k})+(-2\bar{\imath}-\bar{\jmath}+\bar{k})$ $=-\bar{\imath}$	1	
		Here $\bar{a}=\overline{OA}=3\bar{\imath}-\bar{\jmath}$, $\bar{b}=\overline{OB}=2\bar{\imath}+\bar{\jmath}-2\bar{k}$ $\overline{BA}=\bar{a}-\bar{b}$ $=3\bar{\imath}-\bar{\jmath}-(2\bar{\imath}+\bar{\jmath}-2\bar{k})$ $=\bar{\imath}-2\bar{\jmath}+2\bar{k}$	1	
		Moment of $\bar{F}$ at point A about B $=\overline{BA}\times\bar{F}$ $=\begin{vmatrix}\bar{\imath} & \bar{\jmath} & \bar{k}\\ 1 & -2 & 2\\ -1 & 0 & 0\end{vmatrix}$	1	
		$=\bar{\imath}(0)-\bar{\jmath}(0+2)+\bar{k}(0-2)$ $=-2\bar{\jmath}-2\bar{k}$	1	04