Marking Scheme Set 3

1.	0	1
2	216	1
3	{(2,8), (3,27)}	1
4	1	1
5	$-e^x \tan e^x$	1
6	-2cot2x+c or tanx – cotx + c	1
7	0	1
8	a = -9 , b = 27	1
9	Order 1 , Degree 2 or sum 4	1
10	0.12	1
11	Correct proof Or f ′(x) = – sin x Since for each x ∈ (0, π), sin x > 0, we have f ′(x) < 0 and so f is strictly decreasing in (0, π)	1 1
12	Correct proof	1
13	x^x (1+ logx)	1
14	$\frac{\pi}{6}$	1
15	For proving onne one	1
16	Not a function	1
17(i)	(b)	1
17(ii)	(a)	1
17(iii)	(c)	1
17(iv)	(a)	1
17(v)	(d)	1
18(i)	(b)	1
18(ii)	(c)	1
18(iii)	(b)	1
18(iv)	(d)	1
18(v)	(d)	1
19.	calculation of $\sin^{-1}$ 5/13 1 marks Applying formula $\sin^{-1}x+\sin^{-1}y$ and proving 1 marks	
20.	x =cosy /cos (a+y) 1 marks differentiating wrt y and getting result 1 marks Or dx/dt = asint 1/2 marks dy/dt=1+cost 1/2 marks dy/dx=atant/2 1 marks	

21.	Proving one one 1 marks Proving onto 1 marks	
22.	If $\vec{a} + \vec{b} + \vec{c} = \mathbf{0}$ $\vec{a} + \vec{b} = -\vec{c}$ And getting $\lvert\vec{a}\rvert^2 + \left\lvert\vec{b}\right\rvert^2 + 2\lvert\vec{a}\rvert\left\lvert\vec{b}\right\rvert cos\,\theta = \lvert\vec{c}\rvert^2$ 1 marks Getting $\theta = \cos^{-1}\frac{1}{3}$ 1 mark	
23.	Getting DRs of line parallel to the given line 7,-5 and 1 1 mark Equation of the line passing through (1,2,-1) and having DRs 7,-5 and 1 $\vec{r} = (\hat{\imath} + 2\hat{\jmath} - \widehat{k}) + \mu\,(7\,\hat{\imath} - 5\hat{\jmath} + \widehat{k})$ 1 mark	
24.	LHD = 3 1 mark RHD = 1 1 mark	
25.	$\frac{dy}{dx} = x^3\ cosec\ y$; y (0) = 0 $\int siny\ dy = \int x^3 dx$ $-\cos y = \frac{x^4}{4} + c$ 1 mark y (0) = 0 C=-1 $-\cos y = \frac{x^4}{4} - 1$ 1 mark	
26.	$\overrightarrow{\boldsymbol{AB}} = 3\hat{\boldsymbol{\imath}} - \hat{\boldsymbol{\jmath}} + 4\,\widehat{\boldsymbol{k}}$ $\overrightarrow{\boldsymbol{AC}} = 4\hat{\boldsymbol{\imath}} + 5\,\widehat{\boldsymbol{k}}$ Finding $\overrightarrow{\boldsymbol{AD}} = \hat{\boldsymbol{\imath}} + \hat{\boldsymbol{\jmath}} + \widehat{\boldsymbol{k}}$ 1 mark Now finding area of parallelogram $= \sqrt{\mathbf{42}}$ unit 1 mark	
27.	$A^2 = \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$ ½ marks **A^2-5A +7I=0** ½ marks For getting $A^{-1} = \frac{1}{7}\begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$ 1 marks	
28.	$\int_{\mathbf{0}}^{\mathbf{1}} \boldsymbol{x}(\mathbf{1} - \boldsymbol{x})^{\boldsymbol{n}} \boldsymbol{dx}$ **Using property and getting** $\int_{\mathbf{0}}^{\mathbf{1}} \boldsymbol{x}^{\boldsymbol{n}} - \boldsymbol{x}^{\boldsymbol{n}+\mathbf{1}} \boldsymbol{dx}$ 1 marks $\frac{\mathbf{1}}{(\boldsymbol{n}+\mathbf{1})(\boldsymbol{n}+\mathbf{2})}$ 1 marks	
29	let t= tanx	

	$\int \frac{1}{3+t^2} dx$ or $\int \frac{1}{(x+2)^2+4} dx$ 2 marks $\frac{1}{\sqrt{3}} tan^{-1} \frac{x}{\sqrt{3}}$ $\frac{1}{2}tan^{-1}$ (x+2)/2 1 marks		
30	Getting $\frac{dy}{dx} = \frac{\sqrt{x^2+y^2}+y}{x}$ 1 mark Putting y=vx *and getting* $\int \frac{dv}{\sqrt{1+v^2}} = \int \frac{dx}{x}$ 1 mark Getting $\log\left\|v+\sqrt{1+v^2}\right\| = log\|x\|$+c And $y+\sqrt{x^2+y^2} = cx^2$ 1 mark		
31	Given $\overrightarrow{\beta_1}$ is parallel to $\vec{\alpha}$ $\overrightarrow{\beta_1} = \lambda\, \vec{\alpha}$ $\overrightarrow{\beta_1} = 3\,\lambda i - \lambda j$ 1/2 mark $\vec{\beta} = \overrightarrow{\beta_1} + \overrightarrow{\beta_2}$ $\overrightarrow{\beta_2}$ = (2-3λ)I + (1+λ)j -3k ½ Marks $\overrightarrow{\beta_2}$ is perpendicular to $\vec{\alpha}$ So (2-3λ).3 +(1+λ)(-1) -3.0 = 0 λ = ½ 1 mark $\overrightarrow{\beta_1} = \frac{3}{2} i - \frac{1}{2} j$ $\overrightarrow{\beta_2} = \frac{1}{2}i + \frac{3}{2}j - 3k$ 1 mark		
32	Finding values of LHL = a 1 marks Finding value of RHL = ½ 1 mark LHL = RHL = f(0) = a And getting a = ½ 1 mark		
33	reflexive 1 marks Symmetric 1 mark Transitive 1 marks		
34	$cot^{-1}(\frac{cosx/2}{sinx/2})$ 1 +1/2marks =x/2 $\frac{dy}{dx} = \frac{1}{2}$ 1 +1/2marks		
35	Let I = $\int_0^{\frac{\pi}{2}} logsinx\, dx$ Applying property and getting 2I = $\int_0^{\frac{\pi}{2}} logsinx + logcosx\, dx$ 1 mark		

For 2I = $\int_0^{\frac{\pi}{2}} logsin2x\,dx - \int_0^{\frac{\pi}{2}} log2\,dx$ 1 mark

$For\ \int_0^{\frac{\pi}{2}} logsinx\,dx = -\frac{\pi}{2} log2$ 1 mark

36

36 k=9/2 1 marks

Formula of equation of plane 2 marks

5x-2y-z=6 2 marks

Or

Equation of perpendicular $\frac{x+1}{2} = \frac{y-3}{1} = \frac{z+5}{-2}$ 1marks

foot of the perpendicular (-5,1,-2) 2 marks

length of the perpendicular 6 2 marks

37

Length of the wire 34 m

This wire cut at x m and made a rectangle of breadth a m and length 2a m .

Finding a= x/6 m

Area of rectangle = $x^2/18$ 1 mark

Area of square = $\frac{1}{16}(34-x)^2$ 1 mark

Combined area of rectangle and square A = $x^2/18 + \frac{1}{16}(34-x)^2$

For maxima and minima dA/ dx =(17x-306)/72 = 0

x = 18 1 mark

Now d^2A/dx^2 = 17/72 >0 Hence for x= 18 , A is mimimum.

Length of the two pieces are 18 and 16 . 2 marks

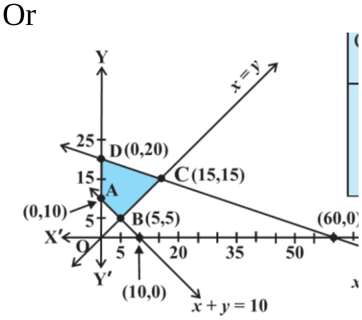
38

x+y≤80, 300x+150y≤15000,x≥0,y≥0, Z=40x+25y 1 mark

Graph 2 mark

Z=(20,60) ,2300 2 mark

Or



2 Mark

Corner Point	Corresponding value of Z = 3x + 9y
A (0, 10)	90
B (5, 5)	**60** ←
C (15, 15)	**180** } ←
D (0, 20)	**180** }

2 Marks

Maximum z exists at every point on line segment joining (15,15) and (0,20) 1 mark