SEC-A

1.c	2.c	3.c	4.b	5.d	6.d	7.d	8.c	9.b	10.b
11.b	12.b	13.b	14.c	15.a	16.a	17.d	18.c	19.b	20.c
21.c	22.b	23.d	24.d	25.d	26.c	27.b	28.b	29.a	30.b
31.b	32.a	33.c	34.b	35.b	36.c	37.d	38.c	39.b	40.c

SEC-B

41. $|A|$ =-1 ----- 1

Adj $= \begin{bmatrix} 1 & -2 & 2 \\ -4 & 3 & -4 \\ -4 & 4 & -5 \end{bmatrix}$, $A^{-1} = \begin{bmatrix} 1 & 2 & -2 \\ 4 & -3 & 4 \\ 4 & -4 & 5 \end{bmatrix}$ -----2+2

$A^{-1} =$ A -----1

42 .$\sim \begin{bmatrix} 1 & 3 & 4 & 7 \\ 0 & 1 & 1 & 2 \\ -2 & 1 & 3 & 4 \end{bmatrix} R_{1\to}R_3$ -----1

.$\sim \begin{bmatrix} 1 & 3 & 4 & 7 \\ 0 & 1 & 1 & 2 \\ 0 & 7 & 11 & 18 \end{bmatrix} R_{3\to}R_3 + 2R_1$ ------2

.$\sim \begin{bmatrix} 1 & 3 & 4 & 7 \\ 0 & 1 & 1 & 2 \\ 0 & 0 & 4 & 4 \end{bmatrix} R_{3\to}R_3 - 7R_2$ --------2

$\rho(A)$ =3 ------ 1

43. . $|A|$ =1 -------1

adj A=$\begin{bmatrix} 3 & -1 \\ -2 & 1 \end{bmatrix}$, $A^{-1} = \begin{bmatrix} 3 & -1 \\ -2 & 1 \end{bmatrix}$ -------- 1+2

x=1 ,y=2 --------2

44.(i) a+3b =10 i +7j –k -------1

2a-b= - i +5 k ---------1

(a+3b).(2a-b)=-15 -------1

(ii)$[a \quad b \quad c] = \begin{vmatrix} \lambda & 0 & 3 \\ 1 & 3 & -1 \\ -5 & -3 & 7 \end{vmatrix} = 0$ --------2

λ =-2 ----1

45. r = -i + 2j +3 k ----1

M= r x F ----1

M=21 i – 7 k -------2

Moment=$7\sqrt{10}$ -----1

D.C .S=$\left(\frac{3}{\sqrt{10}}, \quad 0 \quad , \frac{-1}{\sqrt{10}}\right)$ -------1

46 . Diagram -----1

PA =PO +OA ------ 1

PB=PO-OA -------1

PA.PB=0 -------2

PA ⊥ PB (or) $\angle APB = \frac{\pi}{2}$ ------1

47 . $Z_1 = r_1 e^{i\theta_1} \Rightarrow \quad |Z_1| = r_1$,$\arg(Z_1) = \theta_1$ - ---- 1

$Z_2 = r_2 e^{i\theta_2} \Rightarrow \quad |Z_2| = r_2$,$\arg(Z_2) = \theta_2$ ---------1

$z_1 z_2 = r_1 e^{i\theta_1} r_2 e^{i\theta_2}$ ---------1

$= r_1 r_2 e^{i(\theta_1 + \theta_2)}$ --------1

(i) $|z_1 z_2| = r_1 r_2$

$= |z_1||z_2|$ -------1

(ii) arg $(z_1 z_2) = \theta_1 + \theta_2$

= $\arg(Z_1) + \arg(Z_2)$ -------1

48.$\sqrt{-7 + 24\,i}$ =x +iy -----1

$x^2 + y^2 = -7$, 2xy=24 -----1

$x^2 - y^2$ =25 -----1

$x^2 = 9$,y^2 =16 ----1

$x = \pm 3$, $y = \pm 4$ -----1

$\sqrt{-7+24\,i}$ =(3+4i) (or) (-3-4i) ---1

49.Diagram ----2

Parabola equation is y^2 =4ax ------2

It passes P(4,6) ----1

a =9/4 = 2.25 ------1

50. centre (1,3) -----1

Equartion of R.H is (x-1) (y-3)=c^2 ------2

c^2=16 ---------1

R.H is (x-1)(y-3)=16 -----1

Asymptotes (x-1)=0 and (y-3)=0 ---------1

51. $m_1=\frac{x_1}{y_1}$ ---------2

m_2= - $\frac{c^2}{x_1^2}$ -----2

To prove= -1 ------2

52. (i) continuous in [0,1],diff in (0,1) -----1

f(a)≠f(b) ------1

Rolls theorem fails. -------1

(ii) $\lim_{x\to\infty}\frac{logx}{x} = \lim_{x\to\infty}\frac{1/x}{1}$ ---------2

= 0 ---------1

53 . $dy=\frac{1}{3}x^{-\frac{2}{3}}\,dx$ ----------2

x=64 , dx=1 ,$dy=\frac{1}{48}$ ----------2

$\sqrt[3]{65}=4+0.021\approx 4.021$ ------------2

54.

$\frac{\partial u}{\partial x}=\frac{\sec^2 x}{\tan x+\tan y+\tan z}$ ---------1

$Sin\ 2x\ \frac{\partial u}{\partial x} = \frac{2\ \tan x}{\tan x + \tan y + \tan z}$ --------2

$Sin\ 2y\ \frac{\partial u}{\partial y} = \frac{2\ \tan y}{\tan x + \tan y + \tan z}$ -------1

$Sin\ 2z\ \frac{\partial u}{\partial z} = \frac{2\ \tan z}{\tan x + \tan y + \tan z}$ -------1

By adding $\sum \sin 2x \frac{\partial u}{\partial x} = 2.$ -----1

55. (a)

other root is $2 - i$, ---------1

factor is $x^2 - 4x + 5$ --------1

$\therefore 6x^4 - 25x^3 + 32x^2 - 3x - 10 \equiv (x^2 - 4x + 5)(6x^2 + px - 2)$

$\Rightarrow p = -1.$ --------1

other factor is $6x^2 - x - 2.m$ --------- 1

$x = -2, \frac{2}{3}$ ------1

Roots are $2 \pm i, \quad -2, \quad 2/3.$ --------1

(b). f^1(x)=$3x^2$-6x ---------1

f^1(x)=0 , x=0,2 ---------1

Max val=17, ---------2

Min val=-3 ---------2

SEC -C

56.$\Delta = 24$ --------1

Δ_a=24 -------2

Δ_b=12 ---------2

Δ_c=24 ----------2

Solution x=1 ,y=2,z=1, -----3

57.$[A,B]=\begin{bmatrix} 1 & 1 & 1 & 2 \\ 2 & 1 & -2 & 2 \\ \lambda & 1 & 4 & 2 \end{bmatrix}$ -------1

$\sim\begin{bmatrix} 1 & 1 & 1 & 2 \\ 2 & -1 & -4 & -2 \\ 0 & 1-\lambda & 4-\lambda & 2-2\lambda \end{bmatrix}$ ------------2

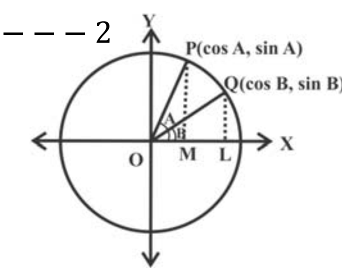
$\sim\begin{bmatrix} 1 & 1 & 1 & 2 \\ 2 & -1 & -4 & -2 \\ 0 & -\lambda & -\lambda & -2\lambda \end{bmatrix}$ ----------1

$\sim\begin{bmatrix} 1 & 1 & 1 & 2 \\ 2 & -1 & -4 & -2 \\ 0 & 0 & 3\lambda & 0 \end{bmatrix}$ ----------2

Case(i) $\lambda=0$, $\rho(A)=\rho(A,B)=2$, The system has infinitely many solutions.--------2

Case(ii) $\lambda\neq 0$, $\rho(A)=\rho(A,B)=3$, The system has unique solution -------2

58. $Diagram$ --------3, $\overrightarrow{OP}=\cos A\,\vec{\imath}+\sin A\,\vec{\jmath}$ ------ 2



$\overrightarrow{OQ}=\cos B\,\vec{\imath}+\sin B\,\vec{\jmath}$ ------2

$\overrightarrow{OP}\cdot\overrightarrow{OQ}=\cos(A-B)$ -----1

$\overrightarrow{OP}\cdot\overrightarrow{OQ}=\cos A\,\cos B+\sin A\sin B$ ------1

$\boxed{\cos(A-B)=\cos A\,\cos B+\sin A\sin B}$ ------ 1

59. $\vec{a}=-\vec{\imath}-2\vec{\jmath}+\vec{k}$, $\vec{u}=\vec{\imath}+2\vec{\jmath}+4\vec{k}$, $\vec{v}=2\vec{\imath}-\vec{\jmath}+3\vec{k}$ ------3

Vector equation is $\therefore\ \boldsymbol{\vec{r}=\vec{a}+s\vec{u}+t\vec{v},}$

$\boxed{\vec{r}=-\vec{\imath}-2\vec{\jmath}+\vec{k}+s(\vec{\imath}+2\vec{\jmath}+4\vec{k})+t(2\vec{\imath}-\vec{\jmath}+3\vec{k})}$ ----2

$(x_1,y_1,z_1)=(-1,-2,1);\ (l_1,m_1,n_1)=(1,2,4);\ (l_2,m_2,n_2)=(2,-1,3)$

Catesian equation is $\begin{vmatrix} x-x_1 & y-y_1 & z-z_1 \\ l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \end{vmatrix} = 0$ -------2

$\begin{vmatrix} x+1 & y+2 & z-1 \\ 1 & 2 & 4 \\ 2 & -1 & 3 \end{vmatrix} = 0$ -----------1

$10x + 5y - 5z + 25 = 0$ (or) 2x+y-z+5=0 -------2

60. $\alpha = p + iq; \beta = p - iq$ -----2

$(y+\alpha)^n = q^n \frac{(\cos\theta + i\sin\theta)^n}{\sin^n\theta} = \frac{q^n}{\sin^n\theta}(\cos n\theta + i\sin n\theta)$ -----2

$(y+\beta)^n = \frac{q^n}{\sin^n\theta}(\cos n\theta - i\sin n\theta)$ ………2

$\alpha - \beta = p + iq - p + iq = 2iq$ ------2

$\therefore \frac{(y+\alpha)^n - (y+\beta)^n}{\alpha - \beta} = \frac{\frac{q^n}{\sin^n\theta}(2i\sin\theta)}{2iq} = q^{n-1}\frac{\sin n\theta}{\sin^n\theta}$ ------2

61.

$x^4 - x^3 + x^2 - x + 1 = 0$

Multiply by $x + 1 \Rightarrow x^5 + 1 = 0 \Rightarrow x^5 = -1$ ---------1

$\Rightarrow x = (-1)^{\frac{1}{5}} = (\cos\pi + i\sin\pi)^{\frac{1}{5}}$ --------2

$= \cos(2k+1)\frac{\pi}{5} + i\sin(2k+1)\frac{\pi}{5}, k = 0,1,2,3,4$ ------3

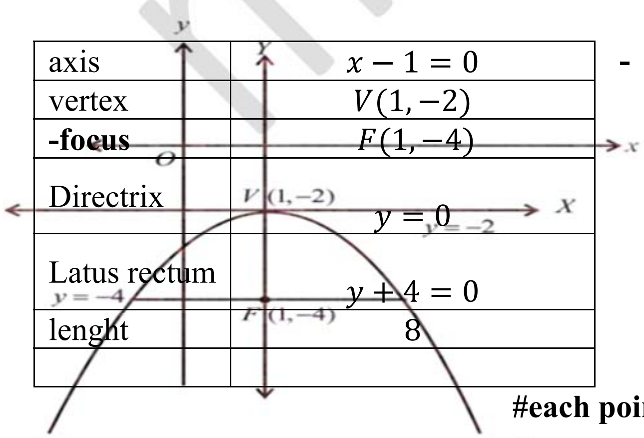
$\boxed{\text{cis}\frac{\pi}{5}, \text{cis}\frac{3\pi}{5}, \text{cis}\frac{5\pi}{5} = \text{cis}\pi = -1, \text{cis}\frac{7\pi}{5}, \text{cis}\frac{9\pi}{5}}$ -------2

the root x= -1 ,then the solutions are

$\boxed{\text{cis}\frac{\pi}{5}, \text{cis}\frac{3\pi}{5}, \text{cis}\frac{7\pi}{5}, \text{cis}\frac{9\pi}{5}}$ -----2

62. Rough diagram ----2

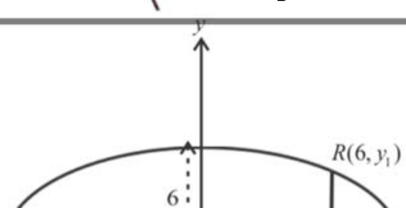
$(x-1)^2 = -8(y+2)$ ----------2



axis	$x - 1 = 0$
vertex	$V(1,-2)$
-focus	$F(1,-4)$
Directrix	$y = 0$
Latus rectum	$y + 4 = 0$
lenght	8

-

#each point carries 1 mark-------6



63. Rough diagram ----2

$AA' = 2a = 20 \Rightarrow a = 10$ -----1

$b = 18 - 12 = 6 - - - - - - 1$

Ellipse equation is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \Rightarrow \frac{x^2}{10^2} + \frac{y^2}{6^2} = 1$ -----2

It passes $R(6, y_1)$ ----------1

$\therefore \frac{6^2}{100} + \frac{y_1^2}{36} = 1$ --------1

$y_1 = 4 \cdot 8$ -------1

Required height= $16 \cdot 8$ ft -------1

64.

$y = x + 4$ ------------1

$m = 1, c = 4$ -------2

Ellipse is $x^2 + 3y^2 = 12$

$\frac{x^2}{12} + \frac{y^2}{4} = 1$ ------1

$a^2 = 12, b^2 = 4$ ------1

Condition $c^2 = a^2m^2 + b^2$ -------2

Given line touches the ellipse -----1

Point of contact $= \left(\frac{-a^2m}{c}, \frac{b^2}{c}\right) = (-3,1)$----2

65.The other asymptote is $2x - y + k = 0$ ------2

Combined equation of the asymptotes $(x + 2y - 5)(2x - y + k) = 0$ -------2

Equation of R.H$(x + 2y - 5)(2x - y + k) + c = 0$ ----------2

k=4 , c=-16 --------2

he equation of R.H is

$(x + 2y - 5)(2x - y + 4) - 16 = 0$ --------2

66.$\frac{dx}{d\theta} = -4a\cos^3\theta \sin\theta$ -------2

.$\frac{dy}{d\theta} = 4a\sin^3\theta \cos\theta$ -----2

Slope =$\frac{dy}{dx} = -\frac{\sin^2\theta}{\cos^2\theta}$ -------2

Equation of the tangents $x\sin^2\theta + y\cos^2\theta = a\sin^2\theta\cos^2\theta$ (or) Intercept form-------2

Sum of the intercepts=a, --------2

67.Rough Diagram -----2

Volume of the cone,V=$\frac{1}{3}\pi x^2$(a+y) ---------2

V=$\frac{1}{3}\pi(a^2 - y^2)$(a+y) --------2

V^1=0, y=$\frac{a}{3}$ -------1

When y=$\frac{a}{3}$,$V^{11} < 0$ ----------1

V=$\frac{8}{27}$(volume of the sphere) -----2

68(i).Domain,extent,intercept and origin --------1

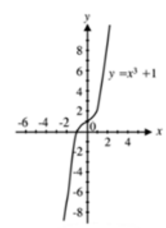
Domain is$(-\infty,\infty)$, *horizondal Extent*$(-\infty,\infty)$, *and thevertical extent*$(-\infty,\infty)$,It does not pass through origin. ---------1

(ii) symmetry:does not posses any symmetrical ------1

(iii)Asymptotes:The curve does not admit any asymptotes ------1

(iv)Monotonicity;the curve is increasing in$(-\infty,\infty)$ -------1

(v)(0,1) is a point of inflection(or) writing the concavity ------2



Rough Diagram --------3

69.$\frac{\partial w}{\partial u} = 2ue^v$ ------1 $\frac{\partial w}{\partial v} = u^2e^v$-------1

$\frac{\partial u}{\partial x} = \frac{1}{y}$ ----------1 $\frac{\partial u}{\partial y} = \frac{-x}{y^2}$---------1

$\frac{\partial v}{\partial x} = \frac{y}{x}$ -----------1 $\frac{\partial u}{\partial y} = \log x$------1

$\frac{\partial w}{\partial x} = \frac{x}{y} x^y \left(\frac{2}{y} + 1\right)$--------2

$\frac{\partial w}{\partial y} = \frac{x^2}{y^3} x^y (y\log x - 2\,)$ -------2

70.(a)

$\vec{b} \times \vec{c} = \begin{vmatrix} \vec{\imath} & \vec{\jmath} & \vec{k} \\ -2 & 0 & 5 \\ 0 & 1 & -3 \end{vmatrix}$ -------1

$= -5\vec{\imath} - 6\vec{\jmath} - 2\,\overrightarrow{k}$ -------- 1

$\vec{a} \times (\vec{b} \times \vec{c}) = \begin{vmatrix} \vec{\imath} & \vec{\jmath} & \vec{k} \\ 2 & 3 & -1 \\ -5 & -6 & -2 \end{vmatrix}$ ------1

$= -12\vec{\imath} + 9\vec{\jmath} + 3\,\vec{k}$ -------------2

$(\vec{a} \cdot \vec{c}) = 6$ -------1

$(\vec{a} \cdot \vec{b}) = -9$ --------1

$(\vec{a} \cdot \vec{c})\vec{b} - (\vec{a} \cdot \vec{b})\vec{c} = -12\vec{\imath} + 9\vec{\jmath} + 3\,\vec{k}$ -----2

, $\boxed{\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \cdot \vec{c})\vec{b} - (\vec{a} \cdot \vec{b})\vec{c}}$ ------------1

(b) y^1=-2xe^{x^2} ------1

y^{11}=-2e^{x^2}(2x^2-1) ----2

y^{11}=0, x=$\frac{-1}{\sqrt{2}}$, $\frac{1}{\sqrt{2}}$ -----2

For (-∞, $-\frac{1}{\sqrt{2}}$]] and[[$\frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$]]the curve is concave upward -----2

For $\left[\frac{1}{\sqrt{2}}\right.$,∞)the curve is concave upward. --------1

The point of inflections are $\left(\frac{-1}{\sqrt{2}}, e^{\frac{-1}{2}}\right)$ and$\left(\frac{1}{\sqrt{2}}, e^{\frac{-1}{2}}\right)$ ---------2