MARK ANALYSIS

(WITHOUT CHOICE)

PART	Questions	Total Questions	Book Back Questions	Interior/Creative Questions	Total Marks
I	1 Mark	20	17	3	20
II	2 Marks	10	8	2	20
III	3 Marks	10	8	2	30
IV	5 Marks	14	11	3	70
Total Marks			112	28	140
Percentage			80%	20%	100%

A-Type		B-Type	
1.	(a) N	1.	(b) $1/\sqrt{2}$
2.	(d) 2	2.	(a) π
3	(d) $\frac{1}{5}$	3.	(d) $2xu$
4.	(d) 2.5	4.	(a) N
5.	(a) 1, 2	5	(d) $1/5$
6.	(a) 19	6.	(a) (1, 0)
7.	(b) $y=x^3+2$	7.	(d) 2.5
8.	(b) [1, 2]	8	(b) $\frac{1}{f(x)} f'(x)\,dx$
9.	(d) $2xu$	9.	(b) [1, 2]
10.	(b) 2	10.	(d) 2
11	(b) $\pm\frac{1}{\sqrt{2}}(1+i)$	11.	(c) $\frac{\pi a^3}{6}$
12.	(b) $1+i$	12.	(a) (1, 2)
13.	(d) 0.25	13.	(b) $\pi/6$
14.	(c) $\pi/2$	14.	(a) 19
15.	(a) (1, 0)	15.	(b) $1+i$
16.	(b) $\pi/6$	16.	(c) $\pi/2$
17.	(c) $\frac{\pi a^3}{6}$	17	(b) $\pm\frac{1}{\sqrt{2}}(1+i)$
18.	(b) $1/\sqrt{2}$	18.	(b) $y=x^3+2$
19.	(a) π	19.	(d) 0.25
20	(b) $\frac{1}{f(x)} f'(x)\,dx$	20.	(b) 2

21. $\text{adj } A = \begin{bmatrix} -1 & 2 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$

$|\text{adj } A| = 9$

$A^{-1} = \pm \frac{1}{\sqrt{|\text{adj } A|}} \text{adj } A.$

$A^{-1} = \pm \frac{1}{3} \begin{bmatrix} -1 & 2 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$

22. $\text{Re}\left(\frac{1}{z}\right) = \text{Re}\left[\frac{1}{x+iy} \times \frac{x-iy}{x-iy}\right]$

$\text{Re}\left(\frac{1}{z}\right) = \frac{x}{x^2+y^2}$

23. $\tan^{-1}(-\sqrt{3}) = -\tan^{-1}(\sqrt{3})$

$= -\pi/3 \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

24. $y = 4x + c \Rightarrow \boxed{m = 4}$

$x^2 + y^2 = 9 \Rightarrow a^2 = 9.$

$c = a^2(1+m^2) \Rightarrow \boxed{c = \pm 3\sqrt{17}}$

25. $x + 5 = 0$, $x = -5$

$\lim_{x \to 5^{\pm}} f(x) = \lim_{x \to -5} \frac{x^2 - 6x + 7}{x+5} = \pm\infty$

vertical asy at $\Rightarrow x = -5$

slant asy at $\cdot y = x - 11.$

26. $F(tx, ty) = \frac{t^2(x^2 + 5x - 10y^2)}{t(3x + 7y)}$

$F(tx, ty) = t^1 f(x, y)$

F is homogeous function of degree 1.

27. $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{\sqrt{1-x^2}}$

$\int \frac{dy}{\sqrt{1-y^2}} = \int \frac{dx}{\sqrt{1-x^2}}$

$\sin^{-1} y = \sin^{-1} x + C.$

28. $\int_{-\infty}^{\infty} f(x)\, dx = 1$

$c \int_1^4 x^2\, dx = 1$ $\boxed{c = \frac{1}{21}}$

29. The roots are $-2+i, \ -2-i$

$x^2 - \Sigma_1 x + \Sigma_2 = 0$

$\Sigma_1 = -4$ $\Sigma_2 = 5$

$x^2 + 4x + 5 = 0$

30. $f(x) = \sin x$

$\int_0^{\pi} f(x)\, dx = \int_0^{\pi} \sin x\, dx$

$f(2a - x) = \sin(\pi - x) = \sin x = f(x)$

$\therefore \int_0^{\pi} f(x)\, dx = 2\int_0^{\frac{\pi}{2}} \sin x\, dx$

$= 2\int_0^{\frac{\pi}{2}} f(x)\, dx.$

31. $X = A^{-1} B$

$|A| = -1 \qquad adj\,A = \begin{bmatrix} 2 & -5 \\ -1 & 2 \end{bmatrix}$

$A^{-1} = \begin{bmatrix} -2 & 5 \\ 1 & -2 \end{bmatrix} \qquad x = -11, \; y = 4.$

32. $z_1 = z, \qquad z_2 = 6+8i$

$|2-10| \le |z+6+8i| \le 2+10$

$8 \le |z+6+8i| \le 12 \qquad$ H.P.

33. The Roots are $7, -1, \frac{1}{7}$

34. $LHS = \tan^{-1}\frac{2}{11} + \tan^{-1}\frac{7}{24}$

$= \tan^{-1}\left[\dfrac{\frac{2}{11}+\frac{7}{24}}{1-\frac{2}{11}\cdot\frac{7}{24}}\right]$

$= \tan^{-1}\left[\frac{125}{250}\right] = \tan^{-1}\left(\frac{1}{2}\right)$

$= RHS.$

35. $= \begin{vmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{vmatrix} [\vec{a}\ \vec{b}\ \vec{c}]$

$= 1\,[\vec{a}\ \vec{b}\ \vec{c}]$

$= [\vec{a}\ \vec{b}\ \vec{c}] = RHS$

36. $\frac{du}{dt} = \frac{\partial u}{\partial x}\cdot\frac{dx}{dt} + \frac{\partial u}{\partial y}\cdot\frac{dy}{dt}$

$\frac{\partial u}{\partial x} = 2xy + 3y^4 \qquad \frac{dx}{dt} = e^t$

$\frac{\partial u}{\partial y} = x^2 + 3x(4y^3) \qquad \frac{dy}{dt} = \cos t$

$\frac{du}{dt} = e^t\left[2e^t \sin t + 3\sin^4 t + e^t \cos t + 12\sin^3 t \cos t\right]$

37. $I = \int_0^{\frac{\pi}{2}} \frac{dx}{1+5\cos^2 x}$

$t = \tan x, \quad dt = \sec^2 x\,dx.$

$= \int_0^{\frac{\pi}{2}} \frac{\sec^2 x\,dx}{6+\tan^2 x}$

$= \int_0^{\infty} \frac{dt}{(\sqrt{6})^2 + t^2} = \frac{\pi}{2\sqrt{6}}$

38. $E(x) = -0.50$

wining amount $= -0.50$ paise

39. $f(x) = x^3 + 2x + 1 \qquad f(2) = 13$

$f'(x) = 3x^2 + 2 \qquad f'(2) = 14$

$f''(x) = 6x \qquad f''(2) = 12$

$f'''(x) = 6 \qquad f'''(2) = 6$

$f^{IV}(x) = 0 \qquad f^{IV}(2) = 0$

$= 13 + \frac{(x-2)(14)}{1!} + \frac{(x-2)^2}{2!}(12) + \frac{(x-2)^3}{3!}6 + 0 + 0$

$= 13 + 14(x-2) + 6(x-2)^2 + (x-2)^3$

40. $\left(\frac{3}{2}\right) * m = \frac{87}{10}$

$\frac{3}{2} + m - \frac{3}{2}(m) + 17 = \frac{87}{10}$

$\frac{17}{2} - \frac{m}{2} = \frac{87}{10}$

$m = -2/5.$

Part - IV

41)(a) $\Delta = 6.$

$\Delta_1 = 12, \Delta_2 = -6 ; \Delta_3 = 24$

$\Rightarrow x_1 = 2, x_2 = -1, x_3 = 4$

(b) $m = \frac{dy}{dx} = \frac{-2\cos t}{7\sin t}$

Eqn of tangent $\Rightarrow y - 2\sin t = \frac{-2\cos t}{7\sin t}(x - 7\cos t)$

$\Rightarrow 2x\cos t + 7y\sin t = 14.$

Eqn of normal

$7x\sin t - 2y\cos t = 45\sin t\cos t$

42)(a) $(z-1)^3 + 8 = 0$

$(z-1)^3 = (-1)^{1/3}(2)$

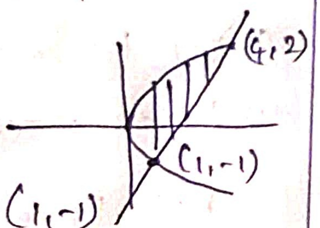
$= 2(-1, -\omega, -\omega^2)$

$z - 1 = -2, -2\omega, -2\omega^2$

$z = -1, 1-2\omega, 1-2\omega^2$

(b) $y^2 = x$

$y = x - 2$



$\Rightarrow$ POI $(4,2)$ & $(1,-1)$

$A = \int_{-1}^{2} (y + 2 - y^2)\,dy$

$= 9/2$ sq units

43) (a) Given eqn is reciprocal equation. Therefore 3 also root

By synthetic division $3, 1/3$ are roots

$\Rightarrow x = -2, -1/2$

$\therefore$ The roots are $3, 1/3, -2, -1/2$

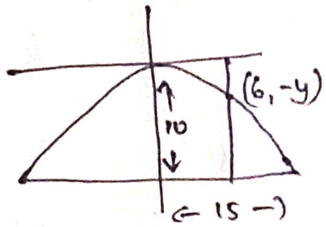
43) (b) $\frac{dy}{dx} = \frac{-x^2 + 3y^2}{2xy}$

$y = vx \Rightarrow v + x\frac{dv}{dx} = \frac{-1 + 3v^2}{2v}$

$\int \frac{2v}{v^2 - 1}\,dv = \int \frac{dx}{x}$

$y^2 - x^2 = cx^3$

44) (a)



$x^2 = -4ay$

At $(15, -10)$

$a = 45/8$

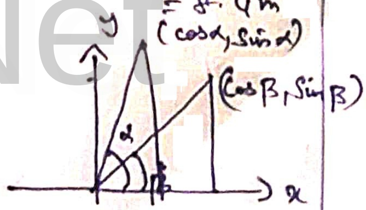
$x^2 = -\frac{45}{2}y$

At $(6, -y) \Rightarrow y = 1.6$

$\therefore$ The required height $= 10 - 1.6$

$= 8.4$ m

(b)



$\vec{a} = \cos\alpha\hat{i} + \sin\alpha\hat{j}$

$\vec{b} = \cos\beta\hat{i} + \sin\beta\hat{j}$

$\vec{a}\cdot\vec{b} = \cos\alpha\cos\beta + \sin\alpha\sin\beta \longrightarrow (1)$

Also $\vec{a}\cdot\vec{b} = \cos(\alpha - \beta) \longrightarrow (2)$

$(1) = (2) \Rightarrow \cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta.$

46)(a) $(x_1, y_1, z_1) = (0, 1, -5)$

$(l_1, m_1, n_1) = (2, 3, 6)$

$(l_2, m_2, n_2) = (1, 1, -1)$

V.N.P $\Rightarrow \vec{r}\cdot(-9\hat{i} + 8\hat{j} - \hat{k}) = 13$

C.E $\Rightarrow 9x - 8y + z = -13$

46) (b) $\frac{dA}{dt} \propto A \Rightarrow \frac{dA}{dt} = KA$

$A = Ce^{kt}$

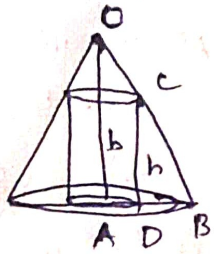
$t=0$, $A = A_0 \Rightarrow A = A_0 e^{kt}$

$t = 50$, $A = 2A_0 \Rightarrow K = \frac{\log 2}{50}$

$A = 3A_0$, $t = ?$

$t = 50 \frac{\log 3}{\log 2}$ years.

47) (a)



$h = \frac{b}{a}(a-r)$

$V = \pi r^2 h$

$V = \frac{\pi b}{a}(ar^2 - r^3)$

$V' = \frac{\pi b}{a}(2ar - 3r^2)$

$V'' = \frac{\pi b}{a}(2a - 6r)$

$V' = 0 \Rightarrow r = \frac{2a}{3}$

$V''\left(\frac{2a}{3}\right) < 0 \Rightarrow V$ attains maximum.

$V = \frac{\pi b}{a}\left(a\left(\frac{4a^2}{9}\right) - \frac{8a^3}{27}\right)$

$V = \frac{4}{9}\left(\frac{1}{3}\pi a^2 b\right)$

$V = \frac{4}{9}$ (vol of cone)

47) (b)

$p \wedge (q \vee r)$	$(p \wedge q) \vee (p \wedge r)$
T	T
T	T
T	T
F	F
F	F
F	F
F	F
F	F
(1)	(2)

(1) = (2)

$\therefore p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$

45) (a) $p = 8/9$, $q = 1/9$, $n = 6$

(i) $P(x=3) = {}^6C_3 \left(\frac{8}{9}\right)^3 \left(\frac{1}{9}\right)^3$

(ii) $n = 4$, $p = 1/9$, $q = 8/9$

$P(x=0) = {}^4C_0 (1/9)^0 (8/9)^4$

(b) $F_1(2,1)$, $F_2(-2,1)$

$C(0,1)$

$c^2 = 4$, $\frac{2b^2}{a} = 6$

$\Rightarrow b^2 = a^2 - c^2$

$\Rightarrow a^2 - 3a - 4 = 0 \Rightarrow a = 4, -1$

$a^2 = 16$, $b^2 = 12$

$\frac{x^2}{16} + \frac{(y-1)^2}{12} = 1$