Vaigai matric Hr Sec School

9688909818 Half Yearly Examination – 2024

12th Maths Answer key.

A. DINESH BABU M.Sc., B.Ed

1. d) 11
2. d) $\frac{\pi}{4}$
3. b) -1
4. d) -4
5. a) $|\alpha| \le \frac{1}{\sqrt{2}}$
6. b) Unique Solution
7. c) $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$
8. b) $x = -1$
9. b) Parallel
10. a) $2\sqrt{3}$
11. b) 2.5
12. d) 2
13. d) 1
14. d) 4π
15. b) $\frac{d^2y}{dx^2} - y = 0$
16. a) $y + \sin^{-1}x = c$
17. a) $\frac{2\pi}{3}$
18. a) $e^{\frac{\log^2 x}{2}}$
19. d) 4
20. a) 11

(21)

$A^{-1} = +\frac{1}{\sqrt{|\operatorname{adj} A|}} \operatorname{adj} A$ — (1)

$A^{-1} = +\frac{1}{6}\begin{bmatrix} 0 & -2 & 0 \\ 6 & 2 & -6 \\ -3 & 0 & 6 \end{bmatrix}$ — (1)

(22)

$z = x + iy \quad \bar{z} = x - iy$ — (1) $\quad z = \bar{z}$ — (1)

(23)

positive zero, negative zero — (1)

Total roots of zero $9 - 3 = 6$ roots — (1)

(24)

$(y+k)^2 = -4a(x-h)$ — (1)

$(y+2)^2 = -12(x-5)$ — (2)

(25)

$\lim_{x\to\infty} \frac{x^2+17x+29}{x^4} = \frac{0}{0}$ (I.D.F) — (1)

$\lim_{x\to\infty} \frac{2}{12x^2} = 0$ — (2)

(26)

$\vec{a} = \hat{i} - \hat{j} + \hat{k} \qquad \vec{n} = 2\hat{i} - \hat{k}$

$\theta = \sin^{-1}\left|\frac{\vec{a}\cdot\vec{n}}{|\vec{a}||\vec{n}|}\right|$ — (1)

$\theta = \sin^{-1}\left(\frac{2\sqrt{2}}{3}\right)$ — (1)

(24) $dA = 2\pi r \cdot dr$ — (1)

$dA = 0.4\pi\ mm^2$ — (1)

(28) $\int_0^\infty e^{-x} x^n \cdot dx = n!$ — (1)

$\int_0^\infty e^{-x} x^n \cdot dx = \frac{n!}{a^{n+1}}$ — (1)

(29). $2y\,y' = 4a$ — (1)

$y' = \frac{y}{2a}$ — (1)

(30). $-1 \le \frac{2x}{1+x} \le 1$

$x \in [-\frac{1}{3}, 1]$

(31) $A^{-1} = \frac{1}{4}\begin{bmatrix} 2 & -2 \\ -3 & 5 \end{bmatrix}$ — (2)

$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -1 \\ 4 \end{bmatrix}$ — (1)

(32) $|z-4i| = |z+4i|$ — (1)

$\sqrt{x^2+(y-4)^2} = \sqrt{x^2+(y+4)^2}$ — (1)

$16y = 0$

$y = 0$ — (1)

(33) Let The roots are $\alpha, \frac{1}{\alpha}, \beta$. — (1)

$\alpha = 3, \beta = 2$

Solution of all roots are

$3, \frac{1}{3}, 2$ — (2)

(34). $\sin^{-1}(-1) + \cos^{-1}(\frac{1}{2}) + \sin^{-1}(-\frac{1}{2})$

$= -\frac{\pi}{4} + \frac{\pi}{3} - \frac{\pi}{6}$ — (2)

$= -\frac{\pi}{12}$ — (1)

(35) Co-efficient of x^2 = Co-efficient of y^2

$\boxed{a = 3}$ — (1)

Centre $(1,0)$ — (1)

radius $r = \sqrt{f^2+g^2-c}$

$\boxed{r = 5}$ — (1)

(36) $\vec{b}\times\vec{d} = 12\hat{i} - 18\hat{j} + 36\hat{k}$ — (1)

$\delta = \frac{|(\vec{c}-\vec{a})\cdot(\vec{b}\times\vec{d})|}{|\vec{b}\times\vec{d}|}$ — (1)

$\delta = 2$ units — (1)

(37) $\left.\begin{aligned} \frac{dy}{dx} &= \cos x \\ \frac{d^2y}{dx^2} &= -\sin x \end{aligned}\right\}$ — (1)

$-\pi \quad + \quad 0 \quad - \quad \pi$ — (1)

Concavity $(n\pi, 3)$ — (1)

(38) $f(x) = f(x_0) + f'(x_0)(x-x_0)$ — (1)

$\sqrt{9.2} = f(9) + f'(9)(0.2)$ — (1)

$\simeq 3.033$ — (1)

(39) $V = \pi\int_0^2 x^2 \cdot dy$ — (1)

$= \frac{\pi}{2}[e^4 - 1)$ — (2)

(40) $\frac{dy}{dx} + \frac{y}{x} = \frac{y^2}{x}$ — (1)

$I.F = e^{\int P\cdot dx} = x$ — (1)

G.S $y(I.F) = \int Q.(I.F).dx + C$

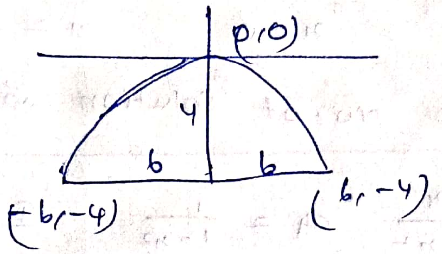
$yx = y^2 x + C$ — (1)

~~$y = 2x - C x^2 y + C$~~.

41) a) $\Delta = -22 \quad \Delta_x = -44 \quad \Delta_y = -66 \quad \Delta_z = -88$ — 3

$x = \frac{\Delta x}{\Delta} = 2, \quad y = \frac{\Delta y}{\Delta} = 3 \quad z = \frac{\Delta z}{\Delta} = 4$ — 2

b).



— 1

$x^2 = -4ay$ — 1

$\frac{dy}{dx} = -\frac{2x}{9}$ — 1

$\theta = \tan^{-1}\left(\frac{4}{3}\right)$ — 1

42) a) $11x^2 - 25y^2 - 44x + 50y - 256 = 0$

$\frac{(x-2)^2}{25} - \frac{(y-1)^2}{11} = 1$ — 1

$c^2 = a^2 + b^2$ — 1 $\quad c = \pm 6 \quad e = \frac{6}{5}$ — 1

$F(8,1) \; \& \; (-4,1)$, $V(2,1)$ — 2

b) $\frac{dA}{dt} \propto A$, $\frac{dA}{dt} = kA \quad A = ce^{kt}$ — 2

$e^{-100k} = \frac{9}{10}$ — 1 $\quad A = A_0\left(\frac{9^{10}}{10^8}\right)\%$ — 2

43) a) $z^3 = -8i$ — 1

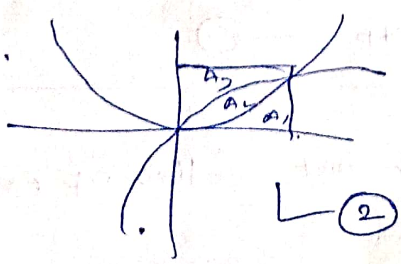
$z = \sqrt[3]{8}\left(\cos\left(\frac{4k\pi - \pi}{6}\right) + i\sin\left(\frac{4k - \pi}{6}\right)\right)$ — 1

$k=0 \quad z = \sqrt{3} - i$

$k=1 \quad z = \cancel{-\sqrt{3} - i} \; 2i$ — 3

$k=2 \quad z = -\sqrt{3} - i$

b).



— 2

$A_1 = \int_0^4 \frac{x^2}{4}\,dx = \frac{16}{3}$

$A_2 = \int_0^4 \left(2\sqrt{x} - \frac{x^2}{4}\right).dx = \frac{16}{3}$ — 3

$A_3 = \int_0^4 (4 - 2\sqrt{x}).dx = \frac{16}{3}$

44 a) $\tan^{-1}\left(\frac{2x}{1-(x^2-1)}\right) + \tan^{-1}(x) = \tan^{-1}(3x)$ — 1

$\tan^{-1}\left(\frac{4x-x^3}{2-3x^2}\right) = \tan^{-1}(3x)$ — 1

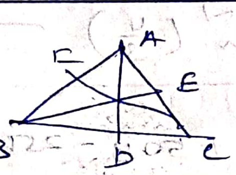
$x=0$ | $x = \pm\frac{1}{2}$ — 2

Total No. of solution is 3 — 1

45 b) $p = \frac{-x}{1-x^2}$ $q = \frac{1}{1-x^2}$ $I.F = \sqrt{1-x^2}$ — 2

G.S. $y\,(I.F) = \int Q.(I.F).\,dx + c$ — 1

$y = \frac{\sin^{-1}x}{\sqrt{1-x^2}} + c(1-x^2)^{-1/2}$ — 2

45 a) 

— 2 P.T — 3

46 a) Intersect point $(3/2, 9/4)$ — 1

$\frac{dy}{dx} = 2x$ $\frac{dy}{dx}_{(3/2, 9/2)} = 3 = m_1$ — 1

$\frac{dy}{dx} = 2(x-3)$ $\frac{dy}{dx}_{(3/2, 9/2)} = -3 = m_2$ — 1

$\theta = \tan^{-1}\left|\frac{3}{4}\right|$ — 2

b) Cartesian form $\begin{vmatrix} x-x_1 & y-y_1 & z-z_1 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = 0$ — 1

$9x-2y-5z=-4$ — 2

Parametric form

$\vec{r} = \hat{i}-\hat{j}+3\hat{k} + s(2\hat{i}-\hat{j}+4\hat{k}) + t(\hat{i}+2\hat{j}+\hat{k})$ — 2

44 b) $f_x = \frac{y}{x^2+y^2}$ $f_y = \frac{-x}{x^2+y^2}$ — 2

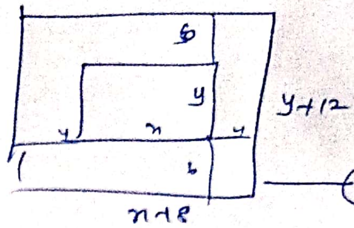
$f_{xy} = \frac{x^2-y^2}{(x^2+y^2)^2}$ $f_{yx} = \frac{x^2-y^2}{(x^2+y^2)^2}$ — 2

$f_{xy} = f_{yx}$ — Hp — 1

47 a) b) Credit work out following.

47 a) $xy = 384$

$y = \frac{384}{x}$



— 1

$A = (x+8)(y+12)$

$A' = 12 - 8\left(\frac{384}{x^2}\right)$ — 1

$A'(x) = 0$

$x = 16$ — 1

$A'(x) = \frac{8(384)(2)}{x^3}$

$A''(x) \geq 0$ minimum — 1

Length $l = 24$ breadth $b = 36$ — 1

b) Let $y = \tan\theta$ — 1

$I = \int_0^{\pi/4} \log(1+\tan\theta) \cdot d\theta$ — 1

$I = \int_0^{\pi/4} \log(2) - \log(1+\tan\theta)$ — 1

$I = \frac{\pi}{8} \log(2)$ — 2

A. DINESH BABU M.Sc B.Ed

PGT. IN MATHS.

VAIGAI MATRIC HR SEC SCHOOL

VALAPADY SALEM (D.T)

9688909818.