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RKR EDUCATIONAL INSTITUTIONS, UDUMALPET.

NESA MATHS - 9750351441

XII STANDARD. (MAR-2025)

MATHEMATICS KEY.

PART - A (* - creative)

S. NO	ANSWER & OPTION A-TYPE	ANSWER & OPTION B-TYPE	S. NO	ANSWER & OPTION A-TYPE	ANSWER & OPTION B-TYPE
1.	a) N	b) $\frac{1}{\sqrt{2}}$	11.	*b) $\pm\frac{1}{\sqrt{2}}(1+i)$	c) $\frac{\pi a^3}{6}$
2.	d) 2	a) π	12.	b) 1+i	*a) 1,2
3.	*d) $\frac{1}{5}$	d) 2×4	13.	d) 0.25	b) $\frac{\pi}{6}$
4.	d) 2.5	a) N	14.	c) $\frac{\pi}{2}$	a) 19
5.	*a) 1,2	*d) $\frac{1}{5}$	15.	a) (1,0)	b) 1+i
6.	a) 19	a) (1,0)	16.	b) $\frac{\pi}{6}$	c) $\frac{\pi}{2}$
7.	b) $y=x^3+2$	d) 2.5	17.	c) $\frac{\pi a^3}{6}$	*b) $\pm\frac{1}{\sqrt{2}}(1+i)$
8.	b) [1,2]	*b) $\int\frac{f'(x)}{f(x)}dx$	18.	b) $\frac{1}{\sqrt{2}}$	b) $y=x^3+2$
9.	d) 2×4	b) [1,2]	19.	a) π	d) 0.25
10.	b) 2	d) 2	20.	*b) $\int\frac{f'(x)}{f(x)}dx$	b) 2

PART - B

21. $|adj A| = 9$ ① m

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

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

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

$= \frac{x}{x^2+y^2}$ ① m

23. $y = \tan^{-1}(-\sqrt{3})$ ① m

$\tan y = -\sqrt{3}$

$y = -\frac{\pi}{3} \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ ① m

24. $y = 4x + c \Rightarrow m = 4$, $x^2+y^2 = 9 \Rightarrow a^2 = 9$ ① m

$c^2 = a^2(1+m^2)$

$c = \pm 3\sqrt{17}$ ① m

25.
$$\begin{array}{r|l} & x-11 \\ \hline x+5 & x^2-6x+7 \\ & x^2+5x \\ \hline & -11x+7 \\ & -11x-55 \\ \hline & 62 \end{array}$$
① m

① m Slant asymptote is $y = x - 11$

26. $F(\lambda x, \lambda y) = \frac{\lambda^2}{\lambda}(F(x,y))$

$= \lambda^1(F(x,y))$ ① m

Degree $\boxed{n=1}$ ① m

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

$\sin^{-1}y = \sin^{-1}x + c$ ① m

28. $f(x)$ is p.d.f then $\int_{-\infty}^{\infty} f(x)dx = 1$

$\int_1^4 cx^2 dx = 1$ ① m

$c\left(\frac{x^3}{3}\right)_1^4 = 1$

$c = \frac{1}{21}$ ① m

29.* Let $\alpha = -2+i$ & $\beta = -2-i$ ① m

$x^2 - x(\alpha+\beta) + \alpha\beta = 0$

$x^2+4x+5 = 0$ ① m

30.* If $f(2a-x) = f(x)$ then $\int_0^{2a} f(x)dx = 2\int_0^a f(x)dx$

$\sin(\pi - x) = \sin x$ ① m

$\int_0^{\pi} f(x)dx = 2\int_0^{\pi/2} f(x)dx$ ① m

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PART-C

31. $|A| = -1$ ①m

$\text{adj}A = \begin{bmatrix} 2 & -5 \\ 1 & -2 \end{bmatrix}$

$A^{-1} = \frac{1}{-1}\begin{bmatrix} 2 & -5 \\ 1 & -2 \end{bmatrix}$ ①m

$X = A^{-1}B$

$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -11 \\ 4 \end{bmatrix}$ ①m $\therefore x = -11, y = 4$

32. $|z_1| = 2$ $|z_2| = |6+8i| = 10$ ①m

$||z_1| - |z_2|| \le |z_1 + z_2| \le |z_1| + |z_2|$

$|2 - 10| \le |z + 6 + 8i| \le 2 + 10$ ①m

$8 \le |z + 6 + 8i| \le 12$ ①m

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

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

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

$= \tan^{-1}\frac{1}{2}$ ①m

33.
$$\begin{array}{r|rrrr} -1 & 7 & -43 & -43 & 7 \\ & 0 & -7 & 50 & -7 \\ \hline & 7 & -50 & 7 & \boxed{0} \end{array}$$
①m

$7x^2 - 50x + 7 = 0$

$x = 7, \frac{1}{7}$ ①m

$\therefore x = -1, 7, \frac{1}{7}$ ①m

35. $[\vec{a}+\vec{c}, \vec{a}+\vec{b}, \vec{a}+\vec{b}+\vec{c}]$

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

$= (1(1-0) - 0 + 1(1-1))[\vec{a}\ \vec{b}\ \vec{c}]$ ①m

$= [\vec{a}\ \vec{b}\ \vec{c}]$ ①m

36. $u = x^2y + 3xy^4$

$x = e^t, y = \sin t$

$u = e^{2t}\sin t + 3e^t\sin^4 t$ ①m

$\frac{du}{dt} = 2e^{2t}\sin t + e^{2t}\cos t$ ①m

$+ 3[e^t\, 4\sin^3 t\cos t + \sin^4 t\, e^t]$

$= 2e^{2t}\sin t + e^{2t}\cos t + 3e^t\sin^4 t$

$+ 12e^t\sin^3 t\cos t$ ①m

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

Let $t = \tan x \Rightarrow dt = \sec^2 x\,dx$ ①m

$I = \int_0^{\infty} \frac{dt}{6 + t^2} = \frac{\pi}{2\sqrt{6}}$ ①m

38. $E(X) = 200 \times \frac{1}{600} + \left(100 \times \frac{4}{600}\right)$

$+ 50 \times \left(\frac{6}{600}\right) + 0$

$= 1.5$ ②m

Loss $E(X) = -2 + 1.5$

$= -0.5$ ①m

39.* $f(x) = x^3 + 2x + 1$

$f(x) = f(a) + f'(a)(x-a)$

$+ \frac{f''(a)}{2!}(x-a)^2 + \cdots$ ①m

$x^2 + 2x + 1 = 13 + 14(x-2) + 6(x-2)^2$

$+ \cdots$ ②m

40.* $\frac{3}{2} * m = \frac{87}{10}$

$\frac{3}{2} + m - \left(\frac{3}{2} \times m\right) + 7 = \frac{87}{10}$ ①m

$-m = \frac{4}{10}$ ①m

$m = -\frac{2}{5}$ ①m

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PART-D

41. a)

$\Delta = 6$ ①m

$\Delta_1 = 12$ ①m

$\Delta_2 = -6$ ①m

$\Delta_3 = 24$ ①m

$x_1 = \frac{\Delta_1}{\Delta} = 2$

$y_1 = \frac{\Delta_2}{\Delta} = -1$

$z_1 = \frac{\Delta_3}{\Delta} = 4$

$x_1 = 2, y_1 = -1, z_1 = 4$ ①m

41. b)

$m = \frac{dy}{dx} = \frac{2\cos t}{-7\sin t}$ ①m

Tangent:- $y - y_1 = m(x - x_1)$ ①m*

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

$2x\cos t + 7y\sin t = 14$ ①m

Normal:- $y - y_1 = -\frac{1}{m}(x - x_1)$ ①m*

$7x\sin t - 2y\cos t = 45\sin t\cos t$ ①m

42. a)

$(z-1)^3 = -8$ ①m

$(z-1)^3 = (-2)^3(1)^3 = (-2)^3(1)$

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

$1 - z = 2(1)^{1/3}$ ②m

$1 - z = 2(1, \omega, \omega^2)$ ①m

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

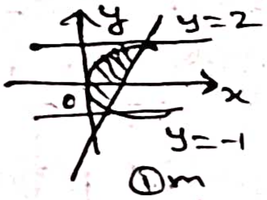
$z = -1, 1-2\omega, 1-2\omega^2$ ①m

42. b)

$y^2 = x, y = x - 2$

$\Rightarrow y = y^2 - 2$

$\Rightarrow y = 2, -1$ ①m



①m

$A = \int_{-1}^{2}(x_1 - x_2)\,dy$ ①m*

$= \int_{-1}^{2}(y + 2 - y^2)\,dy$ ①m

$= \frac{9}{2}$ ①m

43. a)

$\frac{1}{3}$	6	-5	-38	-5	6	
	0	2	-1	-13	-6	
	6	-3	-39	-18	0	
3	0	18	45	18		
-2	6	15	6	0		④m
	0	-12	-6			
$-\frac{1}{2}$	6	3	0			
	0	-3				
	6	0				①m

The roots are $3, \frac{1}{3}, -2, -\frac{1}{2}$

43. b)

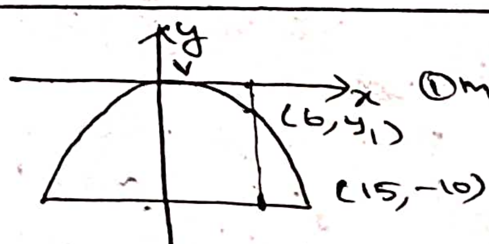
$\frac{dy}{dx} = \frac{3y}{2x} - \frac{x}{2y}$ ①m

put $y = vx$ & $\frac{dy}{dx} = v + x\frac{dv}{dx}$ ①m

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

$y^2 - x^2 = cx^3$ ①m

44. a)



①m

The parabola is opendownward.

$x^2 = -4ay$ ①m

$(x, y) = (15, -10)$

$4a = \frac{225}{10}$ ①m

$x^2 = -\frac{225}{10}y$

$(x, y) = (6, y_1) \Rightarrow y_1 = -1.6$ ①m

Height $= 10 - 1.6 = 8.4$ m ①m

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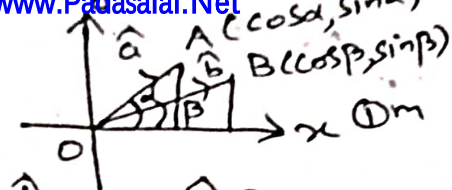
44. b)



$\hat{a} = \cos\alpha\,\hat{i} + \sin\alpha\,\hat{j}$ ①m

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

$\hat{a}\cdot\hat{b} = |\hat{a}||\hat{b}|\cos(\alpha-\beta) = \cos(\alpha-\beta)$ ①m

$\hat{a}\cdot\hat{b} = \cos\alpha\cos\beta + \sin\alpha\sin\beta$ ①m

$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$ ①m

45. b)*

$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ ①m*

$c(0,1)$

$2ae = 4 \Rightarrow ae = 2$

$\frac{2b^2}{a} = 6 \Rightarrow b^2 = 3a$ ①m

$b^2 = a^2(1-e^2) = a^2 - (ae)^2$ ①m

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

$a = 4 \mid a = -1$ (not possible).

$a^2 = 16$ & $b^2 = 12$ ①m

$\frac{(x-0)^2}{16} + \frac{(y-1)^2}{12} = 1$ ①m

45. a)*

$x \to$ ships arrive safely.

$p = \frac{8}{9},\ q = \frac{1}{9}$ ①m

(i) $n=6,\ x=3$

$P(X=x) = nC_x p^x q^{n-x}$

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

$= 6C_3\left(\frac{8^3}{9^6}\right)$ ②*

(ii) $n=4,\ x=0$

$P(X=x) = nC_x p^x q^{n-x}$

$P(X=0) = 4C_0\left(\frac{8}{9}\right)^0\left(\frac{1}{9}\right)^4$

$= \left(\frac{1}{9}\right)^4$ ②*

46. a)

$\vec{b} = 2\hat{i}+3\hat{j}+6\hat{k};\ \vec{c} = \hat{i}+\hat{j}-\hat{k}$

Point $(0,1,-5)$ ①m

$(\vec{r}-\vec{a})\cdot(\vec{b}\times\vec{c}) = 0$ ①m*

$\vec{a} = \hat{j} - 5\hat{k}$

$\vec{b}\times\vec{c} = -9\hat{i}+8\hat{j}-\hat{k}$ ①m

$\vec{r}\cdot(-9\hat{i}+8\hat{j}-\hat{k}) = 13$ ①m

$9x - 8y + z + 13 = 0$ ①m

47. a)

Diagram ①m

$V = \pi r^2 h = \pi r^2 (a-r)\left(\frac{b}{a}\right)$

$V = \frac{\pi b}{a}(ar^2 - r^3)$ ①m

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

$V' = 0 \Rightarrow r = \frac{2a}{3}$ ①m

$V'' = \frac{\pi b}{a}(2a - 6r)$ ①m

V'' at $r = \frac{2a}{3} < 0$, volume is maximum. ①m

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

46. b)

A – population at time 't'.

$\frac{dA}{dt} \propto A \Rightarrow \frac{dA}{dt} = kA$

$A = ce^{kt} \to ①$ ①m

(i) $t=0,\ A=A_0$

$c = A_0$ ①m, $A = A_0e^{kt}$ ①m

(ii) $t=50,\ A=2A_0$

$2A_0 = A_0e^{50k}$

$k = \frac{1}{50}\log 2$ ①m

(iii) $t=t_1,\ A=3A_0$

$t_1 = 50\left(\frac{\log 3}{\log 2}\right)$ ①m

47. b)

p	q	r	q∨r	p∧(q∨r)	p∧q	p∧r	(p∧q)∨(p∧r)
T	T	T	T	T	T	T	T
T	T	F	T	T	T	F	T
T	F	T	T	T	F	T	T
T	F	F	F	F	F	F	F
F	T	T	T	F	F	F	F
F	T	F	T	F	F	F	F
F	F	T	T	F	F	F	F
F	F	F	F	F	F	F	F

①m ①m ①m ①m

$\therefore p\wedge(q\vee r) \equiv (p\wedge q)\vee(p\wedge r)$ ①m

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