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PART – I

1. One mark to write the correct option and the corresponding answer.
2. If one of them (option or answer) is wrong, then award ZERO mark only.

20×1=20

CODE A			CODE B		
Q.No.	Option	Answer	Q.No	Option	Answer
1.	(b)	mn	1.	(a)	Parabola
2.	(a)	$-\pi + cot^{-1}x$	2.	(a)	$xcosx$
3.	(a)	$(3, \sqrt{5})$	3.	(d) (or) (b)	$P = Ce^{-kt}$ (or) $P = Ce^{kt}$
4.	(a)	Parabola	4.	(a)	$[\vec{\alpha}, \vec{\beta}, \vec{\gamma}] = 0$
5.	(d)(or) (b)	$P = Ce^{-kt}$ (or) $P = Ce^{kt}$	5.	(c)	$\neg(p \wedge q) \wedge [p \wedge (pV \neg r)]$
6.	(d)	(2,4,7)	6.	(a)	I_3
7.	(a)	$[\vec{\alpha}, \vec{\beta}, \vec{\gamma}] = 0$	7.	(a)	$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0, \forall (x,y) \epsilon A$
8.	(c)	$\frac{l}{2}, \frac{l^2}{12}$	8.	(a)	1
9.	(a)	1	9.	(a)	$(3, \sqrt{5})$
10.	(a)	$xcosx$	10.	(d)	1
11.	(d)	$\frac{1}{5}$	11.	(c)	16 and 24
12.	(c)	$\neg(p \wedge q) \wedge [p \wedge (pV \neg r)]$	12.	(d)	consistent
13.	(c)	2	13.	(a)	9
14.	(a)	I_3	14.	(b)	0
15.	(d)	consistent	15.	(d)	(2,4,7)
16.	(b)	0	16.	(c)	2
17.	(c)	16 and 24	17.	(d)	$\frac{1}{5}$
18.	(a)	$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0, \forall (x,y) \epsilon A$	18.	(b)	mn
19.	(a)	9	19.	(a)	$-\pi + cot^{-1}x$
20.	(d)	1	20.	(c)	$\frac{l}{2}, \frac{l^2}{12}$

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Important Note for Part-II, Part-III and Part-IV

In an answer to a question, between any two particular stages of marks (greater than one) if a student starts from a stage with correct step but reaches the next stage with a wrong result then suitable credits should be given the related steps instead of denying the entire marks meant for the stage.

PART – II

Answer any 7 Questions. Q.No.30 is compulsory 7×2=14

Q.No	Content	Marks
21.	Order = 2m+1, m = 0,1,2... $\|adjA\|=\|A\|^{2m}$ $\|adjA\|$ is positive	1 1
22.	$\sum_{n=1}^{12} i^n = 0$	2*
23.	$4(k+2)^2 = 4(9)k$ $k = 4$ or 1	1 1
24.	$sin^{-1}[sin10] = sin^{-1}[sin(3\pi - 10)]$ $= 3\pi - 10 \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$	1 1
25.	$x^2 + (y \pm 5)^2 = 25$ (or) any other form	2*
26.	$f'(x) = 2x - 2 > 0 \ \forall x \in (2, \infty)$ f(x) is strictly increasing in the interval $(2, \infty)$	1 1
27.	$f_y = -\frac{1}{\sqrt{1-\frac{x^2}{y^2}}}\left(-\frac{x}{y^2}\right)$ (or) any other form $f_y = \frac{x}{y\sqrt{y^2 - x^2}}$	1 1
28.	$\int_0^{\frac{\pi}{2}} sin^{10}x \, dx = \frac{9}{10} \times \frac{7}{8} \times \frac{5}{6} \times \frac{3}{4} \times \frac{1}{2} \times \frac{\pi}{2}$	2*
29.	Order = 2 Degree = 2	1 1
30.	$Var(2X + 3) = 1$	2*

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PART – III

Answer any 7 Questions. Q.No.40 is compulsory 7×3=21

Q.No	Content	Marks
31.	$A \sim \begin{pmatrix} 2 & -2 & 4 & 3 \\ 0 & 2 & 8 & 7 \\ 0 & 0 & -45 & -30 \end{pmatrix}$	2*
	$\rho(A) = 3$	1
32.	$y^2 - 12y + 32 = 0$	2*
	x = 3,2	1
33.	$2tan^{-1}\frac{1}{2} = tan^{-1}\frac{4}{3}$	2*
	$2tan^{-1}\frac{1}{2} + tan^{-1}\frac{1}{7} = tan^{-1}\frac{31}{17}$	1
34.	Cartesian equation $\frac{x-6}{2} = \frac{y-7}{-3} = \frac{z-4}{5}$ (or) $\frac{x-8}{2} = \frac{y-4}{-3} = \frac{z-9}{5}$	1
	Intersecting points are	1
	$\left(\frac{32}{3}, 0, \frac{47}{3}\right)$	1
	$(0,16,-11)$	1
35.	$\left(\frac{1-cosm\theta}{1-cosn\theta}\right) = \frac{m^2}{n^2}$	2*
	$m = \pm n$	1
36.	$f'(x) = \frac{1}{4}x^{\frac{-3}{4}}$	1
	$\sqrt[4]{15} = 1.969$	2*
37.	$n = 5$	2*
	$\int_0^\infty e^{-x}x^{n-1}dx = 4!$	1
38.	$P(X = x) = \binom{6}{x}\left(\frac{1}{3}\right)^x\left(\frac{2}{3}\right)^{6-x}, x = 0,1,\ldots,6$	1
	Mean=2	1
	Standard deviation=$\frac{2}{\sqrt{3}}$	1
39.	(i) $m * n = m + n - mn$; $m, n \epsilon z$,	1
	$*$ holds Closure property	1
	(ii) $m * (n * p) = (m * n) * p$,associative property is true	1
	(iii) Identity element is 0	
40.	$z_1 = 1 - i, z_2 = 1 + i$	1
	$\left(\frac{z_1}{z_2}\right)^{2026} = -1$	1
	The inverse of $\left(\frac{z_1}{z_2}\right)^{2026} = -1$	1

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PART – IV

Answer all the Questions 7×5=35

Q.No	Content	Marks
41 (a)	$AX = B$ $\lvert A\rvert = 40$ $X = \frac{1}{40}\begin{pmatrix} 5 & 3 & 9 \\ 5 & -13 & 1 \\ 5 & 11 & -7 \end{pmatrix}\begin{pmatrix} 5 \\ -4 \\ 3 \end{pmatrix}$ $x_1 = 1, x_2 = 2, x_3 = -1$ **(OR)**	1 1 2* 1
41 (b)	$\lvert z\rvert^3 = \lvert -2\bar{z}\rvert$ (or) $\lvert z\rvert(\lvert z\rvert^2 - 2) = 0$ $\lvert z\rvert = 0$ $z^4 + 4 = 0$ The equation has 5 solutions	1 1 1 2
42 (a)		4

p	q	r	¬q	$(\neg q \vee r)$	$p \rightarrow (\neg q \vee r)$	$\neg p$	$\neg p \vee (\neg q \vee r)$
T	T	T	F	T	T	F	T
T	T	F	F	F	F	F	F
T	F	T	T	T	T	F	T
T	F	F	T	T	T	F	T
F	T	T	F	T	T	T	T
F	T	F	F	F	T	T	T
F	F	T	T	T	T	T	T
F	F	F	T	T	T	T	T

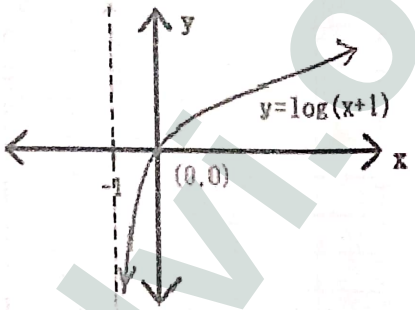
$p \rightarrow (\neg q \vee r) \equiv \neg p \vee (\neg q \vee r)$ — 1

Note: i) The order of rows and columns need not be same as in the scheme
ii) If any mistake in the table then award two marks for the table

(OR)

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42 (b)	$I = \int_0^{\frac{\pi}{4}} log\,(1 + tanx)\,dx$	1
	$I = \int_0^{\frac{\pi}{4}} log\left(1 + tan\left(\frac{\pi}{4} - x\right)\right) dx$	1
	$= \int_0^{\frac{\pi}{4}} log\left[\frac{2}{1 + tanx}\right] dx$	1
	$\int_0^{\frac{\pi}{4}} log\,(1 + tanx)\,dx = \frac{\pi}{8} log2$	2
43 (a)	$(x^2 - x - 2)(x^2 - x - 12) + 21 = 0$	1
	$(y - 5)(y - 9) = 0$	2*
	$x = \frac{1 \pm \sqrt{21}}{2}$	1
	$x = \frac{1 \pm \sqrt{37}}{2}$	1
	(OR)	
43 (b)		1
	i. Domain : $(-1, \infty)$ ii. Range : $(-\infty, \infty)$ iii. It passes through (0,0) iv. It has no symmetry v. x= -1 is vertical asymptotes vi. It is increasing on x>-1 vii. It has no local extremum **(Any Four valid points)**	4
44 (a)	$a^2 = 12\,,b^2 = 4$	1
	$m = 1, c = 4$	1
	$c^2 = a^2m^2 + b^2 = 16$	1
	Line is a tangent to the ellipse	1
	$The\ point\ of\ contact = (-3,1)$	1
	(OR)	

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44 (b)	$A = ce^{-kt}$ (or) $A = ce^{kt}$ $C = A_0$ $e^{100k} = \frac{9}{10}$ $A = A_0\left(\frac{9}{10}\right)^{10}$ (or) $\frac{9^{10}}{10^8}$	2* 1 1 1
45 (a)	Rough Diagram $\hat{a} = cos\alpha\hat{\imath} - sin\alpha\hat{\jmath}, \hat{b} = cos\beta\hat{\imath} + sin\beta\hat{\jmath}$ $\hat{a}.\hat{b} = cos(\alpha + \beta)$ $\hat{a}.\hat{b} = cos\alpha\, cos\beta - sin\alpha\, sin\beta$ $cos(\alpha + \beta) = cos\alpha\, cos\beta - sin\alpha\, sin\beta$ **(OR)**	1 1 1 1 1
45 (b)	$\frac{dx}{dy} = \frac{x^2 + y^2}{xy}$ $x = vy$ $\frac{v^2}{2} = logy + logc$ (or) $yc = e^{\frac{1}{2}\left(\frac{x^2}{y^2}\right)}$ $x_0 = \pm\sqrt{3}e$ **Note: One can do by different methods**	1 1 2* 1
46 (a)	$k = \frac{1}{30}$ (i) $P(2 < X < 6) = \frac{17}{30}$ (ii) $P(2 \le X < 5) = \frac{13}{30}$ (iii) $P(X \le 4) = \frac{14}{30}$ (iv) $P(3 < X) = \frac{21}{30}$ **(OR)**	1 1 1 1 1
46 (b)	Rough diagram $(x - 0.5)^2 = -4a(y - 4)$ $4a = \frac{0.25}{4}$ y=3 (or) the required height= $3m$ (or) any other method	1 2* 1 1

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47 (a)	$v(t) = 6t^2 - 18t + 12$ $a(t) = 12t - 18$ (i) $t = 1, 2$ sec (ii) The total distance= 34 m (iii) $a(1) = -6\ m/s^2, a(2) = 6\ m/s^2$ **(OR)**	1 1 1 1 1
47 (b)	$\vec{a} = \hat{\imath} - 2\hat{\jmath} + 4\hat{k}, \vec{b} = \hat{\imath} + 2\hat{\jmath} - 3\hat{k}, \vec{c} = 3\hat{\imath} - \hat{\jmath} + \hat{k}$ The non-parametric vector equation is $\vec{r}.(\hat{\imath} + 10\hat{\jmath} + 7\hat{k}) - 9 = 0$ Cartesian equation is $x + 10y + 7z - 9 = 0$	1 2* 2*

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