



SNS COLLEGE OF TECHNOLOGY
(An Autonomous Institution, Affiliated to Anna University)
Coimbatore - 641 035.



Internal Assessment- II
Academic Year 2023-2024 (Odd)
First Semester
23MAT101-Matrices and Calculus
(REGULATION 2023)
(Common to All Branches)

A

Time: 1.30 Hours

Maximum Marks: 50

Reg.No:

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PART - A (5 x 2 = 10 MARKS)		CO	BLOOMS
ANSWER ALL QUESTIONS			
1.	Discover the matrix of the quadratic form $2x^2 + 8z^2 + 4xy - 10xz - 2yz = 0$	CO2	(Rem)
2.	Find Rank, index and signature of $y_1^2 + 3y_2^2 + 4y_3^2$	CO2	(Rem)
3.	Develop the Curvature of the curve $x^2 + y^2 = 25$	CO3	(Rem)
4.	Define Evolute and Involute of the curve	CO3	(Rem)
5.	Interpret the envelope of $y = mx + \frac{a}{m}$, where m is the parameter	CO3	(Und)
PART - B (13+13+14= 40 MARKS)			
ANSWER ALL QUESTIONS			
6.	a) Reduce the quadratic form $8x^2 + 7y^2 + 3z^2 - 12xy - 8yz + 4zx$ to canonical form through orthogonal transformation and hence show that it is positive semi definite. Give also a non-zero set of values (x_1, x_2, x_3) which makes this Quadratic form zero.	CO2	(Ana) (13)
	(or)		
	b) Determine the evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	CO3	(Ana) (13)
7.	a) Find the radius of curvature of the curve $x^3 + y^3 = 3axy$ at the point $(\frac{3a}{2}, \frac{3a}{2})$	CO3	(App) (13)
	(or)		
	b)i) Determine the evolute of the parabola $y^2 = 4ax$	CO3	(Ana) (7)
	ii) Interpret the envelope of $\frac{x}{a} + \frac{y}{b} = 1$ subject to the condition $ab = c^2$	CO3	(App) (6)

8.	a) An elastic membrane in the x_1, x_2 plane with boundary circle $x_1^2 + x_2^2 = 1$ is stretched so that a point P (x_1, x_2) goes over into the point Q (y_1, y_2) given by $Y = \begin{bmatrix} y_1 \\ y_2 \end{bmatrix}$ Given $A = \begin{bmatrix} 3 & 1.5 \\ 1.5 & 3 \end{bmatrix}$ in a deformation $Y = AX$, List the Principal directions and corresponding factors of extension or contraction.	CO2	(App) (14)
	(or)		
	b) Construct the circle of curvature at the point $(\frac{1}{4}, \frac{1}{4})$ on the curve $\sqrt{x} + \sqrt{y} = 1$	CO3	(App) (14)

Rem/Und:Remember/Understand App:Apply Ana:Analyze Eva:Evaluate Cre:Create

Prepared by

Teaching Coordinator

Dean(S&H)