

Hall Ticket Number:

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Code No. : 14712 N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. IV-Semester Main & Backlog Examinations, July/August-2023

Matrix theory and Vector Calculus

(Common to Civil & Mech.)

Time: 3 hours

Max. Marks: 50

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Define total derivative of $f(x, y)$.	2	1	1	1,12
2.	Evaluate $\int \tan^{-1}(x) dx$.	2	1	1	1,12
3.	Find Gradient of $x^3y + y^3z + z^3x$ at (1,2,3).	2	1	2	1,12
4.	Find the curl of $\vec{F} = (y + z)\vec{i} + (z + x)\vec{j} + (x + y)\vec{k}$.	2	1	2	1,12
5.	State Stoke's theorem.	2	1	3	1,12
6.	Evaluate $\int_1^2 \int_1^2 \frac{1}{xy} dydx$.	2	2	3	1,12
7.	Define row echelon form of a matrix.	2	1	4	1,12
8.	If -2, -4, 3 are two Eigen values of A then find Trace(A) and det(A).	2	2	4	1,12
9.	If $z = \log xy$ then find $\frac{\partial^2 z}{\partial y \partial x}$.	2	1	1	1,12
10.	Write the physical meaning of divergence.	2	1	2	1,12
Part-B (5 × 6 = 30 Marks)					
11.	If $V = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, then find $x \frac{\partial V}{\partial x} + y \frac{\partial V}{\partial y} + z \frac{\partial V}{\partial z}$.	6	3	1	1,12
12. a)	Find the unit normal vector to the surface $x^3 + y^3 + 3xyz$ at (1,1,1).	3	2	2	1,12
b)	Show that the vector $\vec{F} = (x^2 - yz)\vec{i} + (y^2 - xz)\vec{j} + (z^2 - xy)\vec{k}$ is Irrotational vector.	3	2	2	1,12
13.	Evaluate $\oint_c (x^2 - xy^3)dx + (y^2 - 2xy)dy$ by Green's theorem. Where c is the boundary of the square formed by (0, 0), (2, 0), (2, 2) and (0, 2).	6	3	3	1,12
14.	Find Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$.	6	3	4	1,12

Contd... 2

15. a)	By using implicit differentiation Find $\frac{dy}{dx}$ given that $x^3 + y^3 + 3xy - 1 = 0$	3	2	1	1,12
b)	Find the maximum value of directional derivative of x^2yz at $(1,4,1)$.	3	2	2	1,12
16. a)	Evaluate the line integral $\int_c (x^2 - 2xy)dx + (x^2y + 3)dy$ Where c is $y = x^2$ from $(0,0)$ to $(1,1)$	3	3	3	1,12
b)	Solve the following system of equations. $x + 2y + z = 8, 2x + 2y + 2z = 13, 3x + 4y - z = 2.$	3	2	4	1,12
17.	Answer any <i>two</i> of the following:				
a)	Evaluate $\int \frac{1}{1+e^x} dx$	3	2	1	1,12
b)	Find the Directional derivative of $\phi = x^2 - y^2 + 2z^2$ at $(1,2,3)$ in the direction of the vector $4\bar{i} - 2\bar{j} + \bar{k}$.	3	2	2	1,12
c)	Evaluate $\int_0^a \int_{x^2}^x \sqrt{\frac{x}{y}} dy dx.$	3	3	3	1,12

M : Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	24.61%
ii)	Blooms Taxonomy Level - 2	38.46%
iii)	Blooms Taxonomy Level - 3 & 4	36.93%
