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Code No. : 13743 S OE

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. III-Semester Bridge Course Supplementary Examinations, August - 2022

Matrix Theory & Vector Calculus

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.	If $z = \sin xy$ then find total derivative of z .	2	2	1	1,12
2.	Evaluate $\int x \cdot \log x \, dx$	2	2	1	1,12
3.	Define Curl of a vector point function.	2	1	2	1,12
4.	Find the divergence of $\vec{F} = (y+z)\vec{i} + (z+x)\vec{j} + (x+y)\vec{k}$	2	2	2	1,12
5.	State Stoke's theorem for a surface.	2	1	3	1,12
6.	Evaluate $\int_0^1 \int_0^2 1 \, dy \, dx$	2	2	3	1,12
7.	Define Rank of a Matrix.	2	1	4	1,12
8.	Write any two properties of Eigen values.	2	1	4	1,12
9.	If $x^y = y^x$ then find $\frac{dy}{dx}$.	2	2	1	1,12
10.	Define scalar point & vector point function.	2	1	2	1,12
Part-B (5×6 = 30 Marks)					
11.	If $U = f(x^2 - y^2, y^2 - z^2, z^2 - x^2)$, then Prove that $\frac{1}{x} \frac{\partial U}{\partial x} + \frac{1}{y} \frac{\partial U}{\partial y} + \frac{1}{z} \frac{\partial U}{\partial z} = 0$	6	3	1	1,12
12. a)	Find the Directional derivative of $\phi = 6x^2y + 24y^2z - 8z^2x$ at $(1,1,1)$ in the direction of the vector $2\vec{i} - 2\vec{j} + \vec{k}$.	3	3	2	1,12
b)	If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ and $r = \vec{r} $, prove that $\nabla(\log r) = \frac{\vec{r}}{r^2}$	3	1	2	1,12
13.	Find the work done $\int_C \vec{F} \cdot d\vec{r}$ in moving particle in the force field $\vec{F} = 3x^2\vec{i} + (2xz - y)\vec{j} + z\vec{k}$ along the curve $x^2 = 4y$ & $3x^3 = 8z$ from $x = 0$, to $x = 2$.	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)	If $Z = x^3 + y^3 + 3xy$ then show that $\frac{\partial^2 Z}{\partial x \partial y} = \frac{\partial^2 Z}{\partial y \partial x}$	3	2	1	1,12
b)	Find the angle between the surfaces $x^2 + y^2 + z^2 - xy = 1$ and $x^2y + y^2z + z = 1$ at the point $(1, 1, 0)$.	3	3	2	1,12
16. a)	Evaluate by Green's theorem $\int_c (x^2 - 2xy)dx + (x^2y + 3)dy$ Where c is boundary by $y = x^2$ and $y = x$.	3	3	3	1,12
b)	Solve the system $2x - 3y - z = 3, x + 2y - z = 4, 5x - 4y - 3z = -2$.	3	2	4	1,12
17.	Answer any <i>two</i> of the following:				
a)	Evaluate $\int e^{\cos x} \sin 2x dx$	3	2	1	1,12
b)	What is the greatest rate of change of $f = xyz^2$ at the point $(1, 0, 3)$.	3	2	2	1,12
c)	Evaluate $\int_0^a \int_0^x e^{x+y} dy dx$	3	2	3	1,12

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

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	38.46%
iii)	Blooms Taxonomy Level - 3 & 4	41.54%

Third Sem All