R18 Regulation *Subject code:* 3B1AF

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech I Year I Semester Regular Examinations, July 2021

LINEAR ALGEBRA & APPLIED CALCULUS

(Common to EEE and ME)

Maximum Marks: 70 Date:12.07.2021 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks **(10x2M=20 Marks)**

1 Reduce the following Matrix to row echelon form and find the rank :

$$A = \begin{bmatrix} 1 & 3 & 5 \\ 2 & -1 & 4 \\ -2 & 8 & 2 \end{bmatrix}$$

2 Show that A is an involutary matrix where $A = \begin{bmatrix} 0 & 1 & -1 \\ 4 & -3 & 4 \\ 3 & -3 & 4 \end{bmatrix}$

3 If λ be an Eigen value of a Non-Singular matrix A ,then show that λ^{-1} is an Eigen value of A^{-1}

4 State the Cayley – Hamilton Theorem.

5 Evaluate $\int_1^2 \int_1^3 x\, y^2 \, dx\, dy$

6 Evaluate $\int_0^{\pi} \int_0^{asin\theta} r \, dr\, d\theta$

7 State Cauchy's mean value theorem.

8 Evaluate $\int_0^{\frac{\pi}{2}} sin^3x \; cos^{\frac{5}{2}}x \; dx$

9 If $u = \log\frac{x^4+y^4}{x+y}$, *Show that* $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 3$

10 *If* $u = x^2 - y^2$, $v = 2xy$ *then find* $\frac{\partial(u,v)}{\partial(x,y)}$

Part-B

Answer All the following questions. **(5X10M=50Marks)**

11 Using the Gauss – Jordan Method , find the inverse of the Matrix. (10M)

$$\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$$

OR

12 Solve the following system of equations using Gauss –elimination Method (10M)

$$x + 2y - 2z = 1$$
$$2x - 3y + z = 0$$
$$5x + y - 5z = 1$$
$$3x + 14y - 12z = 5$$

13 Reduce the matrix $A = \begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$ to the diagonal form. (10M)

OR

14 Reduce $3x^2 + 3z^2 + 4xy + 8xz + 8yz$ into canonical form. (10M)

15 Evaluate $\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dy\, dx$ by changing the order of integration. (10M)

OR

16 Find, by double integration, the area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (10M)

17 Verify Rolle's mean value theorem for the function $f(x) = log\frac{x^2+ab}{x(a+b)}$ in[a,b];a>0,b>0. (10M)

OR

18 Prove that $\int_0^1 \frac{x\,dx}{\sqrt{1-x^5}} = \frac{1}{5}\beta\left(\frac{2}{5}, \frac{1}{2}\right)$ (10M)

19 If $u = xy + yz + zx$, $v = x^2 + y^2 + z^2$, w = $x + y + z$ then show that the functions are functionally dependent and hence find the relation between them. (10M)

OR

20 Given $x + y + z = a$ find the maximum value of $x^m y^n z^p$ (10M)