R20 Regulation *Subject code: 3B1AF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Semester Supplementary Examinations, June 2024

LINEAR ALGEBRA & APPLIED CALCULUS

(Common to EEE and ME)

Maximum Marks: 70 Date:25.06.2024 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)		CO	Bloom Tx
1	Define orthogonal matrix.	1	L1
2	Define symmetric matrix.	1	L1
3	If 'λ' is an Eigen value of the matrix A then 'λ' is also an Eigen value of A^T.	2	L1
4	Determine the nature, index, and signature of the quadratic form $x^2 - 6xy + y^2$.	2	L1
5	Find the value of the integral $\int_0^\infty \int_0^\infty e^{-x^2(1+y^2)} x \, dx \, dy$.	3	L1
6	Evaluate $\int_0^2 \int_0^x y \, dy \, dx$.	3	L1
7	Show that $\beta(m,n) = \beta(n,m)$.	4	L1
8	Find $\Gamma-\frac{7}{2}$.	4	L1
9	If u=e^x, find $\frac{\partial^2 u}{\partial y \partial x}$.	5	L1
10	If u = log($x^3 + y^3 + z^3 - 3xyz$) then find $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$.	5	L1

Part-B

Answer All the following questions. (10M X 5=50Marks)			
11	Find the rank of the matrix by reducing to Normal form where $A=\begin{bmatrix} 2 & 3 & 1 & 4 \\ 5 & 2 & 3 & 0 \\ 9 & 8 & 0 & 8 \end{bmatrix}$. [10]	1	L2
	OR		
12	Show that the only real number λ for which the system $x+2y+3z=\lambda x$; $3x+y+2z=\lambda y$; $2x+3y+z=\lambda z$ has non-zero solution is 6 and solve them when $\lambda=6$. [10]	1	L2
13	Determine the Eigen values of A^{-1} where $A=\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ [10]	2	L2

	OR		
14	Determine the Eigen values and Eigen vectors of the following matrices $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$ [10]	2	L2
15	By changing the order of integration, evaluate $\int_0^1 \int_1^{2-x} xydxdy$. [10]	3	L2
	OR		
16	Change the order of integration and evaluate $\int_o^a \int_{x^2/4a}^{2\sqrt{ax}} xy\, dy\, dx$. [10]	3	L2
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. [10]	4	L2
	OR		
18	S.T $\beta(m,n)=\frac{\Gamma m\Gamma n}{\Gamma m+n}$; where m>0;n>0. [10]	4	L2
19	If $x = e^r sec\theta$, $y = e^r tan\theta$ then prove that $JJ^I = 1$ [10]	5	L2
	OR		
20	If u = $\frac{x^2+y^2}{\sqrt{x+y}}$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{3}{2}u$. [10]	5	L2