R20 Regulation *Subject code:3B1AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Semester Supplementary Examinations, January 2025

LINEAR ALGEBRA, CALCULUS & PARTIAL DIFFERENTIAL EUATIONS

(CE)

Maximum Marks: 70 Date: **22.01.2025** 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	BTx
1	Show that the system of linear equations 4x + 2y = 7, 2x + y = 6 has no solution	1	L1
2	For which value of 'λ' the rank of the matrix $A = \begin{bmatrix} 1 & 5 & 4 \\ 0 & 3 & 2 \\ \lambda & 13 & 10 \end{bmatrix}$ is 2.	1	L1
3	Define index, signature of a quadratic form	2	L1
4	If '2' is an Eigen value of the matrix $A = \begin{bmatrix} 2 & -2 & 2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$, find the other two Eigen values	2	L1
5	Find $\Gamma\left(-\frac{7}{2}\right)$	3	L1
6	Find c using Cauchy's mean value theorem for the function f(x)=e^x(sinx-cosx);$[\frac{\pi}{4},\frac{5\pi}{4}]$	3	L1
7	Write the sufficient condition's for the existence of maxima & minima of f(x,y)	4	L1
8	Find the degree of the homogeneous functions $Z = \frac{\sqrt{x}+\sqrt{y}}{x+y}$.	4	L1
9	Form the PDE from z = ax + by	5	L1
10	Form the PDE by eliminating the arbitrary functions from z = f (x^2+y^2)	5	L1

Part-B

Answer All the following questions.	(5X10M=50Marks)		
11	Find the rank of the matrix by reducing to Echelon form where $A = \begin{bmatrix} 1 & 2 & -1 & 4 \\ 2 & 4 & 3 & 5 \\ -1 & -2 & 6 & 7 \end{bmatrix}$ [10M]	1	L2
	OR		
12	Solve 2x – y + 3z =0; 3x + 2y + z = 0 ; x – 4y + 5z =0 [10M]	1	L2

13	Determine the Eigen values and Eigen vectors of the following matrices ; [10M] $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$	2	L2
	OR		
14	Reduce the quadratic form to canonical form. [10M] $3x^2 - 3y^2 - 5z^2 - 2xy - 6yz - 6xz$	2	L2
15	Find c of Cauchy's mean value theorem for $f(x) = \sqrt{x}$ and $g(x) = \frac{1}{\sqrt{x}}$ in [a,b] $0<a<b$ [10M]	3	L2
	OR		
16	S.T $\beta(m,n)=\frac{\Gamma m \Gamma n}{\Gamma m+n}$; where m>0;n>0 [10M]	3	L2
17	Find the extreme values of $f(x,y) = sinx + siny + .\sin(x+y)$. [10M]	4	L2
	OR		
18	Find the extreme values $u(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$ [10M]	4	L2
19	Solve (y-z) p + (x-y)q = z-x [10M]	5	L2
	OR		
20	Form the PDE by eliminating the arbitrary constants from [10M] $z = a\log\left[\frac{b(y-1)}{1-x}\right]$	5	L2