



R20 Regulation

Subject code: 3B1AJ

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Semester Supplementary Examinations, January 2024

LINEAR ALGEBRA CALCULUS & ORDINARY DIFFERENTIAL EQUATIONS (ECE)

Maximum Marks: 70

Date: 18.01.2024

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	Find the rank of the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$	CO1	L2
2	Define symmetric matrix.	CO1	L1
3	If ' λ ' is an Eigen value of the matrix A then ' λ ' is also an Eigen value of A^T	CO2	L2
4	Determine the nature, index, and signature of the quadratic form $x^2 - 6xy + y^2$	CO2	L2
5	Find I. F. of $2xydy - (x^2 + y^2 + 1)dx = 0$	CO3	L1
6	State Newton's law of cooling	CO3	L1
7	Write the working rule of Method of Variation of Parameters?	CO4	L1
8	Find General solution of $(D^2 + 2D^2 + D)y = 0$	CO4	L2
9	Evaluate $\int_0^{\pi/2} \int_0^{\pi/2} \sin(x + y) dx dy$.	CO5	L5
10	Evaluate $\int_0^2 \int_0^x y dy dx$	CO5	L5

Part-B

Answer All the following questions. (5X10M=50Marks)			
11	Find the rank of the matrix by reducing to Normal form where $A = \begin{bmatrix} 2 & 3 & 1 & 4 \\ 5 & 2 & 3 & 0 \\ 9 & 8 & 0 & 8 \end{bmatrix}$ [10M]	CO1	L3
OR			
12	Investigate for what values of k the equations $x + y + z = 1$; $2x + y + 4z = k$; $4x + y + 10z = k^2$ have infinite number of solutions. [10M]	CO1	L4

13	Determine the Eigen values and Eigen vectors of the following matrices. $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ [10M]	CO2	L3
	OR		
14	Reduce the following quadratic form to canonical form by orthogonal transformation $3x^2 + 5y^2 + 3z^2 - 2xy - 2yz + 2xz$ [10M]	CO2	L3
15	A Bacterial culture, growing exponentially, increases from 100 to 400 grams in 10 hours. How much was present after 3 hours. [10M]	CO3	L3
	OR		
16	Find orthogonal trajectories of the family of circles $x^2 + y^2 + 2gx + c = 0$ [10M]	CO3	L4
17	Solve $(D^3 - 6D^2 + 11D - 6)y = e^{-2x} + e^{-3x}$ [10M]	CO4	L3
	OR		
18	Solve $(D^2 + 2D - 3)y = x^2 e^{-3x}$ [10M]	CO4	L3
19	By change the order of integration, evaluate $\int_0^3 \int_1^{\sqrt{4-y}} (x+y) dx dy$ [10M]	CO5	L6
	OR		
20	Evaluate $\iint (x^2 + y^2) dx dy$ in the positive quadrant for which $x+y \leq 1$ [10M]	CO5	L6