



R22 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code: 4B1AA

B.Tech I Semester Supplementary Examinations, September 2023

LINEAR ALGEBRA & ORDINARY DIFFERENTIAL EQUATIONS
(Common to CE,EEE,ECE,CSE,CSE(AIML),CSE(DS) and IT)

Maximum Marks: 60

Date:29.09.2023 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 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

(10x1M=10 Marks)

- 1.a Find the rank of the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$
- b Define symmetric matrix.
- c Define index of a quadratic form
- d If '2' is an Eigen value of the matrix $A = \begin{bmatrix} 2 & -2 & 2 \\ 0 & 1 & 1 \\ 0 & 0 & -1 \end{bmatrix}$, find the other two Eigen values.
- e Find $\frac{\partial M}{\partial y}, \frac{\partial N}{\partial x}$ of $2xydy - (x^2 + y^2 + 1)dx = 0$
- f Write the standard form of linear differential equation?
- g Solve $(D^2 - 2D + 4)y = 0$
- h Find P.I of $(D^2 + 6D + 9)y = 2e^{3x}$
- i Find the value of the integral $\int_0^1 \int_0^1 dx dy$
- j Evaluate $\int_0^1 \int_0^2 x + y dx dy$

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 2 Find the rank of the matrix by reducing to Echelon form were

$$A = \begin{bmatrix} 1 & 2 & -1 & 4 \\ 2 & 4 & 3 & 5 \\ -1 & -2 & 6 & 7 \end{bmatrix}$$

(10M)

OR

- 3 Solve $2x - y + 3z = 0$; $3x + 2y + z = 0$; $x - 4y + 5z = 0$

(10M)

- 4 Verify Cayley - Hamilton theorem for $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$

(10M)

OR

- 5 Determine the Eigen values of A^{-1} where $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$

(10M)

- 6 Solve $y(1 + xy)dx + x(1 - xy)dy = 0$

(10M)

OR

- 7 Solve $\frac{dy}{dx} - \frac{\tan y}{1+x} = (1+x)e^x \sec y$

(10M)

- 8 Solve by the method of variation of parameters $(D^2 + a^2)y = \tan ax$

(10M)

OR

- 9 Solve $(D^3 + 2D^2 + D)y = e^{2x} + x^2 + x + \sin 2x$

(10M)

- 10 Evaluate $\iint_R y \, dx \, dy$ when R is the region bounded by y-axis, the curve $y = x^2$ and the line $x + y = 2$ in the first quadrant.

(10M)

OR

- 11 Evaluate $\iint (x^2 + y^2) \, dx \, dy$ in the positive quadrant for which $x + y \leq 1$.

(10M)