R20 Regulation *Subject code:3B1AJ*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Semester Supplementary Examinations, September 2023

LINEAR ALGEBRA CALCULUS & ORDINARY DIFFERENTIAL EQUATIONS

(ECE)

Maximum Marks: 70 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 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 Show that the system of linear equations $4x + 2y = 7$, $2x + y = 6$ has no solution

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.

3 Define index, signature of a quadratic form.

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

5 check whether the D.E. is exact or not $(y^2 - x^2)dx + 2xydy = 0$

6 Find the orthogonal trajectory of $x^2 + cy^2 = 1$ passing through the points (2, 1)

7 Solve $(D^3+3D^2+3D+1)y = 0$

8 Write the working rule of Method of Variation of Parameters.

9 Change the order of integral $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y}\, dydx$

10 Find the limits of the integration where the region bounded by the x-axis, ordinate at $x = 2a$ and the parabola $x^2 = 4ay$.

Part-B

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

11 Find the rank of the matrix by reducing to Echelon form where: [10]

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

OR

12 Solve $2x - y + 3z = 0$; $3x + 2y + z = 0$; $x - 4y + 5z = 0$ [10]

13 Verify Cayley – Hamilton theorem for $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ [10]

OR

14 Determine the Eigen values of A^{-1} where $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ [10]

15 Solve $y(1 + xy)dx + x(1 - xy)dy = 0$ [10]

OR

16 A Bacterial culture, growing exponentially, increases from 100 to 400 grams in 10 hours. How much was present after 3 hours. [10]

17 Solve by the method of variation of parameters $(D^2 + a^2)y = tanax$ [10]

OR

18 $Solve(D^2 - 4D + 3)y = sin3xcos2x$ [10]

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

OR

20 Find the area of the region bounded by $y^2 = 4ax$ and $x^2 = 4ay$ [10]