



R20 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code: 3B1AJ

B.Tech I Semester Regular/Supplementary Examinations, April 2022

LINEAR ALGEBRA, CALCULUS & ORDINARY DIFFERENTIAL EQUATIONS (ECE)

Maximum Marks: 70

Date: 30.04.2022 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 Define Diagonal matrix.
- 2 Define Symmetrix matrix.
- 3 Find the characteristic equation of the matrix $\begin{pmatrix} 1 & 2 \\ 0 & 2 \end{pmatrix}$
- 4 State Cayley Hamilton Theorem
- 5 Define orthogonal trajectory.
- 6 Find the orthogonal trajectories of family of curves $y = ax^2$, 'a' being a parameter.
- 7 Solve the equation $y'' - 6y' + 13y = 0$.
- 8 Write down the Wronskian formula.
- 9 Evaluate $\int_0^1 \int_0^2 y^2 x \, dy \, dx$.
- 10 Find the area bounded by the circle $r = 2 \sin \theta$ and $r = 4 \sin \theta$.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Solve the system of equations
 $10x - 2y + 3z = 23$, $2x + 10y - 5z = -33$, $3x - 4y + 10z = 41$ by Gauss elimination method. [10]

OR

- 12 Find the inverse of the matrix $\begin{pmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{pmatrix}$ by Gauss-Jordan method. [10]

- 13 Obtain the diagonal matrix $D = N^T(AN)$ from the matrix $A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$ using orthogonal transformation. [10]

OR

14 Find the inverse of $A = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{pmatrix}$ using Cayley-Hamilton theorem. [10]

15 Solve: (i) $(x^2 - 4xy - 2y^2)dx + (x^2 - 4xy - 2y^2)dy = 0$. [5]
(ii) $(2x - y + 1)dx + (2y - x - 1)dy = 0$. [5]

OR

16 A body whose temperature is initially at 100°C is allowed to cool in air, whose temperature remains at a constant temperature 20°C . It is given that after 10 minutes, the body has cooled to 40°C . Using Newton's law of cooling, find the temperature of the body after half an hour. [10]

17 Solve $(D^2 - 2D + 1)y = x \cos x$. [10]

OR

18 Solve $(D^2 - 2D + 1)y = e^x x^2$ by using method of variation of parameters. [10]

19 Change the order of integration and evaluate $\int_0^1 \int_{x^2}^{2-x} xy \, dy \, dx$. [10]

OR

20 Find the area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$. [10]