



R20 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code: 3B1AJ

B.Tech I Year I Semester Regular Examinations, July 2021

LINEAR ALGEBRA, CALCULUS & ORDINARY DIFFERENTIAL EQUATIONS
(ELECTRONICS & COMMUNICATION ENGINEERING)

Maximum Marks: 70

Date: 12.07.2021 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 skew symmetric matrix.
- 2 Define singular matrix.

3

Find the eigen values of the inverse of the matrix $A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 3 & 4 \\ 0 & 0 & 4 \end{bmatrix}$.

4

Write down the quadratic form corresponding to the matrix $\begin{bmatrix} 2 & 0 & -2 \\ 0 & 2 & 4 \\ -2 & 4 & 2 \end{bmatrix}$.

5

Define orthogonal trajectory.

6

Find the orthogonal trajectories of family of curves $y = ax^2$, 'a' being a parameter.

7

Solve $(D^2 - 6D + 13)y = 0$.

8

Find the particular integral of $(D^2 - 1)y = x$.

9

Evaluate $\int_0^a \int_0^b (x + y) dx dy$.

10

Transform the integration $\int_0^\infty \int_0^y dx dy$ to polar coordinates.

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11 Solve the following system of equations by using Gauss elimination method: (10M)
 $4x - 5y - 4z = 9$, $2x + 4y + z = 4$ and $3x - y - 5z = 0$.

12

OR
Find the inverse of the matrix $\begin{pmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{pmatrix}$ by Gauss-Jordan method. (10M)

- 13 Reduce the quadric form $x^2 + y^2 + z^2 - 2xy - 2yz - 2zx$ to canonical form through an orthogonal transformation. (10M)

OR

- 14 Verify Cayley- Hamilton theorem for the matrix $A = \begin{bmatrix} 8 & -8 & 2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$. (10M)

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

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. (10M)

- 17 Obtain the general solution of $(D^2 + 4D + 3)y = e^x \sin x + xe^{3x}$. (10M)

OR

- 18 Solve $(D^2 + a^2)y = \tan ax$, by the method of variation of parameters. (10M)

- 19 Change the order of integration and evaluate $\int_0^a \int_x^a (x^2 + y^2) dy dx$. (10M)

OR

- 20 Find the area of the region D bounded by the parabolas $y = x^2$ and $x = y^2$. (10M)