R20 Regulation *Subject code:3B1AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Semester Supplementary Examinations, September 2023

LINEAR ALGEBRA, CALCULUS & PARIAL DIFFENTIAL EUATIONS
(CE)

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 Find c using Rolle's mean value theorem for the function $f(x) = \frac{\sin x}{e^x}$

6 Define Beta and Gamma functions

7 If $u=e^x$, find $\frac{\partial^2 u}{\partial y \partial x}$.

8 If $u = e^x \sin y$, $v= e^x \cos y$, then find jacobian$\frac{\partial(u,v)}{\partial(x,y)}$.

9 Form the PDE from z = ax + by

10 Form the PDE by eliminating the arbitrary functions from $z = f(x^2+y^2)$

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 = $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and find A^{-1} and A^4 [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 Find c of Cauchy's mean value theorem for $f(x) = \sqrt{x} \; and \; g(x) = \frac{1}{\sqrt{x}}$ in [a,b] 0<a<b [10]

OR

16 S.T $\beta(m,n)=\frac{\Gamma m \Gamma n}{\Gamma m+n}$; where m>0;n>0 [10]

17 If $u = xy + yz + zx, \quad v = x^2 + y^2 + z^2, \quad w = x + y + z$ then show that the functions are functionally dependent and hence find the relation between them. [10]

OR

18 Determine whether u = sinx + siny ; v = sin(x+y) are functionally dependent or not. [10]

19 Solve (y-z) p + (x-y)q = z-x [10]

OR

20 Form the PDE by eliminating the arbitrary constants from [10]

$$z = a \log\left[\frac{b(y-1)}{1-x}\right]$$