R17 Regulation *Subject: 1B1AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech. I Year I Semester Supplementary Examinations, April 2023

MATHEMATICS-I

(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science& Engineering & Information Technology)

Maximum Marks: 70 Date: 04.04.2023 Duration: 3hours

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.Each question carries 10 marks and may have a,b,c,d as sub questions.

Part-A

Answer all the following questions carry equal marks (10x2M=20 Marks)

1. Define an orthogonal matrix.
2. If A and B are square symmetric matrices of same order then prove that AB + BA is symmetric.
3. If the eigenvalues of a 3×3 matrix A are -1,2,3, then find the eigenvalues are A^2.
4. Find the nature of the quadratic form $2x_1^2 + 3x_2^2$.
5. Solve $(D^2 + 5D + 6)y = 0$.
6. State Law of Natural Growth.
7. Find the value of c in Roll's theorem for f(x)=sin(x) in (0,π)
8. Solve the differential equation $(D^2-4D+13)y=0$
9. State Euler's theorem.
10. Define functional dependence and independence.

Part-B

Answer all the questions (5X10M=50M)

11. Write the procedure to solve the system of equations $AX = B$ with any method. (10M)

OR

12. Solve the system of equations $x + y + z = 1$, $x + 2y + 4z = 2$, $x + 4y + 10z = 3$ (10M)

13. If A = $\begin{bmatrix} 2 & 1 & 2 \\ 5 & 3 & 3 \\ -1 & 0 & -2 \end{bmatrix}$ verify Cayley- Hamilton theorem. (10M)

OR

14. Reduce the quadratic form $x_1^2 + 5x_2^2 + x_3^2 + 2x_1x_2 + 2x_2x_3 + 6x_3x_1$ to canonical form. (10M)

15. Solve $(D^2 - 2D + 1)y = e^x + (3x^2)$ (10M)

OR

16. Solve $(D^2 + a^2)y = \sec ax$ by method of variation of parameters. (10M)

17. Find the approximate value of $\sqrt[5]{245}$ by using Lagrange's mean value theorem. (10M)

OR

18. Verify Rolle's theorem for $\log\frac{x^2+ab}{x(a+b)}$ on [a,b], b>a>0 (10M)

19. If $x = e^r sec\theta , y = e^r \tan\theta$ prove that $\frac{\partial(x,y)}{\partial(r,\theta)} \cdot \frac{\partial(r,\theta)}{\partial(x,y)} = 1$ (10M)

OR

20. If $u = 2xy,\ v = x^2 - y^2, x = r\cos\theta, y = r\sin\theta$, evaluate $\frac{\partial(u,v)}{\partial(r,\theta)}$ without actual substitution. (10M)