R17 Regulation *Subject: 1B1AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Medbowli, Meerpet,Balapur,Hyderabad-500097

B.Tech. I Year I Semester Supplementary Examinations, April 2022

MATHEMATICS-I

(Common to CE,EEE,ME,ECE,CSE & IT)

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

Answer all the following questions carry equal marks (10x2=20 Marks)

1. Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & -3 \\ -1 & 1 & 2 \\ 3 & 9 & -10 \end{bmatrix}$
2. Write about the consistency of the system of equations $AX = B, B \neq 0$, with n equations and n unknowns.
3. If the eigenvalues of a 3×3 matrix A are -1,2,3, then find the eigenvalues are A^2.
4. Identify the nature of the Quadratic form $x_1^2 + 4x_2^2 + x_3^2 - 4x_1 x_2 + 2x_1 x_3 - 4x_2 x_3$.
5. Write the procedure of orthogonal trajectories of polar form.
6. Find the particular integral of $(D^2 + 4)y = cos3x$.
7. Check whether the Rolle's theorem conditions hold for $f(x) = (x-1)(x-2)(x-3)$ in [0,3].
8. Write the Taylor's series for one dimensional variable.
9. State Euler's theorem.
10. Define functional dependence and independence.

Part- B

Answer all the following questions (5X10M=50M)

11. Solve the following system of equations using Gauss elimination method (10 marks)

$$2x + y - z = 4$$
$$x - y + 2z = -2$$
$$-x + 2y - z = 2$$

(OR)

12. Solve the equations

$$2x + 3y + z = 9$$
$$x + 2y + 3z = 6$$
$$3x + y + 2z = 8$$

by LU decomposition method. (10 marks)

13. If A = $\begin{bmatrix} 2 & 1 & 2 \\ 5 & 3 & 3 \\ -1 & 0 & -2 \end{bmatrix}$ verify Cayley- Hamilton theorem. Hence find A^{-1} also find A^4

(10 marks)

(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.
(10 marks)

15. Solve $(D^2 + 7D + 12)y = e^{2x} + 6$. (10 marks)

(OR)

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

17. (a) Verify the Lagrange's mean value theorem for the function $f(x) = x^3 - x$, [0,2].
(5 marks)

(b) Write the Maclaurin's series of $f(x) = cosx$. (5 marks)

(OR)

18. Expand $f(x, y) = e^x \cos y$ in powers of x and y at (0,0) upto third degree term by Taylor's series. (10 marks)

19. If $u = 2xy, v = x^2 - y^2, x = rcos\,\theta, y = rsin\,\theta$, evaluate $\frac{\partial(u,v)}{\partial(r,\theta)}$ without actual substitution. (10 marks)

(OR)

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