

Roll No. _____

22605

**M. Tech. 1st Semester (ME) CBCS Scheme
Examination – February, 2022**

NUMERICAL METHODS AND COMPUTING

Paper : MTMEZ1D1

Time : Three Hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in total by selecting *one* question from each Unit. Question No. 1 is compulsory

1. (a) Define Relative and percentage error
- (b) Write one Bracketing method and formula for the same
- (c) Write steps for matrix inversion method
- (d) Differentiate between initial and boundary value problems

UNIT - I

2. Use Lagrange's interpolation formula to find the value of y when $x = 10$, if the following values of x and y are given:

x	5	6	9	11
y	12	13	14	16

3. Find the cubic spline interpolation for the data:

x	1	2	3	4
y	1	5	11	8

UNIT - II

4. Evaluate $\int_{-1}^{+1} \frac{dx}{1+x^2}$ using Gauss formula for $n = 2$ and $n = 3$.
5. Find by Newton-Raphson method, a root of the equation $x^3 - 5x - 3 = 0$ correct to 3 decimal places.

UNIT - III

6. Solve the following equations by Gauss elimination method:
- $2x - y + 3z = 9;$
 $x + y - z = 6;$
 $x - y + z = 2.$

22605- (P-3)(Q-9)(Z1) (2)

7. Using Jacobi's method, find all the eigen values and the eigen vectors of:

$$\begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$$

UNIT - IV

8. Using Runge-Kutta method of fourth order, solve:

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2} \text{ with}$$

$$y(0) = 1 \text{ at } x = 0.2, 0.4$$

9. Solve $\frac{dy}{dx} = 1 + xy^2, y(0) = 1$

for $x = 0.4$ by using Milne's method, when it is given that $y(0.1) = 1.105, y(0.2) = 1.223, y(0.3) = 1.354$.

22605- (P-3)(Q-9)(Z2) (3)