H Roll No. .....

# TMA–402

## B. TECH. (CSE)
## (FOURTH SEMESTER)
## MID SEMESTER EXAMINATION, 2021

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

**Time : 1½ Hours**

**Maximum Marks : 50**

**Note :** (i) Answer all the questions by choosing any ***one*** of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) Using the method of false position, find the root of equation $x^6 - x^4 - x^3 - 1 = 0$ upto four decimal places. 10 Marks (CO1)

OR

(b) Apply Gauss-Seidel iteration method to solve the equations : 10 Marks (CO1)

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

$$2x + y + 20z = 25$$

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2. (a) By mean of Newton's divided difference formula, find the values of $f(8)$ and $f(15)$ from the following table : 10 Marks (CO2)

| $x$ | $f(x)$ |
|---|---|
| 4 | 48 |
| 5 | 100 |
| 7 | 294 |
| 10 | 900 |
| 11 | 1210 |
| 13 | 2028 |

OR

(b) By means of Lagrange's formula, prove that : 10 Marks (CO2)

$$y_0 = \frac{1}{2}(y_1 + y_{-1}) - \frac{1}{8}$$

$$\left[\frac{1}{2}(y_3 - y_1) - \frac{1}{2}(y_{-1} - y_{-3})\right]$$

3. (a) Find the positive real root of $x - \cos x = 0$ by bisection method correct up to four decimal places. 10 Marks (CO1)

OR

(b) Find the root of the equation $xe^x = \cos x$ corrected to four decimal places by using Secant method. 10 Marks (CO1)

4. (a) Solve the following system of linear equations by Jacobi's iterative method : 10 Marks (CO1)

$$10x + y + z = 12$$
$$2x + 10y + z = 13$$
$$2x + 2y + 10z = 14$$

OR

(b) Find a real root of $2x - \log_{10} x = 7$ correct to four decimal places using iteration method. 10 Marks (CO1)

5. (a) Evaluate from following table $f$ (3.8) to three significant figures using Gregory-Newton backward interpolation formula : 10 Marks (CO2)

| $x$ | $f(x)$ |
|---|---|
| 0 | 1 |
| 1 | 1.5 |
| 2 | 2.2 |
| 3 | 3.1 |
| 4 | 4.6 |

OR

(b) The following are the numbers of deaths in four successive ten year age groups. Find the number of deaths at 45-50 and 50-55 :

10 Marks (CO2)

| Age group | Deaths |
|---|---|
| 25—35 | 13,229 |
| 35—45 | 18,139 |
| 45—55 | 24,225 |
| 55—65 | 31,496 |