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Total Pages : 4 Roll No. .....

MT-603

Numerical Analysis-I

MA/M.Sc. Mathematics (MAMT/MSCMT-20)

3rd Semester Examination, 2022 (June)

Time : 2 Hours] **Max. Marks : 40**

Note : This paper is of Forty (40) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Ten (10) marks each. Learners are required to answer any Two (02) questions only.

(2×10=20)

1. Find all the roots of the equation $x^4 - 3x + 1 = 0$ using Graeffe's root squaring method. Use four squaring to estimate roots.

2. Find the root of the equation $x^3 - 2x - 5 = 0$ by Muller's method. Take 1, 2 and 3 as initial approximations.

3. Find double root of the equation $x^3 - 0.75x + 0.25 = 0$ taking initial approximation $x_0 = 0.3$.

4. Using Gauss Jordan method solve the following linear equations

$$10x + y + z = 12$$

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

$$x + y + 5z = 7$$

5. Find quotient and reminder on division of polynomial $x^4 - 5x^3 + 6x^2 + 4x - 18$ by a linear factor$(x - 2)$. Also verify the result.

SECTION–B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Five (05) marks each. Learners are required to answer any Four (04) questions only. (4×5=20)

1. Find the root of the equation $4 \sin x + x^2 = 0$ by secant method.

2. Find all the derivatives of $x^4 - 4x^3 + 8x^2 - 8x + 4$ at $x = 3$, using synthetic division.

3. Solve the given system of the equations using the method of determinants.

$$3x + y + 2z = 3$$

$$2x - 3y - z = -3$$

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

4. Solve the following system of equations by LU factorization method :

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

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

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

5. Find all the Eigen values of the matrix

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

6. Find the root of the equation $x^3 - x^2 - x - 1 = 0$ using chebyshev method.

7. Transform the following matrix to tridiagonal forms by Given's method.

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$$

8. Define the following :

(a) Hermitian Matrix.

(b) Unitary Matrix.

(c) Bisection Method.

(d) Partition Method.

(e) Complex Eigen Values.
