A–899

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

MAMT–08

NUMERICAL ANALYSIS

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

2nd Year Examination, 2024 (June)

Time : 2:00 Hrs. Max. Marks : 70

Note* :–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

Section–A

Long Answer Type Questions 2×19=38

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Find the root of the equation $3x - \sqrt{1+\sin x} = 0$ using iteration method.

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

3. Using the gauss jorden method solve the following linear equations :

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

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

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

4. Compute $y(0.2)$ by Taylor's series, where $y(t)$ is the solution of the IVP.

$$\frac{dy}{dt} = t + y,\ y(0) = 1$$

5. Solve the boundary value problem :

$$\frac{d^2y}{dx^2} = y\ \ y(0) = 0,\ \ y(1) = 1.2$$

by employing shooting method, take $y(0) = 0.85, 0.95$ as initial guesses.

Section–B

Short Answer Type Questions 4×8=32

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Find the real root of the equation $x^4 + 7x^3 + 24x^2 - 15 = 0$, using Birge-Vieta method.

2. Solve the giving system of equations using the method of determinants :

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

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

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

3. Transform the following matrix to tridiagonal form by given's method :

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

4. Fit a second degree polynomial to the data :

x	y
–5	–5
–3	–1
–2	0
–1	1
0	3
1	4
2	4
3	3
4	2

5. Express $2 - x^3 + 3x^4$ as a sum of chebyshev polynomials.

6. Define the following :

   (a) Hermition matrix

   (b) Unitary matrix

7. Solve BVP :

$$y'' = 2$$

$$y(0) = y' = y(1) = y'(1) = 0$$

8. Express $2T_0(x) + T_1(x) + 2T_2(x)$ as a polynomial in x.

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