

A-1048

Total Pages : 4

Roll No.

MT-608

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

Numerical Analysis-II

Examination, 2026 (Feb.)

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 $2 \times 19 = 38$

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.

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(1)

P.T.O.

1. Fit the curve of the form $y = ax + bx^2$ to the given data :

x	1	1.5	2	2.5	3	3.5	4
y	1.1	1.95	3.2	5	8.1	11.9	16.4

2. Obtain the second degree polynomial approximation to the function :

$$f(x) = \frac{1}{1+x^2}, x \in [1, 2]$$

Using Taylor series expansion about $x = 1$ Find a bound on the truncation error.

3. Determine the best minimax approximation to the function $f(x) = x^2$ on $[0, 1]$ with a straight line.
4. Use Picard's method to compute $y(t)$ given that :

$$\frac{dy}{dt} = \frac{e^{-t}}{y}, \quad y(0) = 2$$

5. Use Milne's predictor and corrector Method to obtain the solution of the equation :

$$\frac{dy}{dx} = x - y^2 \quad \text{at } x = 0.8$$

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. Derive the fourth-order Runge-Kutta method and explain its computational advantages.
2. Solve the BVP :

$$y^{iv} = 2$$

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

3. Express $2 - x^2 + 3x^4$ as a sum of Chebyshev polynomials.
4. Describe Picard's iteration method for solving initial value problems.
5. Compute $x(0.05) y(0.05)$ given that :

$$\frac{dx}{dt} = xy + t, \quad \frac{dy}{dt} = ty + x$$

6. Compute $y(1)$ by Adams-Moulton method, given that :

$$\frac{dy}{dt} = y - t^2, \quad y(0) = 1$$

7. Define the Taylor series method for solving ODEs.
8. Define the following :
 - (i) Boundary value problem
 - (ii) Orthogonal polynomials
 - (iii) Polynomial curve fitting
 - (iv) Initial value problem
