

Roll No.

Total No. of Pages : 02

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M.Sc. (Mathematics) (Sem.-2)

NUMERICAL ANALYSIS

Subject Code : MSM-205-18

M.Code : 75966

Date of Examination : 21-12-22

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of FIVE questions carrying TWO marks each.**
2. **SECTION - B & C. have THREE questions each.**
3. **Attempt any FOUR questions from SECTION B & C carrying FIFTEEN marks each.**
4. **Select atleast TWO questions from SECTION - B & C each.**

SECTION-A

- 1. Write short notes on :**

- If $u = \frac{5xy^2}{z^3}$ and errors in x , y and z be 0.001. Compute the relative maximum error in u when $x = y = z = 1$.
- Find the iterative formula to solve $x = e^{-x}$ using Newton Raphson Method.
- Using newton divided difference formula, find the unique polynomial $P(x)$ of degree 2 or less such that

$$P(1) = 1, P(3) = 27, P(4) = 64$$

- d) What is the difference between Gauss-Seidal and Jacobi's method?
- e) Write the formula of Runge-Kutta method of order 3.

SECTION-B

2. Compare a real root of the equation

$$f(x) = 3x + \sin(x) - e^x = 0, x_0 = 0, x_1 = 1 \text{ using Regula-Falsi method.}$$

3. Describe the convergence of Lin-Bairstow's method.
4. Consider the tri-diagonal matrix

$$A = \begin{pmatrix} 4 & 2 & 0 \\ 2 & 2 & 1 \\ 0 & 1 & 1 \end{pmatrix}.$$

To find eigenvalues one uses successive iterations of Givens rotations. Apply two complete iteration of Given's method to calculate the eigen values.

SECTION-C

5. Using the Adams-Bashforth predictor-corrector equations, evaluate $y(1.4)$, if y satisfies the following equation.

$$\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x^2}$$

$$\text{And } y(1) = 1, y(1.1) = 0.996, y(1.2) = 0.986, y(1.3) = 0.972$$

6. Find the solution at $x = 12.2$ using Stirling's formula.

x	10	11	12	13	14
$f(x)$	0.23967	0.2806	0.31788	0.35209	0.38368

7. Using the Runge-Kutta formula of fourth order, find the numerical solution at $x = 0.8$ for

$$\frac{dy}{dx} = x + y, y(0.4) = 0.41$$

Assume the step length $h = 0.2$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.