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Total No. of Pages : 02

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M.Sc Mathematics (2017 Batch) (Sem.–2)

NUMERICAL ANALYSIS

Subject Code : MSM-205

Paper ID : [75012]

Time : 3 Hrs. Max. Marks : 80

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of EIGHT questions carrying TWO marks each.
2. SECTION - B & C. have THREE questions in each section carrying SIXTEEN marks each.
3. Select atleast TWO questions from SECTION - B & C EACH.

SECTION-A

1. Answer briefly :

a) Define absolute error with example.

b) Explain loss of significant digit using example.

c) Write formula for Newton Raphson method.

d) Write maclaurins series expansion.

e) Give general formula for Euler's method.

f) Write expression for Simpson's 1/3 rule.

g) Write a short note on Newton Cote's formulae.

h) Apply modified Euler's method to find value at x=1.2 given that $\frac{dy}{dx} = x + y^2$, y(1)=1 in two steps of 0.1 each.

SECTION B

2. Find the roots of the equation $x^3-2x-5=0$ using Regulafalsi method.

3. Solve the following system of equations using Gauss Jordan method :

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

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

$$-x + 3y + 4z = 4$$

4. Transform the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ to tridiagonal form by Given's method. Find the eigen vector corresponding to largest eigen value.

SECTION-C

5. Using Lagrange's interpolation formula find a polynomial which passes through the points (0, -12), (1,0), (3, 6), (4, 12).

6. Use the classical Runge-Kutta formula of fourth order to find the numerical solution at $x = 0.8$ for

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

Assume the step length $h = 0.2$

7. Consider the initial value problem $y' = x(y + x) - 2$, $y(0) = 2$. Use Modified Euler's method with step size $h = 0.3$ to compute approximations to $y(0.6)$.