MMDSC-1.5

Sl. No.

I Semester M.Sc. Degree Examination, December - 2023

MATHEMATICS-I

Numerical Analysis

(CBCS Scheme)

Time : 3 Hours **Maximum Marks : 80**

***Instructions to Candidates*:**

1) ***Answer any Five full questions.***

2) ***All questions carry equal marks.***

1. a) Derive the nth iterative formula of Muller method to find roots of the equation $f(x)=0$.

b) Describe the Regula-Falsi method geometrically and obtain its nth iterative formula **(10+6)**

2. a) Prove that the rate of convergence of Newton raphson method is 2.

b) Perform three iterations of Birge-vieta method to find the smallest positive root of the polynomial $2x^3-5x+1=0$. Also obtain the deflated polynomial. **(10+6)**

3. a) Find all the roots of the polynomial $x^3-6x^2+11x-6=0$ using the graeffe's roots squaring method.

b) Obtain inverse of A by LU decomposition of the matrix $\begin{bmatrix} 3 & 2 & 1 \\ 2 & 3 & 2 \\ 1 & 2 & 2 \end{bmatrix}$. **(8+8)**

4. a) Solve the following system of linear equation by using gauss-seidel method.

$8x-y+z=18$

$x+y-3z=-6$

$2x+5y-2z=3$

b) Describe Lagrange's interpolation method obtain the truncation error formula. **(8+8)**

5. a) Find the unique polynomial of degree 2 or less, such that $f(0)=1; f(1)=3, f(3)=55,$ using Newton's Divided difference interpolation.

b) Obtain Newton's bivariate interpolating polynomial for equispaced points. **(8+8)**

[P.T.O

6. a) Obtain the least squares polynomial for degree one and two for $f(x) = x^{1/2}$ on [0,1].

b) For the data

x	0	1	2	3
$f(x)$	1	2	33	244

Fit quadratic splines with $M(0) = f''(0) = 0$. Hence find an estimate of $f(2.5)$. **(8+8)**

7. a) Explain initial value problem method [Shooting method].

b) Obtain non-linear second order differential equations using boundary conditions. **(8+8)**

8. a) Explain trapezoidal and simpson's method based on the method of undetermined co-efficients.

b) Evaluate the integral $I = \int_0^1 \frac{dx}{1+x}$ using

i) Composite Trapezoidal rule

ii) Composite Simpson's rule, with 2, 4 and 8 equal subintervals. **(8+8)**
