No. of Printed Pages : **3**

21MAT1C4L

Sl. No.

M.Sc. I Semester Degree Examination, April/May - 2024

MATHEMATICS

Numerical Analysis

(NEP)

Time : 3 Hours Maximum Marks : 70

Note : *Answer* ***any five*** *of the following questions with question No.* ***1 (Q.1) Compulsory****. Each question carries* ***equal*** *marks.*

1. (a) Derive the Regula-Falsi scheme to find the root of $f(x)=0$. Also, derive the condition for convergence of Regula-Falsi method. **7**

(b) Perform three iterations of the Newton-Raphson method to obtain the complex root of $f(x)=z^3+1=0$, using initial approximation $z_0=0.25+0.25i$ **7**

2. (a) Solve the following system of equations by Triangularisation method, obtain result correct to three decimal places. **7**

$$2x-3y+10z=3$$

$$-x+4y+12z=20$$

$$5x+2y+z=-12$$

(b) Describe Gauss-Seidal method for solving system of equations in the form of $AX=B$ **7**

3. (a) Find the Eigen values and Eigen vectors of the matrix **7**

$$A=\begin{vmatrix} 1 & \sqrt{3} & 4 \\ \sqrt{3} & 5 & \sqrt{3} \\ 4 & \sqrt{3} & 1 \end{vmatrix}$$

by Jacobi's method.

(b) Explain the procedure of Given's method for solving the tridiagonal symmetric matrices. **7**

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4. (a) Describe piecewise linear interpolation and also obtain the piecewise linear interpolating polynomial for the following data. **7**

x	1	2	4	8
$f(x)$	3	7	21	73

(b) Determine the piecewise quadratic interpolating polynomial for the function $f(x)$ by the following data. **7**

x	-3	-2	-1	1	3	6	7
$f(x)$	369	222	171	165	207	990	1779

5. (a) Derive an expression for Newton's Bivariate interpolating polynomial for equispaced points. **7**

(b) Construct the Bivariate interpolating polynomial by the following data given by **7**

y/x	0	1	3
0	1	2	10
1	2	4	14
3	10	14	28

and hence find f (0.5, 0.5).

6. (a) Find the solution of system of equations by Crout's method. **7**

$$x+y+z=9$$
$$2x-3y+4z=13$$
$$3x+4y+5z=40$$

(b) Describe the Power method for finding the eigen values and eigen vectors. **7**

7. (a) Explain the Lagrange's interpolation formula. And also find $f(x)=\log_{10}(301)$ by Lagrange's formula using following data. **7**

x	300	304	305	307
$f(x)=\log_{10}{}^{x}$	2.4771	2.4829	2.4843	2.4871

(b) Write down the least square approximation theory to fit the value for the given data (or) continuous function over an interval I. **7**

8. (a) Solve the system of equations by Gauss-Elimination method. Obtain result correct to three decimal places. **5**

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

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

(b) Find numerically smallest eigen value of and corresponding eigen vectors by inverse power method. **5**

$$A=\begin{vmatrix}1 & 6 & 1\\ 0 & 2 & 0\\ 0 & 0 & 3\end{vmatrix}$$

(c) Obtain the least Square approximation of Second degree for the discrete data. **4**

x	-2	-1	0	1	2
$f(x)$	15	1	1	3	19

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