S.B.V.P. SAMAJ’S

S.M.B.S. Thorat College of Arts, Science and Commerce Sangamner

**Department of Mathematics**

**CertificateCourse: -2022-23**

**Syllabus of Course:**

**Theory Syllabus:**

1.Solution for System of linear equations: (02 lectures)

\* System of linear equations, Matrix form of system of linear equations.

\*Homogeneous and non-homogeneous system of linear equations.

\* Gauss Elimination and Gauss Jordan Method.

2.Solution of Algebraic and Transcendental Equations**:** (02 lectures)

\* Regula-Falsi Method.

\* Newton- Raphson Method.

3.Eigen values and Eigen vectors: (02 lectures)

\* Characteristic equation of a matrix of order up to 3X3.

\* Diagonalization.

4.Interpolation: (04 lectures)

\*Newton’s Forward Interpolation Formula.

\* Newton’s Backward Interpolation Formula.

\*Lagrange’s Interpolation Formula for unequal interval.

\* Newton’s divided difference formula.

5.Numerical Integration: (02 lectures)

\* Numerical Integration, General quadrature formula.

\* Trapezoidal rule.

\* Simpson’s (1/3)rd rule.

\* Simpson’s (3/8)th rule.

6. Numerical solution of first order ordinary differential equations**:** (04 lectures)

\*Euler’s Method.

\*Runge - Kutta Methods of 2nd and4th order.

**Practical Syllabus:**

**Practical 1. Using Scilab:**

i) Revision of Scilab with some basic commands e.g. size, length, eye, ones, rand, zeros etc.

ii) Use of ‘ deff ‘ command for one and two variables functions.

iii) Draw 2-D and 3-D graph for some standard functions. e.g. X2 , sin (x), exp(x), x3 +y3 etc .

**Practical 2. Using Scilab:**

i) Basic operations on matrices. e.g. addition , subtraction, multiplication ,square etc.

ii) Solution for system of linear equation .

**Practical 3. Scilab Programming** :

i) Regula-Falsi Method.

ii) Newton-Raphson Method.

**Practical 4. Using Scilab :**

i) Eigen values and Eigen vectors.

ii) Diagonalization.

**Practical 5. Scilab programming :**

i) Newton’s forward interpolation formula.

ii) Newton’s backward interpolation formula.

**Practical 6. Scilab programming :**

i) Lagrange’s interpolation for unequal interval.

ii) Newton’s divided difference formula.

**Practical 7. Scilab Programming :**

i) Numerical Integration by Trapezoidal method.

ii) Numerical Integration by Simpson’s (1/3)rd  rule.

iii) Numerical Integration by Simpson’s (3/8 th rule.

**Practical 8. Scilab Programming :**

i) Euler’s Method.

ii) Runge-Kutta Method.