Semester – V

BRANCH	Subject	Subject Code
B.Sc. (Math) -Major)	Numerical Methods and Scientific Computation	MAM1-151

Course Objective:-The Main Objective of the course will be to build the basic foundation for studying Mathematics. The Demand for Trained workforce in Mathematics is ever growing in Fundamental Research and Industry Sector. Academic and Research Sectors also require Interdisciplinary trained manpower to foster the Mathematics Revolution. The curriculum aims to impart basic knowledge with emphasis on its applications to make the students ready for industries andresearch work in concerned field.

Course learning outcomes (CLO):-

1. Understand numerical methods to find the solution of a system of linear equations.
2. Compute interpolation value for real data.
3. Find quadrature by using various numerical methods.
4. Solve system of linear equations by using various numerical techniques.
5. Obtain solutions of ordinary differential equations by using numerical methods.

Unit – I

Methods for Solving Algebraic and Transcendental Equations

1.1 Ramanujan
1.2 Bisection
1.3 Regula Falsi
1.4 Secant
1.5 Newton-Raphson

Unit – II

Interpolation and Numerical Integration:

2.1 Lagrange interpolation
2.2 Finite difference operators
2.3 Interpolation formula using Differences
2.3.1 Gregory-Newton Forward Difference Interpolation
2.3.2 Gregory-Newton Backward Difference Interpolation
2.4 Numerical Integration

2.4.1 Newton-Cote's formulae
2.4.2 Trapezoidal rule
2.4.3 Simpson's 1/3 Rule

2.4.4 Simpson's 3/8 Rule
2.4.5 Gauss Integration

Unit – III

Methods to Solve System of Linear Equations:

3.1 Direct method for solving system of linear equations
- 3.1.1 Gauss elimination
- 3.1.2 LU decomposition
- 3.1.3 Cholesky decomposition

3.2 Iterative method
- 3.2.1 Jacobi
- 3.2.2 Gauss-Seidel

Unit – IV

Numerical Solution of Ordinary Differential Equations:

4.1 Single step methods
- 4.1.1 Picard Methods
- 4.1.2 Taylor's series Methods
- 4.1.3 Euler Methods
- 4.1.4 Runge-Kutta Methods

4.2 Multistep methods
- 4.2.1 Predictor-corrector Methods
- 4.2.2 Modified Euler Methods
- 4.2.3 Milne-Simpson Methods

Test Books:-

1. S.S. Sastry: Introductory Methods of Numerical Analysis
2. E. Balagurusamy: Numerical Methos