

6 th Semester		Numerical Methods	L-T-P 3-0-0	3 Credits
-----------------------------	--	-------------------	----------------	--------------

Module I:

Approximation of numbers, Significant figures, Accuracy and precision, Error definition, Round off errors, Error propagation, Total numerical error Roots of equation: Bisection method, False-position method, Fixed point iteration, Newton-Raphson method, Secant method, Convergence and error analysis, System of non-linear equations Linear algebraic equation: LU decomposition, The matrix inversion, Error analysis and system conditions, Gauss-Siedel method

Module II:**(12 Hours)**

Interpolation: Newton's divided difference interpolating polynomial, Lagrange interpolating polynomial, Spline interpolation. Numerical integration: The Trapezoidal rule, Simpson's rule, Newton-Cotes algorithm for equations, Romberg integration, Gauss quadrature

Module III:**(12 Hours)**

Ordinary differential equation: Euler method, Improvement of Euler's method, RungeKutta methods, System of equations, Multi step methods, General methods for boundary value problems, Eigen value problems (Algorithm and error analysis of all methods are included)

Books:

- [1] S.C. Chapra, R.P.Canale," Numerical methods for Engineers", Fifth edition, THM Publication.
- [2] S. Kalavathy, " Numerical methods", Thomson/ Cengage India
- [3] K.E. Atkinson," Numerical analysis," Second edition, John Wiley & Sons.

Digital Learning Resources:

Course Name: Numerical Analysis
 Course Link: <https://nptel.ac.in/courses/111/107/111107062/>
 Course Instructor: Dr. Sandip Banerjee, Prof. Roshan Lal, IIT Roorkee