

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2 Computer Engineering

Subject Name NUMERICAL METHODS

Sr.No	Course content
1.	Modeling, computers and error analysis : Mathematical modeling and engineering problem-solving. Role of computers and software. Approximations and errors. Significant figures; accuracy and precision. Errors; round-off and truncation errors; error propagation
2.	Roots of equations : Mathematical background. Bisection, False-position and Newton- Raphson methods. Case studies
3.	Systems of linear algebraic equations : Mathematical background. Gauss elimination; pitfalls and techniques for improvement. Matrix inversion and Gauss-Seidel methods. Case studies.
4.	Curve fitting : Mathematical background. Least squares linear and polynomial regression. Lagrange interpolating polynomials. Spline interpolation. Case studies
5.	Numerical integration : Mathematical background. Newton-Cotes integration formulas; trapezoidal rule and Simpson's rules; integration with unequal segments. Case studies.
6.	Ordinary differential equations : Mathematical background. Euler's method; modifications and improvements in Euler's method. Runge-Kutta methods. General methods for boundary value problems. Case studies

Reference Books:

1. S C Chapra and R P Canale
 Numerical Methods for Engineers
 McGraw Hill International Edition
2. M K Jain, S R K Iyengar and R K Jain
 Numerical Methods for Scientific and Engineering Computation
 Wiley Eastern
3. S S Shastry
 Introductory Methods of Numerical Analysis
 Prentice Hall of India