



Sankalchand Patel University
Faculty of Engineering and Technology
Second Year (4th Sem) Bachelor of Technology
(Computer Engineering / Information Technology)
In Effect from Academic Year 2017-18

Subject Code: 1ET1030401	Subject Title: Computer Oriented Numerical & Statistical Methods
Pre-requisite Subject	Differentiation, Integration, Matrix operation, Various Mathematical Series, Fundamental Mathematics, Basic statistics

Course Objective: To understand the applications of numerical methods. To solve equations numerically, To evaluate integrals numerically, To solve ordinary differential equations numerically. To develop programs of all the numerical methods.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total (T+P)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1.	Finite Differences and Interpolation: Finite Differences, Forward, Backward and Central operators, Interpolation by polynomials: Newton's forward, Backward interpolation formulae, Gauss & Stirling's central difference formulae, Newton's divided and Lagrange's formulae for unequal intervals.	6	14
2.	Errors and Approximations: Significant figures, accuracy and precision, errors, round-off and truncation errors, error propagation.	3	7
3.	Roots of Non- Linear Equations: Bisection, Regula-Falsi, Secant method, Successive approximation method, Newton-Raphson method, Rate of Convergence, Budan's Theorem, Barristow's method,	8	19
4.	Systems of linear algebraic equations: Gauss elimination, Gauss Jacobi method, Gauss-Seidel method, ill-conditioned Equations, pitfalls and techniques for improvement.	4	14
5.	Curve Fitting: Fitting of Linear, Quadratic, Exponential and Logarithmic curves by Least squares method	2	5

6.	Numerical Integration: Newton-Cotes integration formulas: Trapezoidal rule, Simpson's rules, Gaussian Quadrature formula: one, two and three points.	4	10
7.	Numerical Solution of Ordinary Differential equations: Taylor's method, Euler's method, Runge-Kutta method of order four, Milne's Predictor-Corrector method.	5	12
8.	Statistical Methods: Mean, Median, Mode, Mean Deviation, Quartile Deviation, Standard Deviation, Skewness, Correlation and regression, Moments and Expectations.	8	19

Course Outcome: Students will be able to apply mathematical concepts to engineering problems of their relevant branches after studying this course.

List of Reference Books:

1. Numerical Methods for engineers. S C Chapra and R P Canale .McGrow Hill International Edition
2. Numerical Methods in Science & Engineering Prog.- By Dr. B. S. Grawal, Khanna Pub., New Delhi.
3. Erwin Kreyszig: Advanced Engineering Mathematics, 8th Ed., John Wiley & Sons, India, 1999
4. Statistical Methods, S.P.Gupta, Sultan and Chand Publications
5. Computer Programming in C by V. Rajaraman

List of Experiments:

1. Develop a C program to find a root of a non-linear equation using Bisection method.
2. Develop a C program to find a root of a non-linear equation using False Position method.
3. Develop a C program to find a root of a non-linear equation using Secant method.
4. Develop a C program to find a root of a non-linear equation using Newton-Raphson method.
5. Develop a C program to find a root of a non-linear equation using Barirstow's method
6. Develop a C program to implement Trapezoidal Rule.
7. Develop a C program to implement Simpson's $1/3^{rd}$ Rule.
8. Develop a C program to implement Simpson's $3/8^{th}$ Rule.
9. Develop a C program to solve Linear Equations using Gauss- Elimination Method.
10. Develop a C program to compute the Gauss Jacobi Method.
11. Develop a C program to Linear Equations using Gauss- Seidel Method
12. Develop a C program to compute the interpolation value using Newton's Forward Difference formula.
13. Develop a C program to compute the interpolation value using Newton's Backward Difference formula.
14. Develop a C program to compute the interpolation value using Stirlig's formula
15. Develop a C program to implement Euler's method.
16. Develop a C program to implement Runge- Kutta 4^{th} order method.
17. Develop a C program to implement fitting of straight line using Least Square.
18. Develop a C program to compute Standard Deviation.