Course: BTech   **Semester:** 4

Prerequisite: Basic concepts of Statistics and Probability.

Rationale: The course provides systematic knowledge of probability, numerical and statistical methods.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
4	-	-	-	4	20	20	-	60	-	100

SEE - Semester End Examination, **CIA -** Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

W - Weightage (%) , **T** - Teaching hours

Sr.	Topics	W	T
1	**UNIT 1Correlation, Regression and Curve fitting:** Correlation and Regression – Rank correlation Curve Fitting by The Method of Least Squares- Fitting of Straight Lines, Second Degree Parabolas and More General Curves.	18	11
2	**UNIT 2Probability and Probability Distributions:** Probability Spaces, Conditional Probability, Bayes' Rule, Discrete and continuous random variables, Independent Random Variables, Expectation and Variance of Discrete and Continuous Random Variables, Distribution and Their Properties: Binomial Distribution, Poisson Distribution, Normal Distribution.	23	13
3	**UNIT 3Testing of Hypothesis:** Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Test for single mean, difference of means, Test for ratio of variances, Chi-square test for goodness of fit and independence of attributes.	26	15
4	**UNIT 4Solution of a System of Linear Equations, Roots of Algebraic and Transcendental Equations:** Gauss-Jacobi and Gauss Seidel Methods, Solution of Polynomial and Transcendental Equations – Bisection Method, Newton-Raphson Method and Regula-Falsi Method.	11	7
5	**UNIT 5Finite Differences and Interpolation:** Finite Differences, Relation between Operators, Interpolation using Newton's Forward and Backward Difference Formulae. Newton's Divided and Lagrange's Formulae for Unequal Intervals.	11	7
6	**UNIT 6Numerical Integration:** Trapezoidal rule, Simpson's 1/3rd and 3/8th Rules, Gaussian Quadrature Formulae. **Numerical solution of Ordinary Differential Equations:** Taylor's Series, Euler and Modified Euler's Methods. Runge-Kutta Method of Fourth Order for Solving First and Second Order Equations.	11	7

Reference Books

1.	**Introductory Methods of Numerical Analysis** By Sastry S. S	Prentice Hall of India
2.	**Numerical Methods in Engineering & Science with Programs in C and C++ (TextBook)** By Dr. B. S. Grewal	Khanna Publishers
3.	**Introduction to Numerical Analysis** By C.E. Froberg	Addison Wesley Publishing Company
4.	**Introduction to Probability (TextBook)** By P. G. Hoel, S. C. Port and C. J. Stone,	UBS Publishers,
5.	**Fundamentals of Mathematical Statistics (TextBook)** By S.C. Gupta and V. K. Kapoor	Sultan Chand & Sons

Course Outcome

After Learning the Course the students shall be able to:

• Analyse correlation and regression between two variables and fit a curve to the given set of values.

• Calculate probabilities and analyse random variables to determine expectation and variance.

• Evaluate hypotheses by conducting significance tests for proportions, means, standard deviations, and variances using large sample tests, chi-square tests, and other appropriate statistical methods.

• Apply numerical methods such as Gauss-Jacobi, Gauss Seidel, bisection method, Newton-Raphson method, and Regula-Falsi method to solve systems of linear equations and algebraic/transcendental equations

• Interpolate data using finite differences and various interpolation techniques including Newton's forward/backward difference formulae, and Lagrange's formulae for unequal intervals.

• Utilize numerical integration techniques such as the trapezoidal rule, Simpson's rules, and Gaussian quadrature formulae, as well as numerical methods including Taylor's series, Euler's method, Modified