

PROBABILITY AND NUMERICAL METHODS

Semester IV

SUB CODE: CC 401 B

Teaching Scheme (Credits and Hours)

| Teaching scheme | | | | Total Credit | Evaluation Scheme | | | | | Total |
|-----------------|-----|-----|-------|-----------------|-------------------|-------|-----------------|-------|--------|-------|
| L | T | P | Total | | Theory | | Mid Sem Exam | CIA | Pract. | |
| Hrs | Hrs | Hrs | Hrs | | Hrs | Marks | Marks | Marks | Marks | Marks |
| 03 | 01 | 02 | 06 | 05 | 03 | 70 | 30 | 20 | 30 | 150 |

Total hours (Theory): 45

Total hours (Tutorial): 15

Total Hours (Practical): 30

Total hours: 90

Detailed Syllabus

| No | Topics | Lectures (Hours) | Weight age |
|----|--|------------------|-------------|
| 1 | Combinatorial Analysis: Introduction, The Basic Principle of Counting, Permutations, Combinations | 3 | 5% |
| 2 | Probability Axioms: Axiomatic Definitions, Conditional probability, Baye's theorem | 7 | 15% |
| 3 | Discrete Random Variables: Random variables, Discrete Random Variables, Expected Value, Expectation of a Function of a Random Variable, Variance, Binomial Distribution, Poison Distribution. | 7 | 15% |
| 4 | Continuous Random Variables: Introduction, Expectation and Variance of Continuous Random Variables, The Uniform Random Variable, Normal Random Variables, Exponential Random Variables | 6 | 15% |
| 5 | Interpolation: Interpolation by polynomials, forward difference formula, backward difference formula, Central difference formula, Lagrange's Formula, divided differences, error of the interpolating polynomial. | 6 | 15% |
| 6 | Numerical Integration: Newton cotes Formula, Trapizoidal Formula, , Simpson's $1/3$, $3/8$ formula, Weddles formula, Gaussian Quadrature Formula. | 5 | 10% |
| 7 | Roots of non-linear equation: Errors, Bisection, False Position, Secant, Newton- Raphson methods, Newton- Raphson method for two variables, rate of convergence. | 7 | 20% |
| 8 | Linear algebraic equation: Gauss-Seidel methods, Gauss-Jacobian methods, partial pivoting, ill conditional equations. | 4 | 5% |
| | Total | 45 | 100% |

Text Books:

- 1 "A first course in Probability" by Sheldon Ross 8th Edition
2. Computer Oriented Numerical Methods, V Rajaraman., PHI.

Reference Books:

1. C. E. Froberg, Introduction to Numerical Analysis (2nd Edition), Addison-Wesley
2. Advanced Engineering Mathematics (8th Edition)", by E. Kreyszig, Wiley-India (2007).

3. Computer Oriented Numerical Methods - R. S. Salaria., Khanna Publisher
4. Fundamentals of Mathematical Statistics – By S. C. Gupta & V. K. Kapoor , - Pub: Sultan Chand & Sons
5. Introduction to Numerical Analysis - By S. S. Sastry., PHI .

List of Tutorials

| Sr. No. | Tutorial Content |
|---------|---|
| 1 | Problem solving on “ Counting Principle ”. |
| 2 | Problem solving on “ Probability Axioms ” |
| 3 | Problem solving “ Discrete Random Variables ”. |
| 4 | Problem solving “ Continuous Random Variables ”. |
| 5 | Problem solving on “ Interpolation ” |
| 6 | Problem solving “ Numerical Integration ”. |
| 7 | Problem solving on “ Roots of equation ”. |
| 8 | Problem solving on “ Linear algebraic equation: ”. |
| | |

List of Experiments

| Sr. No. | Tutorial Content |
|---------|---|
| 1 | Implement Bisection Method |
| 2 | Implement False position Method |
| 3 | Implement Secant Method |
| 4 | Implement Newton Raphson Method |
| 5 | Implement Trapezoidal Method |
| 6 | Implement Simpson's 1/3rd Method |
| 7 | Implement Simpson's 3/8th Method |
| 8 | Implement Gauss Elimination Method |
| 9 | Implement Gauss Seidal Method |
| 10 | Implement Newton's Forward interpolation |
| 11 | Implement Newton's Backword interpolation |