4. N.P. Bali and Manish Goel - Engineering Mathematics; Laxmi Publications

BAS-24 APPLIED COMPUTATIONAL METHODS

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To find the root of a curve using Bisection, Regula falsi Newton's Method.
2. Use of moments and kurtosis to find the type of curve.
3. To interpolate a curve using Gauss, Newton's interpolation formula.
4. To find the derivative of a curve.
5. To find the area of a curve.

Topics Covered

UNIT-I 9

Numerical Methods: Solution of algebraic and Transcendental equations, Bisection method, Method of False position (Regula-Falsi method) and Newton-Raphson method, Solution of linear simultaneous equations; Guass-Siedel method, Crout's method.

UNIT-II 9

Interpolation and Numerical Integration: Interpolation: Finite Differences, Difference operators, Newton's forward and backward interpolation formulae, Lagrange's formula for unequal intervals, Newton's divided difference formula for unequal intervals. Numerical Integration: Trapezoidal Rule, Simpson's one-third and three-eight rules.

UNIT-III 9

Numerical Solution of Ordinary Differential Equations and Difference Equations: Picard's method, Taylor's Series method, Euler's method, Modified Euler's method, Runge-Kutta method of order four. Difference equations and their solutions. Rules for finding the particular integral.

UNIT-IV 9

Statistical Methods and Probability Distributions: Frequency Distributions, mean, mode, median, standard deviation, Moments, Skewness, Kurtosis, Types and measurement of Skewness and Kurtosis. Correlation; Regression and regression lines. Binomial Distribution, Poisson's Distribution, Normal Distribution.

Experiments

1. To implement Regula-Falsi method to find root of algebraic equation.
2. To implement Newton-Raphson method to find root of algebraic equation.
3. To implement Newton's Divided Difference formula to find value of a function at a point.
4. To implement Numerical Integration by using Simpson's one-third rule.
5. To implement numerical solution by using Runge-Kutta method of order four to find solution of differential equation.

6. To implement numerical solution of differential equation by Picard's method.
7. To implement numerical solution of differential equation by using Euler's method.
8. To estimate regression equation from sampled data and evaluate values of standard deviation, regression coefficient.

Books & References

1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers.
2. B.V. Ramana: Higher Engineering Mathematics, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. H.K. Dass and Rama Verma: Engineering Mathematics; S. Chand Publications.
4. N.P. Bali and Manish Goel: Engineering Mathematics; Laxmi Publications.

BAS-25 PROBABILITY THEORY AND STOCHASTIC PROCESS

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Define and apply basic concepts and methods of probability theory.
2. Use common probability distributions and analyse their properties.
3. Define and use the properties of Stochastic processes, especially random walks, branching processes, the Poisson and Wiener process, applied to real problem.
4. Explain the concept of measurability and define and work with sigma algebras and construct probability measures on sample spaces.

Topics Covered

UNIT-I 9

Probability and Distributions

Definition of probability, Mutually exclusive events, Addition and Multiplication Theorems of probability. Conditional Probability, Baye's Theorem. Binomial Probability Distribution, Poisson's Probability Distribution, Normal Probability Distribution.

UNIT-II 9

Stochastic Programming

Stochastic linear programming, Stochastic non- linear programming, Stochastic Geometric programming, Stochastic Dynamic programming.

UNIT-III 9

Non- linear Programming: Unconstrained Optimization Techniques

Direct Search methods: Random Search methods, Univariate method, Rosenbrock's method of Rotating Co-ordinates, Simplex method, Indirect Search methods: Steepest Descent method, Quasi-Newton Methods.

UNIT-IV 9

Stochastic Inventory models and Classical Optimization Techniques