

Syllabus

Panjab University, Chandigarh BCA 3rd Semester Computer Oriented Numerical Methods

Time Duration : 3 Hrs.

External Marks : 65

Internal Marks : 10

Number of Lectures : 60

Objective. To teach the students the basic techniques of a Numerical & Statistical Methods. After completing this course students will be able to solve various problems of Financial, Scientific and Engineering fields.

Note. (vii) The Question Paper will consist of Four Sections.

- (viii) Examiner will set total of NINE questions comprising TWO questions from each Section and ONE compulsory question of short answer type covering whole syllabus.
- (ix) The students are required to attempt ONE question from each Section and the Compulsory question.
- (x) All questions carry equal marks unless specified.
- (xi) The students can use only Non-programmable & Non-storage type of Calculator.
- (xii) Log tables are followed. Students may be provided the same for computation.

SECTION-A

Data Representation and Computer Arithmetic Introduction, Concept of Exact and Approximate Numbers, Concept of Significant digits, Representation, of Numbers in memory, storage of integer numbers, signed representation, 1's Complement Representation, 2's Complement Representation, Floating Point Numbers and their storage, Floating Point Arithmetic, Normalization and their consequences, errors, measures of Accuracy. Absolute Error, Relative Error and Percentage Error,

Error types, Data Errors. Truncation Errors, Round-Off Errors, Computational Errors, Rules Relationship between Relative Error and Significant digits, and Error Propagation : Error Propagation in Addition Operation, Subtraction Operation, Multiplication Operation and Division Operation.

SECTION-B

Solution of Non-linear Equations : Introduction, Types of Non-Linear Equations : Polynomial Equations, Transcendental Equations, Methods of Finding Solutions of Non-Linear equations, Direct Method, Iterative Method.

Iterative Methods : Bisection Method, False-Position Method, Secant Method, Newton-Raphson Method, Zeros of a polynomial using Birge – Vieta Method.

Convergence of Iterative Methods : Convergence of Bisection Method, Convergence of False Position Method, Convergence of Newton – Raphson Method, Convergence of Secant Method, Comparison between Iterative Methods.

Simultaneous Linear Equations : Solutions of simultaneous Linear Equations using Direct and Iterative Methods : Direct Methods : Gauss – Elimination Method, Gauss-Jordan Method, Concept of Pivoting, Iterative Method : Gauss-Seidal Method.

SECTION-C

Interpolation : Introduction, Lagrange Interpolation, Inverse Interpolation, Finite Differences : Forward Differences, Backward Differences, Divided Differences, Difference Tables : Forward Difference Table, Backward Difference Table, Divided Difference Table, Observations regarding Difference Tables, Newton's Method of Interpolation : Newton's Forward Difference Interpolation Formula, Newton's Backward Difference Interpolation Formula, Newton's Divided Difference Interpolation Formula, Numerical Integration : Introduction, Newton-Cotes Integration Formulae :

Trapezoidal Rule, Simpson's 1/3rd Rule, Simpson's 3/8 Rule.

SECTION -D

Approximation : Approximation of function : Taylor Series Representation, Chebyshev Polynomials.

Solution of Ordinary Differential Equations : Introduction, Euler's Method, Runge-Kutta Methods : 2nd order & 4th order, Predictor Corrector Methods : Modified Euler's Method.