

SYLLABUS

COMPUTER ORIENTED NUMERICAL METHODS

B.C.A.-II (SEMESTER-III)

(P.U.)

Time : 3 Hours

External Marks : 65

Internal Marks : 10

- Note.**
- (i) The question paper will consist of four Units.
 - (ii) Examiner will set total **nine** questions comprising **two** questions from each section and **one** compulsory question of short answer type covering whole syllabi.
 - (iii) The students are required to attempt **one** question from each section and the compulsory question.
 - (iv) All questions carry equal marks unless specified.
 - (v) The students can use only basic (non-programmable) type of calculator.
 - (vi) Log tables are allowed. The same may be provided to the students for computation.

UNIT - I

Introduction to differentiation, integration and matrix algebra.

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.

UNIT - II

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 Methods, Zeros of a polynomial using Birge - Vieta Method. Convergence of Iterative Methods, Comparison between Iterative Methods.

Simultaneous Linear Equations : Solution 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.

UNIT – III

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 3/8th Rule.

UNIT – IV

Approximation : Approximation of functions: 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.