SYLLABUS

BCA-16-304 COMPUTER ORIENTED NUMERICAL METHODS

B.C.A. Semester-III

P.U.

L	T	P	Cr
6	1	-	3

External marks : 65
Internal Marks : 10
Number of Lectures : 60

Time Duration : 3 Hours

Objective : To teach the students the essential techniques of Numerical Methods. After completing this course students will be able to solve various Scientific and Engineering fields problems.

Note :

(*i*) The Question paper will consist of Four Sections.

(*ii*) Examiner will set total of Nine questions comprising Two questions from each Section and One compulsory question of short answer type covering whole syllabus.

(*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 student can use only Non-programmable & Non-storage type of Calculators.

(*vi*) Log tables are allowed. Students may be provided the same for computation.

UNIT – I

Data Representation and Computer Arithmetic : Introduction, Concept of Exact and Appropriate 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 equation : 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 : 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 : Solution of Simultaneous Linear Equations using Direct and Iterative Methods : Direct Methods : Gauss – Elimination Method, Gauss-Jordan Method, Concept of Pivoting, Iterative Method : Gauss-Seidel 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 : Traperoidal Rule, Simpson's $1/3^{rd}$ Rule, Simpson's $3/8^{th}$ Rule.

UNIT – IV

Approximation : Approximation of functions : Taylor Series Representation, Chebyshev Polynomial.

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