M.Sc. Nuclear physics SEMESTER – III PAPER – 304

**COMPUTATIONAL METHODS AND PROGRAMMING (Syllabus)**

# MODULE l

PROGRMMING IN “C”

1. INTRODUCTION TO “C”: Characters, constants, variables, keywords and instructions in ‘C’. Arithmetic instructions, Assignment statements, Input / Output functions, conditional statements, writing simple programs in ‘C’.
2. EXPRESSIONS IN “C”: Logical expressions and control statements, decision control, loop control and case control structures, functions, arrays, syntax rules, global and state variables. Data types and stacks structures, pointers, lists and trees.
3. ‘C’ Programming applied to numerical solutions for problems in Module I

MODULE II

1. ROOTS OF EQUATIONS:

Iteration method, Bisection method, Newton-Raphson method

1. SOLUTION TO SIMULTANIOUS LINEAR ALGEBRIAC EQUATIONS:

Matrix inversion method, Gauss elimination method, Iterative method, Jacobi’s method, Gauss – Seidel method.

1. INTERPOLATION:

Finite differences, Newton’s forward difference interpolation formula, Newton’s backward difference interpolation formula, Newton’s divided difference formula, LaGrange’s interpolation formula

1. CURVE FITTING AND APPROXIMATION:

Least square curve fitting procedures, fitting a straight line, nonlinear curve fitting, data fitting by Cubic Splines.

1. NUMERICAL INTEGRATION: (**For assignment/2nd Mid for the year 20-21**)

Trapezoidal rule, Simpson’s 1/3 rule, Simpson’s 3/8th rule, Gauss quadrature.

Text and Reference Books:

1) Computer Oriented Numerical methods by V. Rajaraman

2) Computer programming in “C” by V. Rajaraman.

3) Numerical Methods in “C” by Xavier.

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