

IV SEMESTER

SSP-S. 415/420

P401, E401: Computational Methods and Programming in "C"

2007 - 2008

(Common Paper for M.Sc PHYSICS & M.Sc. ELECTRONICS)

NUMERICAL METHODS

1. ROOTS OF EQUATIONS : 4 Hrs.
Iteration Method, Bisection Method, New-Raphson Method.
2. SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS:
Matrix Inversion Method, Gauss elimination method, Iteration Methods, Jacobi's Method, Gauss-Seidel Method. 4 Hrs.
3. INTERPOLATION : 6 Hrs.
Finite Difference operators, Newton's Forward difference Interpolation formula, Newton's Backward difference Interpolation formula, Newton's divided difference formula, Lagrange's interpolation formula.
4. SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: 6 Hrs.
Picard's Method, Euler's Method, Runge-Kutta (second – order and fourth – order), methods, Adams – Bashforth method.
5. SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS : 4 Hrs.
Wave equation, Laplace equation.

PROGRAMMING IN "C"

6. INTRODUCTION TO "C" 6 Hrs.
Characters, constants, variables, Keywords and Instructions in 'C'. Arithmetic Instructions, Assignment statements, Input / Output functions, conditional statements. Writing a program, simple 'C' Program examples.
7. EXPRESSIONS IN "C" : 6 Hrs.
Logical Expressions and Control Statements, Decision Control, Loop Control and Case Control Structures, Functions, Arrays, Syntax rules, Global, Local and static variables, Data types and stacks, Structures, Pointers, Lists and Trees.
8. "C" PROGRAMMING APPLIED TO NUMERICAL METHODS : 14 Hrs.
Roots of equations, Solutions of Simultaneous equations, Numerical Interpolation, Numerical integration, Solutions of ordinary differential equations and partial differential equations. Fourier Transforms, Z – Transforms.

Textbooks :

1. "Numerical Methods for Engineers and Scientists " by Iqbal.M.Khan, Q.Hassan. Galgotia Publication Pvt. Ltd., New Delhi. 1997.
2. "Computer Programming in "C" by V. Raja Raman, Prentice Hall of India Pvt. Ltd., New Delhi. 1995.
3. "NUMERICAL RECIPES IN C" by W.H. Press, S.A. Teukolsky, W.T. Vetterling & B.P. Flannery, Cambridge University Press. 2001 (2nd Edition)
4. "Networks & Systems " by D. Roy Chowdary, New Age International Publisher.

Reference Books :

1. "Numerical Methods for Scientific and Engineering Computation " by M.K. Jain, S.R.K.Iyengar, R.K. Jain. New Age International Publishers, Bangalore.
2. "Introduction to Numerical Analysis " by S.S. Sastry . Prentice Hall of India.
3. "Numerical Methods " by E. Balaguru Swamy. Tata Mc-Graw Hill
4. "Programming in "C" by Byron.S.Gottfried, Schaur's Series ,Tata Mc-Graw Hill,
5. "Let us "C" by Yashvant Kanetkar, B.P.B.Publishers, New Delhi.