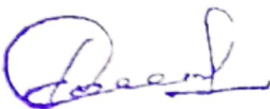


GOVT. SHAHEED BAPURAO P.G. COLLEGE SUKMA (C.G.)

LIST OF ELECTIVE COURSES

(1) B.Sc. Final Year (Mathematics)




Principal
Govt. Shaheed Bapurao College Sukma
Distt.-Sukma

PAPER - III - (OPTIONAL)

(I) PRINCIPLES OF COMPUTER SCIENCE (Paper Code-0900)

UNIT-I **Data Storage** - Storage of bits, Main Memory, Mass Storage, Coding Information of Storage, The Binary System, Storing Integers, storing fractions, communication errors.
Data Manipulation - The Central Processing Unit, The Stored-Program Concept, Programme Execution, Other Architectures, Arithmetic Logic Instructions, Computer-Peripheral Communication.

UNIT-II **Operating System and Networks** - The Evolution of Operating System, Operating System Architecture, Coordinating the Machine's Activities, Handling Competition Among Process, Networks, Networks Protocol.

Software Engineering - The Software Engineering Discipline, The Software Life Cycle, Modularity, Development Tools and Techniques, Documentation, Software Ownership and Liability.

UNIT-III **Algorithms** - The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery, Iterative Structures, Recursive Structures, Efficiency and Correctness, (Algorithms to be implemented in C++).

Programming Languages - Historical Perspective, Traditional Programming Concepts, Program Units, Language Implementation, Parallel Computing, Declarative Computing.

UNIT-IV **Data Structures** - Arrays, Lists, Stacks, Queues, Trees, Customised Data Types, Object Oriented Programming.

File Structure - Sequential Files, Text Files, Indexed Files, Hashed Files, The Role of The Operating System.

Database Structure - General Issues, The Layered Approach to Database Implementation, The Relational Model, Object-Oriented Database, Maintaining Database Integrity, E-R models.

UNIT-V **Artificial Intelligence** - Some Philosophical Issues, Image Analysis, Reasoning, Control System Activities, Using Heuristics, Artificial Neural Networks, Application of Artificial Intelligence.

Theory of Computation - Turing Machines, Computable functions, A Non computable Function, Complexity and its Measures, Problem Classification.

REFERENCES :

1. J. Glen Brookspear, Computer Science : An Overview, Addison Wesley.
2. Stanley B. Lippman, Josee Lojole, C++ Primer (3rd Edition), Addison-Wesley.

PAPER - III - (OPTIONAL)

(II) DISCRETE MATHEMATICS (Paper Code-0901)

- UNIT-I Sets and Propositions - Cardinality. Mathematical Induction, Principle of Inclusion and exclusion.
Computability and Formal Languages - Ordered Sets. Languages. Phrase Structure Grammars. Types of Grammars and Languages. Permutations. Combinatorics. Discrete Probability.
- UNIT-II Relations and Functions - Binary Relations, Equivalence Relations and Partial Order Relations and Lattices. Chains and Antichains. Pigeon Hole Principle. Graphs and Planar Graphs - Basic Terminology. Multigraphs. Weighted Graphs and Circuits. Shortest Paths. Eulerian Paths and Circuits. Travelling Salesman Problem. Planner Graphs.
TREES.
- UNIT-III Finite State Machines - Equivalent Machines. Finite State Machines as Language Recognizers. Analysis of Algorithms - Time Complexity. Complexity of Prime Numbers. Discrete Numeric Functions and Generating Functions.
- UNIT-IV Recurrence Relations and Recursive Algorithms - Linear Recurrence Relations with Constant Coefficients. Homogeneous Solutions. Particular Solution. Total Solution by the Method of Generating Functions. Brief review of Groups and Rings.
- UNIT-V Boolean Algebras - Lattices and Algebraic Structures. Duality. Distributive Lattices. Complemented Lattices. Boolean Lattices and Boolean Algebras. Boolean Functions and Expressions. Propositional Calculus. Design and Implementation of Combinational Networks. Switching Circuits.

REFERENCES :

C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw-Hill International Edition, Computer Science Series, 1986.

PAPER - III - (OPTIONAL)

(III) APPLICATION OF MATHEMATICS IN FINANCE AND INSURANCE
(Paper Code-0902)

Application of Mathematics In Finance :

- UNIT-I Financial Management - An overview. Nature and Scope of Financial Management. Goals of Financial Management and main decisions of financial management. Difference between risk, speculation and gambling.
Time value of Money-Interest rate and discount rate. Present value and future value discrete case as well as continuous compounding case. Annuities and their applications. Newton Raphson Method to calculate IRR. Measurement of returns under uncertainty. Meaning of risk. Difference between risk and uncertainty. Types of risk. Measurement of risk. Calculation of security and Portfolio Risk and Return-Markowitz Model. Sharpe's Single Index Model. Systematic Risk and Unsystematic risk.
- UNIT-II Taylor series and Bond Valuation. Calculation of Duration and Convexity of bond prices. Financial Derivatives - Futures. Forward, Swaps and Options. Call and Put Options and Put Parity Theorem. Pricing of contingent claims through Binomial Option Pricing Theorem.
- UNIT-III

Application of Insurance Fundamentals - Insurance defined, Meaning of loss, Chances of loss, Peril, hazard, and proximate cause in Insurance. Costs and benefits of insurance to the society and branches of insurance-life insurance and various types of general insurance. Insurable loss exposure-timing of a loss that is ideal for insurance. The Insurance Mathematics - Construction of Mortality Tables, Calculation of Premium of Life Insurance for a fixed duration and for the whole life.

UNIT-V Determination of claims for General Insurance - Using Poisson Distribution and Negative Binomial Distribution-the Polya Case. Determination of the amount of Claims in General Insurance - Compound Aggregate claim model and its properties, and claims of reinsurance. Calculation of a compound claim density function, F-recursive and approximate formulae for F.

REFERENCES :

1. Aswath Damodaran, Corporate Finance - Theory and Practice, John Wiley & Sons Inc.
2. John C. Hull, Options, Futures, and Other Derivatives, Prentice-Hall of Indian Private Limited.
3. Sheldon M. Ross, An Introduction to Mathematical Finance, Cambridge University Press.
4. Mark S. Dorfman, Introduction to Risk Management and Insurance, Prentice-Hall, Englewood Cliffs, New Jersey.
5. C.D. Daykin, T. Pentikainen and M. Pesonen, Practical Risk Theory for Actuaries, Chapman & Hall.

PAPER - III - (OPTIONAL)

Theory component will have maximum marks 30.

Practical component will have maximum marks 20.

(IV) PROGRAMMING IN C AND NUMERICAL ANALYSIS (Theory & Practical)
(Paper Code-0903)

UNIT-I Programmer's model of a computer, Algorithms, Flow Charts, Data Types, Arithmetic and input/output instructions, Decisions control structures, Decision statements, Logical and Conditional operators, Loop, Case control structures, Functions, Recursion, Preprocessors, Arrays, Puppeling of strings, Structures, Pointers, File formatting.

Numerical Analysis

UNIT-II Solution of Equations : Bisection, Secant, Regula Falsi, Newton's Method, Roots of Polynomials : Interpolation : Lagrange and Hermite Interpolation, Divided Differences, Difference Schemes, Interpolation Formulas using Differences, Numerical Differentiation, Numerical Quadrature : Newton-Cotes's Formulas, Gauss Quadrature Formulas, Chebychev's Formulas

UNIT-III Linear Equations : Direct Methods for Solving Systems of Linear Equations (Gauss Elimination, LU Decomposition, Cholesky Decomposition), Iterative Methods (Jacobi, Gauss-Seidel, Relaxation Methods) The Algebraic Eigenvalue problem : Jacob's Method, Givens' Method, Householder's Method, Power Method, QR Method, Lanczos' Method.

UNIT-IV Ordinary Differential Equations : Euler Method, Single-step Methods, Runge-Kutta's Method, Multi-step Methods, Milne-Simpson Method, Methods Based on Numerical