1MCACC3: DISCRETE MATHEMATICS

Total No. of Hours: 52 **Hours/Week: 04**

Course Objective: To equip with mathematical skills for automating, simulating and modelling computer hardware and software systems**.**

Course Outcome: Students will be able to

CO1: Understand the concept of logical reasoning

CO2: Implement various algorithms using principles of mathematical induction

CO3: Interpret the importance of set theory concepts

CO4: Understand the importance of graph theory and its applications

Unit I	**Introduction to logic**: Methods of proof, Rules of inference, valid arguments, Rules of inference for quantified statements. Principle of Mathematical Induction. Basic counting principles, the product rule and the sum rule, Examples to illustrate sum and product rule. The inclusion exclusion principle and examples, Pigeonhole Principle and examples.	8 hrs
Unit II	Review of set theory concepts, Definition and types of relations. Representing relations using matrices and digraphs. Closure of relations, Transitive closure, Warshall's algorithm. Recurrence relations, modeling with recurrence relations with example of Fibonacci numbers. Generating function- definition with examples, List of generating functions. Partial orderings, Hasse diagrams, Maximal and minimal elements.	12 hrs
Unit III	Introduction to Graph Theory, types of graphs Basic terminology, Sub graphs, Representing graphs as incidence matrix and adjacency matrix. Graph Isomorphism connectedness and simple graphs paths and cycles in graphs and digraphs, planar graphs, graph colouring. Trees, Rooted trees, Binary trees, properties of Trees, Minimal Spanning Trees, Network Flows-Graphs as Models of Flow of Commodities, Flows.	12 hrs

Unit IV	Error analysis, Polynomial, algebraic and transcendental equations, Solution of equations -Bisection method, Fixed point iteration method, Newton Raphson method, convergence. System of linear equations- Solution by direct methods-Gauss Jordon method, LU decomposition method. Solution by iterative methods- Gauss Seidal method, Jacobi's method.	10 hrs
Unit V	Numerical solutions of First order linear Ordinary Differential equations- Euler and Picard methods. Runge Kutta methods (III & IV level). Introduction to Eigenvalues and Eigenvectors.	10 hrs

REFERENCE BOOKS

[1] C.L. Liu, "*Elements of Discrete Mathematics*", Tata McGraw Hill, Second Edition.

[2] J. L. Mott, A. Kandel and T. P. Baker, "*Discrete Mathematics for Computer Scientists and Mathematicians*", Prentice Hall of India, Second Edition.

[3] K. Shankar Rao, "*Numerical methods for Scientists and Engineers*", Prentice Hall Publications, Second Edition.

[4] M. K. Jain, S. R. Iyengar and R. K. Jain, "*Numerical Methods*", Second Edition.

[5] J. P. Trembly and R. P. Manohar, "*Discrete Mathematical Structures with applications to Computer Science*", McGraw Hill.

[6] F. Harary, "*Graph Theory*", Addition Wesley.

[7] J. H. Van Lint and R. M. Wilson, "*A course on Combinatorics*", Cambridge University Press.

[8] Generald and Wheatly, "*Applied Numerical Analysis*", Prentice-Hall Publications.

[9] E. V. Krishnamurthy and S. K. Sen, "*Numerical Algorithms*", East West Press.

[10] E Balagurusamy, "*Numerical Methods*", Tata McGraw Hill Publications.