CSH 201: Discrete Structures

Teaching Scheme	Examination Scheme	
Lectures: 1 hrs/Week	Class Test	— 6 Marks
Tutorials: 1 hr/Week	Teachers Assessment	— 3 Marks
	Attendance	— 6 Marks
Credits: 2	End Semester Exam	— 35 Marks

Prerequisite: Sets, Relations, Trees, Graphs, Boolean Algebra etc.

Course Objectives:

1. **Mathematical reasoning:** Students are expected to use use mathematical reasoning in order to read, comprehend, and construct mathematical arguments. Students will learn basic concepts of mathematical logic and proof.

2. **Combinatorial analysis:** Students will count or enumerate objects and perform combinatorial analysis.

3. **Discrete structures:** Students will learn the basic concepts of sets, permutations, relations.

graphs, trees and finite state machines. Students will represent discrete objects and relationships using abstract mathematical structures.

4. **Algorithmic thinking:** Students will verify whether an algorithm works well and perform analysis in terms of memory and time.

5. **Applications and modeling:** Discrete mathematics has been used in numerous applications. Students will formulate and model problems with the concepts and techniques of discrete mathematics.

Detailed Syllabus:

Unit-1
Set Theory: Introduction of sets, Subsets, Proper Subset, Disjoint Set, Power Set, General identities on sets, Set Operations, Venn-Diagram, Principle of Inclusion and Exclusion.   **Relations:** Definition, Operations on relations, Composite Relations, Properties of relations, Equality of relations, Order of relations.   **Functions:** Definition, Classification of functions, Operations on functions.
Unit-2
Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Normal Subgroups, Permutation and Symmetric groups. Group Homeomorphisms, Definition and elementary properties of Rings and Fields.
Unit-3
Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram.   **Lattices:** Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice.   **Boolean algebra:** Introduction, Axioms and Theorems of Boolean algebra, Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.
Unit-4
Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, **Predicate Logic:** First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.
Unit-5
Trees: Definition, Binary tree, Binary tree traversal, Binary search tree.   **Graphs:** Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths.
Unit-6
Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle.Recurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences.
Suggested Readings:
1. Liu and Mohapatra, "Elements of Distcrete Mathematics", McGraw Hill   2. Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw-Hill   3. R.P. Grimaldi, Discrete and Combinatorial Mathematics, Addison Wesley,   4. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill,   5. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, PHI

Course Outcomes:

1. Write an argument using logical notation and determine if the argument is or is not valid.
2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
3. Understand the basic principles of sets and operations in sets.
4. Prove basic set equalities.
5. Apply counting principles to determine probabilities.
6. Demonstrate an understanding of relations and functions and be able to determine their properties.

Bachelor of Science (Honors) in Computer Science

Unit-6
Leadership: Concept, Importance & Leadership Styles, Controlling: Concept, Process, Principles & Techniques of Controlling, Types of Control, Effective Control System.

Text and Reference Books
1. Essentials of Management, Harold Koontz, Heinz Weihrich, Tata McGraw-Hill, 1998.
2. Essentials of Management, Joseph L. Massie, Prentice Hall of India, Pearson, 4th Edition, 2003
3. Management, Stoner, Freeman, Gilbert, Pearsons, 6TH Edition.

Course Outcomes:
1. Understand the concepts related to Business organization.
2. Demonstrate the roles, skills and functions of manager.
3. Analyze effective application of PPM knowledge to diagnose and solve organizational problems and develop optimal managerial decisions.
4. Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities.
5. Recognize the role of communication in the management function.