Discrete Structure

BEG274CO

Year: II **Semester: IV**

Teaching Schedule (Hours/week)			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
3	2	-	20	-	80	-	100

Course Objective: On completion, students will be able to explain and apply the basic methods of discrete (non continuous) mathematics in Computer engineering. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, computer systems and compiler design.

Course Contents:

1. **Mathematical Preliminaries** **(5 hrs)**
   - 1.1 Sets and subsets
   - 1.2 Operations on sets
   - 1.3 Basic Number theory
   - 1.4 Principle of counting , permutation and combinations
   - 1.5 Pigeonhole Principle
2. **Logic and Proof** **(10hrs)**
   - 2.1 Proposition and truth values
   - 2.2 Compound propositions
   - 2.3 Tautology and contradiction
   - 2.4 Logical equivalence
   - 2.5 Normal forms
   - 2.6 Logical inferences, rules of inference
   - 2.7 Introduction to Predicate Logic
   - 2.8 Mathematical Induction
3. **Relation** **(10 hrs)**
   - 3.1 Introduction
   - 3.2 Relation on sets
   - 3.3 Some operations on sets
   - 3.4 Types of relation in a set
   - 3.5 Properties of relations
   - 3.6 Representation of relations
   - 3.7 Compositions of relations
   - 3.8 Closure of relations
   - 3.9 Transitive closure and Warshall's Algorithm
4. **Recurrence Relation** **(7hrs)**
   - 4.1 Recurrence relation with theorems
   - 4.2 Particular solution
   - 4.3 Solution to non linear recurrence relation
   - 4.4 Generating Functions
   - 4.5 Application of recurrences to algorithm analysis
   - 4.6 Integer functions
5. **Graph Theory** **(9 hrs)**
   - 5.1 Graph and its types
   - 5.2 Adjacency and degree
   - 5.3 Walk, path, trails and circuits (cycle)

5.4 Types of Graphs (Regular graph, complete graph, cycle graph, connected graph, simple graph and bipartite graph)
5.5 Shortest path problems
5.6 Eulerian graph
5.7 Hamiltonian graph
5.8 Sub-graph
5.9 Transport Network

6. **Language , Grammar and Automata** **(4 hrs)**
   6.1 Introduction
   6.2 Strings
   6.3 Languages
   6.4 Regular expressions
   6.5 Grammars
   6.6 Finite-state Automata

Reference Books:

1. Bernard Kolman, Rober C. Busby, Sharon Ross, "Discrete Mathematical Structure", Pearson Education Pvt. Ltd. India
2. Joe L. Mott, Abraham Kandel, Thoedore P. Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", India, Prentice Hall, 2004
3. Kenneth H. Rosen, "Discrete Mathematics & its Applications", New Delhi, Tata McGraw Education, 2007
4. R. Johnsonbough, "Discrete Mathematics", India, Prentice Hall, 1999