

Year	I	Course Code: 21BCA2C6L	Credits	04
Sem.	II		Course Title: Discrete Mathematics	Hours
Course Pre-requisites, if any	NA			
Formative Assessment Marks: 40	Summative Assessment Marks: 60		Duration of ESA: 02 hrs.	
Course Outcomes	<div>1. At the end of the course the student should be able to:</div> <div>2. To understand the basic concepts of Mathematical reasoning, set and functions.</div> <div>3. To understand various counting techniques and principle of inclusion and exclusions.</div> <div>4. Understand the concepts of various types of relations, partial ordering and</div> <div>5. Equivalence relations.</div> <div>6. Apply the concepts of generating functions to solve the recurrence relations.</div> <div>7. Familiarize the fundamental concepts of graph theory and shortest path algorithm</div>			
Unit No.	Course Content			Hours
Unit I	<b>The Foundations:</b> Logic and proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy. <b>Basic Structures:</b> Sets, Functions, Sequences, Sums, and Matrices: Sets, set operations, Functions, Sequences and Summations, matrices.			10
Unit II	<b>Counting:</b> Basics of counting, Pigeonhole principle, Permutation and combination, Binomial Coefficient and Combination, Generating Permutation and Combination. <b>Advanced Counting Techniques:</b> Applications of Recurrence Relations, Solving Linear Recurrence, Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating functions, Inclusion-Exclusion, Applications of Inclusion-exclusion.			10
Unit III	<b>Induction and Recursion:</b> Mathematical Induction, Strong Induction and Well- Ordering, Recursive Definitions and Structural Induction, Recursive			12

	Algorithms, Program Corrections. <b>Relation:</b> Properties of relation, Composition of relation, Closer operation on relation, Equivalence relation and partition. Operation on relation, Representing relation.	
Unit IV	<b>Graphs:</b> Graphs and Graph models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring..	08
<b>Recommended Learning Resources</b>		
Print Resources	<b>Reference Books:</b> <ol style="list-style-type: none"> <li>1. Discrete Mathematics and Its Applications, Kenneth H. Rosen: Seventh Edition, 2012.</li> <li>2. Discrete Mathematical Structure, Bernard Kolman, Robert C, Busby, Sharon Ross, 2003.</li> <li>3. Graph Theory with Applications to Engg and Comp. Sci: Narsingh Deo-PHI1986.</li> <li>4. Discrete and Combinatorial Mathematics Ralph P. Grimaldi, B. V. Ramatta, Pearson, Education, 5Edition.</li> <li>5. Discrete Mathematical Structures, Trembley and Manobar.</li> </ol>	