

COURSE STRUCTURE

CourseCode	BCA10040				
CourseCategory	Program Foundation				
CourseTitle	Discrete Mathematics				
Teaching Scheme	Lectures	Tutorials	Laboratory / Practical	Project	Total
Weekly load hours	3	-	-	-	3
Credits	3	-	-	-	3
Assessment Schema Code	TT1				

Pre-requisites: Basic Knowledge of Mathematics

Course Objectives:

1. Using Mathematically Correct Terminology And Notation.
2. Constructing Correct Direct And Indirect Proofs.
3. Applying Logical Reasoning To Solve A Variety of problems.

Course Outcomes:

After completion of this course students will be able to:

1. Demonstrate the ability to write and evaluate proof outline basic structure
2. Understand the basic principles of sets and operations on sets.
3. Analyze Basic Set Equalities.
4. Apply Counting Principles To Determine Probabilities.
5. Demonstrate an understanding of relations and functions and be able to determine their properties.
6. Demonstrate different traversal methods for trees and graphs.
7. Model problems in Computer Science using graphs and trees.

Course Contents:

Unit 1: Set Theory & Logic [9]

Sets, Subsets, Operations on Sets DeMorgan's Laws Power Set of a Set Cartesian Product Equivalence Relation. Partition of a Set Partial order on a set

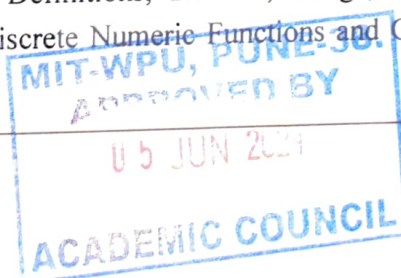
Unit 2: Combinatorics and Discrete Probability [9]

Permutations & Combinations– Rule of sum and product, permutations, combinations, Algorithms for generation of permutations.

Discrete Probability, Conditional Probability, Information and Mutual Information, Binomial Coefficients and combinatorial Identities

Unit 3: Relations and Functions [9]

Definitions, Properties of Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations and lattices, Chains and Anti-chains Definitions, Domain, Range, One-To-One and One-To-One, Inverse And Composition, Pigeon hole Principle, Discrete Numeric Functions and Gathering Functions, Job Scheduling Problems



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Unit 4: Graphs [9]

Definition And Examples Of Graphs, Incidence And Degree Sub-graphs, Walks, Path, Circuits, Connected and disconnected graphs, Euler Graphs Operations on graphs. Hamiltonian Graphs, Traveling Salesman problem Algorithms: Connectedness Algorithm, Shortest Path Algorithm

Product of two graphs, Complement of a graph, Self-Complement Of a graph

Unit 5: Trees [9]

Definition and properties of trees, Pendent Vertices, center of a tree, Rooted And Binary Tree. Spanning Trees, minimum spanning tree algorithms. Fundamental Circuits, cut set and cut vertices, fundamental cut sets Connectivity and separability, max-flow min-cut theorem.

Learning Resources:

Textbooks/Reference Books::

1. Kenneth H. Rosen, —Discrete Mathematics and its Applications, Tata McGraw-Hill, ISBN 978-0-07-288008-3, 7th Edition.
2. C.L. Liu, —Elements of Discrete Mathematics, TMH, ISBN 10:0-07-066913-9. 6th Edition

Supplementary Reading:

1. Discrete Mathematical Structures: Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, Nadeen-Ur-Rehman. Person Publication, 6th Edition
2. Discrete Mathematics and Its Applications: by Rosen, McGraw Hill Publication, 8th Edition.
3. Graph Theory with Application to Engineering and Computer Science, Deo, Narsing, Eastern Academy Education, 5th Edition.

Weblinks:

1. <https://www.javatpoint.com/discrete-mathematics-tutorial>
2. https://www.tutorialspoint.com/discrete_mathematics/index.htm
3. https://www.tutorialspoint.com/discrete_mathematics/index.htm

MOOCs: Online courses for self-learning

Courses by NPTEL and MIT Open Courseware etc

Pedagogy:

- Participative Learning,
- discussions,
- algorithm,
- programming concepts,
- experiential learning through practical problem solving,
- assignments.

