

SES'S L. S. RAHEJA COLLEGE OF ARTS AND COMMERCE
(AUTONOMOUS)



Syllabus of Principles of Discrete Structures and Algorithmic Techniques
under NEP 2020 vertical (OE) with effect from 2024-2025

Programme: Bachelor of Science in Information Technology

Department of Mathematics, Statistics and Computer

HoD/Sr. Person of the Department: Dr. Seema Ukidve

Date of approval by the BoS: 24/04/2024

Approved by the Academic Council: 29/04/2024

Approved by the Governing Body: 06/05/2024



Programme: B.Sc.(IT)				Semester : I	
Course : Principles of Discrete Structures and Algorithmic Techniques				Code: UGBSCITIOE124	
Academic Year: 2024-2025		Batch: 2024-2027			
Teaching Scheme			Evaluation Scheme		
Lectures	Practical	Tutorials	Credits	Internal Continuous Assessment (ICA) (weightage)	Term End Examinations (TEE) (weightage)
30	Nil	Nil	2	20	30

Learning Objectives:	<ol style="list-style-type: none"> 1. Course will provide students with an overview of discrete mathematics. 2. Students will learn about topics such as logic and proofs, sets and functions, recursion, graph theory, trees and other important discrete math concepts.
Learning Outcomes :	<ol style="list-style-type: none"> 1. Use logical notation. 2. Perform logical proofs. 3. Apply recursive functions and solve recurrence relations. 4. Use graphs and trees. 5. Apply basic and advanced principles of counting. 6. Define sets and Relations. 7. Calculate discrete probabilities.
Pedagogy:	<ol style="list-style-type: none"> 1. Interactive Lectures 2. Flipped Classroom 3. Case Studies and Real-World Applications 4. Collaborative Learning 5. Research Component

Detailed Syllabus: (per session plan)

Session Outline for “Principles of Discrete Structures and Algorithmic Techniques”

Each lecture session would be of one hour duration (30 Sessions).

Module	Module Content	Module Wise Pedagogy Used	Module Wise Duration
I	Set Theory Introduction, Sets and Elements, Subsets, Venn Diagrams, Set Operations, Algebra of Sets, Duality, Finite Sets, Counting Principle, Classes of Sets, Power Sets, Partitions, Mathematical Induction Relations Introduction, Product Sets, Relations, Pictorial Representatives of Relations, Composition of Relations, Types of Relations, Closure Properties, Equivalence Relations, Partial Ordering Relations		15

II	<p>Functions and Algorithms Introduction, Functions, One-to-One, Onto, and Invertible Functions, Mathematical Functions, Exponential and Logarithmic Functions, Sequences, Indexed Classes of Sets, Recursively Defined Functions, Cardinality</p> <p>Graph Theory Introduction, Data Structured, Graphs and Multigraphs, Subgraphs, Isomorphic and Homoeomorphic Graphs, Paths, Connectivity, Traversable and Eulerian Graphs, Bridges of Königsberg, Labelled and Weighted Graphs, Complete, Regular, and Bipartite Graphs, Tree Graphs, Planar Graphs, Graph Colourings, Representing Graphs in Computer Memory, Graph Algorithms, Traveling-Salesman Problem, Solved Problems</p> <p>Directed Graphs Introduction, Directed Graphs, Basic Definitions, Rooted Trees, Sequential Representation of Directed Graphs, Marshall's Algorithm, Shortest Paths, Linked Representation of Directed Graphs, Graph Algorithms: Depth-First and Breadth-First Searches, Directed Cycle-Free Graphs, Topological Sort, Pruning Algorithm for Shortest Path</p>		15
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REFERENCE BOOKS

Title	Author/s	Publisher	Edition	Year
Discrete Mathematics, Schaum's Outlines Series	Seymour Lipschutz, Marc Lipson	Tata MCGraw Hill	3 rd	2007
Discrete Mathematics with Applications	Sussana S. Epp	Cengage Learning	5 th	2018
Discrete Mathematics and its Applications	Kenneth H. Rosen	Tata MCGraw Hill	8 th	2019
Discrete mathematical structures	B Kolman RCBusby, S Ross	PHI		
Discrete structures	Liu	Tata MCGraw Hill		
Advanced Applied Mathematics	M. P. Chaudhary	Piyush Book Publication Pvt. Ltd. New Delhi, India, 2003 . ISBN: 81-86548-64-5		

QUESTION PAPER PATTERN

Details of Internal Continuous Assessment (ICA)

Internal Test Marks: 10

1 internal test of 10 marks will be conducted.

Term End Examination Question Paper Pattern Total Marks: 30

Q1 Answer any **three** out of the following Four questions (based on Module I) $5*3=15$

Q2 Answer any **three** out of the following Four questions (Based on Module II) $5*3=15$