Code: BCS405A **Course: Discrete Mathematical Structures**
Credits: 3 **L:T:P - 2:2:0**
SEE: 100 Marks **CIE: 50 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	Basics of number system, Mathematics
Learning objectives	1. To solve problems using concepts of Functions. 2. Solve problems using Relations and its properties. 3. To introduce Generating Functions and Recurrence Relations 4. To introduce concepts and properties of Graphs 5. To introduce the concepts of Trees and its properties.

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Apply the concepts and properties of Functions and Relations in solving problem.	Apply
CO2	Solve problems using Recurrence Relations and Study its applications in computers.	Apply
CO3	Solve problems using concepts of graphs and analyze its real-world applications.	Apply
CO4	Synthesis tree structure paradigm.	Analyze

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	3	3	-	2	-	-	-	-	2	-	2	2		-	2
CO2	3	3	-	2	-	-	-	-	2	-	2	2		-	2
CO3	3	3	-	2	-	-	-	-	2	-	2	2		-	2
CO4	3	3	-	3	-	-	-	-	2	-	2	2		-	2

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1: Functions			
1.1	**Functions:** Cartesian Products and Relations	2	-	-
1.2	Plain and One-to-One, Onto Functions	1	1	-
1.3	The Pigeonhole Principle	1	1	-
1.4	Function Composition and Inverse Functions	1	1	-
	Module – 2: Relations			
2.1	**Relations:** Properties of Relations,	1	1	-
2.2	Computer Recognition – Zero-One Matrices and Directed Graphs	2	1	-
2.3	Partial Orders – Hasse Diagrams.	2	1	-
	Module – 3: Recurrence Relations			
3.1	**Recurrence Relations:** First order linear recurrence relations,	2	-	-
3.2	The Second order linear homogeneous recurrence relation with constant coefficients	1	-	-

3.3	Non Homogeneous recurrence relation	2	1	-
	Module – 4: Graph Theory and Applications			
4.1	**Graph Theory and Applications**: Definitions and Examples Sub graphs, Complements	1	1	-
4.2	Graph Isomorphism, Vertex Degree, Euler Trails and Circuits	1	0	-
4.3	Planar Graphs	1	1	-
4.4	Hamilton Paths and Cycles	1	1	-
4.5	Graph Coloring, and Chromatic Polynomials	1	1	-
	Module – 5: Trees			
5.1	**Trees:** Definitions, Properties, and Examples	2	1	-
5.2	Rooted Trees	1	1	-
5.3	Trees and Sorting	1	1	-
5.4	Weighted Trees and Prefix Codes	1	-	-
	Total No. of Lecture Hours	**25**	-	-
	Total No. of Tutorial Hours		**15**	-
	Total No. of Practical Hours			**00**

Textbook:

1. Discrete and Combinatorial Mathematics, Ralph P. Grimaldi, 5th Edition, PHI/Pearson Education, 2004.

Reference Book:

1. Handbook of discrete and combinatorial mathematics, Kenneth H.Rosen, John G.Michels.
2. Mathematics of Computer Science, Prof. Albert R.Meyer, MIT Open Course Ware.
3. Concrete Mathematics: A foundation for computer science, Ronald L.Graham, Donald Ervin Knuth, Oren Patashnik
4. Graph Theory with Applications to Engineering and Computer Science by
5. NarsinghDeo, Prentice-Hall, 2004