



COURSE DATA SHEET

SEMESTER	I	BATCH	2026-2029
COURSENAME	LOGIC AND DISCRETE SYSTEMS	COURSE CODE	26UMAGE1E03
COURSE UNITS	5	COURSE TYPE	GENERIC ELECTIVE -I
CONTACT HOURS (L-T-P)	4-2-0	CREDITS	4
OFFERED BY	MATHEMATICS	SHIFT-(I/II) Shift-I-8.15am - 12.50pm Shift-II-1.00pm to 5.30pm	I

COURSE OBJECTIVES

1.	Understand the fundamental concepts of mathematical logic, sets, functions, relations, and algebraic systems
2.	Develop analytical and problem-solving skills by applying logical reasoning, truth tables, and algebraic structures.
3.	Gain knowledge of groups, semigroups, monoids, and their applications in discrete mathematical structures.
4.	To introduce graph theory concepts and analyze various types of graphs, trees, graph connectivity, and graph traversals.
5.	Apply graph algorithms such as Dijkstra's shortest path algorithm and Kruskal's minimum spanning tree algorithm to solve real-world computational problems.

COURSE OUTCOMES: On completion of the course the students will be able to...

	CO Statement	Cognitive Level
CO1	Explain the concepts of propositional logic, logical connectives, truth tables, tautologies, contradictions, and logical equivalences to solve logical problems.	K1-K3 (Understand and Apply)
CO2	Demonstrate the concepts of sets, functions, composition of functions, relations, and characteristic functions in mathematical	K1-K3 (Understand and Apply)



	and computational contexts.	
CO3	Analyze algebraic structures such as semigroups, monoids, groups, and subgroups, and verify their fundamental properties.	K1-K4 (Understand, Apply and Analyze)
CO4	Analyze the properties of graphs and trees, including graph isomorphism, connectedness, Euler and Hamiltonian graphs, and their applications in solving discrete mathematical problems.	K1-K5 (Understand, Apply, Analyze and Evaluate)
CO5	Apply graph algorithms to determine shortest paths, minimum spanning trees, and planar graph properties for solving network and optimization problems.	K1-K5 (Understand, Apply, Analyze and Evaluate)

SYLLABUS

UNIT	TOPICS	HOURS
1	Unit I Logic: Introduction, Propositions, Connectives, truth table tautology and contradiction, Logical Equivalences. Chapter: 3 Sections: 3.0 to 3.5	15
2	Unit – II Functions Sets and functions: Introduction, Types of sets, Laws on Sets, Relations Equivalence Relations, Functions, Types of functions , Composition of functions (Simple Problems). Chapter: 4 Sections 4.0 to 4.3	15
3	Unit – III Algebraic Systems Algebraic Systems: Introduction, semigroups, Groups, Subgroups, monoids (excluding the topic: Group of permutations.) Chapter: 5 Sections 5.1 to 5.4	15
4	Unit – IV Introduction to Graphs Graphs and Trees: Introduction, Graphs, sub graphs, isomorphism, Some Special classes of graphs, connectedness, Euler graphs Hamiltonian graphs and circuits, trees. Chapter: 9 Sections 9.1 to 9.9	15
5	Unit – V Graphs and Trees Graphs and trees (cont.): Planar graphs, Dijkstra's Algorithm for shortest path, Algorithm for minimum Spanning trees (Kruskal's Algorithm), spanning trees. Chapter: 9 Sections 9.11, 9.13,9.16-9.18	15



		Total Hours 75
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TEXT/REFERENCE BOOKS/E - RESOURCES:

Text Book	1. ChandrasekHara Rao K., Discrete Mathematics, Narosapublishing housepvt.ltd,New Delhi. Reprint 2012,
Books For Reference	1. Rajagopalan S. P., Sattanathan R., Discrete Mathematics, Marghampublications,Chennai, 2010. 2. D.Iranian, B.Pushpa, SCITECH Winners wisdom Publishers,2019. 3. Kindle Edition, Discrete Mathematics Fifth Edition For Anna University By Pearson Fifth Edition. 4. Veerarajan, T., <i>Discrete Mathematics</i> , McGraw Hill Education (India) Private Limited, New Delhi, 2018. 5. Vatsa B. S., Suchi Vatsa, Reprint: Discrete Mathematics New Age international(p) ltd. Publishers, 2020 6. Geetha P., Reprint, Discrete Mathematics, SciTech Publications (India) Pvt. Ltd,2017.
E-Learning Resources	1. http://www-th.ucdenver.edu/~wcherowi/courses/m4408/gtln.html 2. https://freebookcentre.net/maths-books-download/Graph-Theory-Lecture-Notes-by-NPTEL.html 3. https://www.studocu.com/en-ca/document/ryerson-university/discrete-mathematics-ii/lecture-notes/lecture-notes-lectures-introductory-graph-theory/352148/view 4. https://youtu.be/Fxa-Uw1CtYQ 5. https://youtu.be/MiCsFcI_0ss

PEDAGOGY(TEACHING METHODOLOGY):

- ChalkandTalk
- LCD



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- Assignment
- Seminar
- Quiz
- Groupdiscussion
- Reference material landvideos
- E-learning resources

CO-PO AND CO-PSO MAPPING:										
	PO1	PO2	PO3	PO4	PO5	PO6		PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2		3	2	1
CO2	3	2	3	2	3	2		2	2	2
CO3	3	2	3	2	2	2		3	2	2
CO4	3	3	3	2	2	2		2	3	1
CO5	3	2	2	2	2	2		3	3	1
Average (Use only filled in cells for calculation)	3	2.2	2.8	2	2.2	2		2.6	2.4	1.4

Correlation Level: 1-Low 2-Moderate 3-Strong



JUSTIFICATION OF CO-PO/PSO MAPPING			
CO	PO/PSO	Level of correlation	Justification
CO1	PO1	3	Students acquire strong knowledge of propositional logic, truth tables, tautologies, contradictions, and logical equivalences, thereby strengthening mathematical fundamentals.
	PO2	2	Logical reasoning helps students identify and analyze computational and mathematical problems.
	PO3	2	Students develop logical solutions using truth tables and logical equivalences.
	PO4	2	Students interpret logical expressions and validate results through systematic reasoning.
	PO5	2	Students utilize digital tools and software for constructing truth tables and logical analysis.
	PO6	2	Logical reasoning promotes ethical and rational decision-making in professional practice.
	PSO1	3	Provides a strong mathematical foundation required for Cognitive Systems and Computing applications.
	PSO2	2	Supports problem-solving skills required in computational modeling.
	PSO3	1	Offers introductory support for interdisciplinary applications involving logical reasoning.
CO2	PO1	3	Students gain comprehensive knowledge of sets, relations, and functions used in mathematics and computer science.
	PO2	2	Relations and functions enable analysis of mathematical and computational problems.



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	PO3	3	Students design mathematical models using sets and functions to solve practical problems.
	PO4	2	Students interpret mappings and relationships using analytical techniques.
	PO5	3	Functions and relations form the basis of many computing and programming applications.
	PO6	2	Develops systematic and responsible problem-solving abilities.
	PSO1	2	Supports mathematical modeling relevant to Cognitive Systems.
	PSO2	2	Enhances analytical thinking through relation and function analysis.
	PSO3	2	Facilitates applications in interdisciplinary computational domains.
CO3	PO1	3	Students understand algebraic structures such as semigroups, monoids, groups, and subgroups.
	PO2	2	Students analyze algebraic properties and verify structural relationships.
	PO3	3	Algebraic structures assist in constructing mathematical models and computational solutions.
	PO4	2	Encourages analytical evaluation of abstract mathematical systems.
	PO5	2	Supports applications in cryptography, automata theory, and computer science.
	PO6	2	Develops systematic and responsible problem-solving abilities.
	PSO1	2	Supports mathematical modeling relevant to Cognitive Systems.
	PSO2	2	Enhances analytical thinking through relation and function analysis.
	PSO3	3	Facilitates applications in interdisciplinary computational domains.
CO4	PO1	2	Students understand algebraic structures such as semigroups, monoids, groups, and subgroups.
	PO2	3	Students analyze algebraic properties and verify structural relationships.
	PO3	2	Algebraic structures assist in constructing mathematical models and computational solutions.
	PO4	2	Encourages analytical evaluation of abstract mathematical systems.



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	PO5	2	Supports applications in cryptography, automata theory, and computer science.
	PO6	3	Promotes logical thinking and professional problem-solving skills.
	PSO1	2	Provides advanced mathematical foundations essential for Cognitive Systems.
	PSO2	2	Strengthens computational reasoning and algorithmic understanding.
	PSO3	3	Enables interdisciplinary applications involving abstract algebraic models.
CO5	PO1	3	Students acquire in-depth knowledge of graph theory and tree structures.
	PO2	3	Students analyze graph properties, connectivity, Euler and Hamiltonian graphs.
	PO3	2	Students develop solutions to network-based problems using graph concepts.
	PO4	2	Graph analysis enhances critical thinking and interpretation of complex structures.
	PO5	2	Supports the use of graph-based software tools and computational techniques.
	PO6	2	Encourages collaborative and ethical approaches to solving real-world network problems.
	PSO1	3	Graph theory supports computational modeling in Cognitive Systems.
	PSO2	1	Strongly contributes to algorithmic problem-solving and data representation.
	PSO3	3	Provides introductory interdisciplinary applications of graph theory.