

ATMIYA UNIVERSITY

Faculty of Science

DSE-Interdisciplinary (Theory) For the students admitted from A.Y. 2023-2024 & onwards		
Offering Department: Mathematics		Offered to: M.C.A.
Semester – I		
Course Code	Course Title(F)	Course Credit and Hours
23MCAID101	Discrete Mathematical Structures	3 Credits - 3 hrs/wk (3 Theory)

Course Description:

This course should cover the basic concepts of mathematics such as set theory, logic, functions and relations etc as well as discrete mathematics, including graph theoretical concepts, which are helpful for the students to apply the knowledge in the field of computer application.

Course Purpose:

The purpose of the course is to have some basic knowledge in mathematics for the learner who wants to be the part of computer application as Mathematics is a fundamental part of computer application. In each application or software, there are many uses of mathematics such as binary number system, statistics, linear algebra, calculus, discrete mathematics etc.

Course Outcomes: Upon completion of this course, the learner will be able to

CO No.	CO Statement	Blooms taxonomy Level (K ₁ to K ₆)
CO ₁	Understand and demonstrate the concept of Set Theory and Logic.	K1, K2
CO ₂	Define and explain the concept of Functions and Relations.	K1, K2
CO ₃	Review and analyse the concept of Permutation and combinations.	K2, K4
CO ₄	Develop and interpret the concept of graph theory.	K2,K3
CO ₅	Summarize and apply Algorithms.	K2,K3

Course Contents	Hrs
Module-I: Set Theory and Logic	9
<ul style="list-style-type: none">Basic set theory- terminology and notationsClasses of sets and power setSet operationsVenn Diagrams	

<ul style="list-style-type: none"> • Mathematical induction • Propositional logic, Logical equivalence. 	
Module-II: Functions and Relations	8
<ul style="list-style-type: none"> • Mapping (bijective, surjective, injective), • Relations-equivalence, • Poset, Lattice 	
Module-III: Permutation and combinations.	8
<ul style="list-style-type: none"> • Permutations (Meaning, formula) • Permutations of different things • Permutations of Similar things • Restricted Permutation • Combinations (Meaning formula) • Combinations of things taken some or all at time • Some Restricted Combinations • Examples 	
Module-IV: Concepts of Graph Theory.	10
<ul style="list-style-type: none"> • Graphs-Definition and examples. • Sub-graphs, standard graphs. • Isomorphism of Graphs. • Trees, spanning trees, binary trees. • Matrix representation of graphs. 	
Module-V: Algorithms in Graph Theory.	10
<ul style="list-style-type: none"> • Kruskal's Algorithm, • Prim's Algorithm, • Dijkstra's Algorithm, • Flyod's Algorithm, • Warshall's Algorithm, • DFS, BFS. 	

Pedagogic Tools:

- Chalk and Talk
- PPT and Videos.
- Assignment
- Group discussion
- Seminar

Text Books:

- J. L. Mott, Abraham Kandel and T. P. Baker, (2008), Discrete Mathematics for Computer Scientists and Mathematicians, PHI.
- Bhishma Rao, (2006), Discrete Structure and Graph Theory, Scitech Publications.
- S. Arumugam and S. Ramachandran, (2015), Invitation to Graph Theory, Scitech Publications.

Reference Books:

- Stoll R.R. (1979), Set theory and Logic, Dover Publications, New York.
- Lipschutz S. (1988), Set Theory and Related Topics, 2nd edition, Schaum's Outline Series, McGraw Hill.
- J. Clark and D. A. Holton, (1991), A First Look at Graph Theory, World Scientific Publishing Co. Pvt. Ltd.
- J. P. Tremblay and R. Manohar, (2004), Discrete Mathematical Structures with Applications to Computer Science, Tata-McGraw Hill Publishing Company Limited, New Delhi, 21st Reprint.

Suggested reading / E-resources:

- http://www.math.toronto.edu/weiss/set_theory.pdf
- <https://www.classcentral.com/classroom/youtube-math-320-set-theory-102494/62fc38196db96>

Suggested MOOCs:

- <https://www.classcentral.com/subject/set-theory>
- <https://www.coursera.org/browse/math-and-logic>
- <https://nptel.ac.in/courses/111107058>

Methods of Assessment & Tools:

Components of CIA: 40 marks

Sr. No.	Component	Content	Duration (if any)	Marks	Sub Total
A	Test 1	Any 2 units	1 $\frac{1}{2}$ hours	5 (Set for 30)	20
	Test 2	Remaining 3 units	2 $\frac{1}{2}$ hours	15 (Set for 45)	
B	Assignment			08	20
C	Class activity			12	
Grand Total					40
Assignment		<ul style="list-style-type: none"> • Hand Book • Seminars 			
Class activity		<ul style="list-style-type: none"> • Quiz 			

	<ul style="list-style-type: none">• Class Test• Group Discussion
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Note: Any other assessment tools or methods can be adopted as per requirement of the course