COURSE CODE	COURSE NAME	L	T	P	CREDIT	YEAR OF INTRODUCTION
101009/MA100 A	DISCRETE MATHEMATICS	3	1	0	4	2021

1. Preamble

This course introduces students to the modern theory of probability and statistics, covering important models of random variables and analysis of random processes using appropriate time and frequency domain tools. A brief course in numerical methods familiarizes students with some basic numerical techniques for finding roots of equations, evaluating definite integrals solving systems of linear equations and solving ordinary differential equations which are especially useful when analytical solutions are hard to find.

2. Prerequisite

A basic course in Set theory.

3. Syllabus

Module 1:

Boolean algebra: Introduction of Boolean algebra - truth table- basic logic gate - basic postulates of Boolean algebra - principle of duality - canonical form - Karnaugh map.

Module 2:

Abstract algebra: Set - relation- group – ring - field.

Module 3:

Combinatorics: Basic counting - balls and bins problems - generating functions - recurrence relations- Proof techniques- principle of mathematical induction- pigeonhole principle.

Module 4:

Graph Theory: Graphs and digraphs – complement- isomorphism - connectedness and reachability - adjacency matrix - Eulerian paths and circuits in graphs and digraphs - Hamiltonian paths and circuits in graphs and tournaments – trees - Planar graphs- Euler's formula- dual of a planer graph - independence number and clique number - chromatic number- statement of Four-color theorem.

Module 5:

Logic: Propositional calculus - propositions and connectives, syntax; Semantics – truth assignments and truth tables- validity and satisfiability- tautology- Adequate set of connectives-Equivalence and normal forms- Compactness and resolution- Formal reducibility - natural deduction system and axiom system- Soundness and completeness.

4. Text Books

1. I. N. Herstein , *"Topics in Algebra",* Second Edition, John Wiley and Sons,2006.
2. M. Morris Mano,*" Digital Logic & Computer Design",* First edition, Pearson, 2016.
3. C. L. Liu ,*"Elements of Discrete Mathematics"*, Second Edition, McGraw Hill, New Delhi, 2017.
4. J. A. Bondy and U. S. R. Murty, "*Graph Theory with Applications*", Macmillan Press, London, 1976.
5. L. Zhongwan ,"*Mathematical Logic for Computer Science*" , World Scientific, Singapore,1989.

5. Reference Books

1. Gilbert Strang, "*Introduction to linear algebra*". Second Edition, Cengage learning India,2005.
2. Harry lewis, Rachel Zax, "*Essential Discrete Mathematics for Computer Science",Princeton University Press,2019.*
3. R. A. Brualdi," *Introductory Combinatorics*", Fifth edition, North-Holland, New York,2009.
4. N. Deo ,"*Graph Theory with Applications to Engineering and Computer Science",* Prentice Hall, 1979.
5. E. Mendelsohn, "*Introduction to Mathematical Logic*", Second Edition, Van-Nostrand, London.

6. Course Outcomes

After the completion of the course the student will be able to

CO1: Understand the concept, properties and important models of logic gates and Karnaugh maps.
CO2: Understand the concept, properties and structures like group and ring.
CO3: Analyze counting principle and its applications.
CO4: Illustrate the graphs and its properties and applications in colouring.
CO5 Apply propositional calculus and normal form

7. Mapping of Course Outcomes with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1	3	2	3	2	1	_	_	_	_	2	_	1	_	_	_
CO.2	3	2	3	2	3	_	_	_	_	2	_	2	_	_	_
CO.3	3	2	2	_	2	_	_	_	_	2	_	2	-	_	_
CO.4	3	2	3	1		_	_	_	_	2	_	_	_	_	_
CO.5	3	2	2	1	1	_	_	_	_	2	_	1	-	_	_

8. Assessment Pattern

Learning Objectives	Continuous Internal Evaluation (CIE)		End Semester Examination (ESE out of 100)
	Internal Examination 1* (50)	Internal Examination 2* (50)	
Remember	10	10	20
Understand	20	20	40
Apply	20	20	40
Analyse			
Evaluate			
Create			

***Internal examination (offline): 50 and Internal examination (online): 25**

9. Mark Distribution

Total	CIE				ESE
	Attendance	Internal Examination	Assignment/Quiz/ Course Project	Total	
150	10	25 (Average of two scores)	15	50	100

10. End Semester Examination Pattern

There will be two parts; Part A and Part B. Part A contain 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer anyone. Each question can have maximum 2 sub-divisions and carry 14 marks.

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