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Course Code: MAT133

Semester: I

DISCRETE MATHEMATICS

Course Objective:

This course will help the learner to understand Boolean Algebra and basic properties of Boolean Algebra, various concepts in Differential and Integral calculus, Algebraic structures like Groups, Rings, Fields and construct proofs by Mathematical Induction.

UNIT - I

10 Periods

Boolean algebra: Introduction of Boolean Algebra - Truth Table - Basic Logic Gates - Basic Postulates of Boolean Algebra - Principle of Duality - Canonical Form - Karnaugh Map.

UNIT - II

10 Periods

Calculus: Differential Calculus – Limits, Continuity, Geometrical interpretation of the derivative, Integral Calculus - Applications of Double and Triple Integrals, to calculate Volume of solids.

UNIT - III

15 Periods

Abstract algebra: Sets- Basic Set Operations-Cartesian Product and Power sets – Relations, functions and their properties, **Groups** – Groups, Abelian groups, Subgroups, Cyclic groups, Cosets, Lagrange's theorem; **Introduction to Rings and Fields:** Basic definitions and concepts.

UNIT - IV

10 Periods

Combinatorics: Basic Counting principles - Balls and Pins Problems - Pigeonhole Principle-Generating Functions - Recurrence Relations - **Proof Techniques** - Principle of Mathematical Induction

TEXTBOOKS

1. T Veerarajan, *Discrete Mathematics*, Tata Mc-Graw Hill Education, 2008.
2. Morris Mano M. *Digital Logic & Computer Design*, Pearson Education, Tenth Imprint, 2008.
3. Grewal B.S. *Higher Engineering Mathematics*, Khanna Publication, Delhi, Forty Fourth Edition, 2015.

REFERENCES

1. Joseph A. Gallian, *Contemporary Abstract Algebra*, Brooks/Cole CENGAGE Learning, 2013.
2. Herstein I.N. *Topics in Algebra*, John Wiley and Sons, Second Edition, 2006.
3. Peter V.O'Neil, *Advanced Engineering Mathematics*, Thomson Learning, Seventh Edition, 2012.
4. Greenberg M. D, *Advanced Engineering Mathematics*, Pearson Education, Second Edition, 2002.
5. Wartikar P.N, Wartikar J.N. *Textbook of Applied Mathematics*, Volume I and II, Vidyarthi Prakashan, 2010.

UNITWISE LEARNING OUTCOMES

Upon successful completion of each unit, the learner will be able to

Unit I	<ul style="list-style-type: none">• Simplify simple Boolean functions using basic Boolean properties.• Optimize a Boolean expression using Karnaugh Map
Unit II	<ul style="list-style-type: none">• Interpret the geometric meaning of differential and integral calculus• Apply the concept and principles of differential and integral calculus to solve geometric and physical problems
Unit III	<ul style="list-style-type: none">• Understand the basic concepts of group and use appropriate techniques to derive properties of group• Understand the elementary concepts of rings and fields and appreciate the similarities and difference between these concepts and those of group theory
Unit IV	<ul style="list-style-type: none">• Synthesize induction hypotheses and simple induction proofs• Derive closed form and asymptotic expressions from series and recurrences for growth rates of processes

COURSE LEARNING OUTCOMES

Upon successful completion of this course, the learner will be able to

- Define basic properties of Boolean algebra
- Describe concepts and principles of differential and integral calculus of real functions
- Explain concepts of group, rings and their applications in both algebraic and geometric contexts
- Model and analyze computational processes using combinatorial methods