Course Title : Discrete Mathematical Structures			
Course Code : P18CS35	**Semester : 3**	**L :T:P:H : 4:0:0:4**	**Credits: 3**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage : CIE:50%, SEE:50%**	

Course Content

Unit-1

Fundamentals of Logic: Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference. The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems.

Self Study Component : Basic Connectives, proofs of theorems

10 Hours

Unit-2

Properties of the Integers: Mathematical Induction, The Well Ordering Principle – Mathematical Induction, Recursive Definitions. The Division Algorithm:Prime numbers. Fundamental Permutations, Combinations – The Binomial Theorem, Combinations with Repetition.

Self Study Component : Principles of Counting: The Rules of Sum and Product

10 Hours

Unit-3

Relations and Functions: Relations, Functions – Plain and One-to-One, Onto Functions. The Pigeon-hole Principle, Function Composition and Inverse Functions. Properties of Relations. Computer Recognition – Zero-One Matrices and Directed Graphs, Partial Orders – Hasse Diagrams, Equivalence Relations and Partitions.

Self Study Component : Cartesian Product and Relations

11 Hours

Unit-4

The Principle of Inclusion and Exclusion: The Principle of Inclusion and Exclusion, Generalizations of the Principle, Derangements – Nothing is in its Right Place, Rook Polynomials.Arrangement with forbidden position.

Recurrence Relations: First Order Linear Recurrence Relation, The Second Order Linear Homogeneous Recurrence Relation with Constant Coefficients.

Self Study Component : Addition Principle

10 Hours

Unit-5

Introduction to Graph Theory: Definitions and Examples, Sub graphs, Complements, and Graph Isomorphism, Vertex Degree, Euler Trails and Circuits ,Planar graphs. Trees: Definitions, Properties, and Examples, Routed Trees, Trees and Sorting, Weighted Trees and Prefix Codes

Self Study Component : Graph colouring and chromatic polynomials

11 Hours

Text Book:

1. Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5th Ed, Pearson Ed. 2004

Reference Books:

1. Basavaraj S Anami and Venakanna S Madalli: Discrete Mathematics – A Concept based approach, Universities Press, 2016 2.
2. Kenneth H. Rosen: Discrete Mathematics and its Applications, 6th Edition, McGraw Hill, 2007.
3. Jayant Ganguly: A Treatise on Discrete Mathematical Structures, Sanguine-Pearson, 2010.
4. D.S. Malik and M.K. Sen: Discrete Mathematical Structures: Theory and Applications, Thomson, 2004. 5. Thomas Koshy: Discrete Mathematics with Applications, Elsevier, 2005, Reprint 2008.

Course outcomes:

After studying this course, students will be able to:

1. **Verify** the correctness of an argument using propositional and predicate logic
2. **Demonstrate** the ability to solve problems using counting techniques and combinatorics in the context of discrete probability.
3. **Solve** problems involving recurrence relations.
4. **Construct** proofs using direct proof, proof by contraposition, proof by contradiction, and proof by cases, and mathematical induction.
5. **Ability** to Explain and distinguish graphs and their properties.

CO-PO Mapping

Semester: 3	**Course code : P18CS35**						**Title : Discrete Mathematical Structures**								
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PO S1**	**PO S2**
CO 305.1	**Verify** the correctness of an argument using propositional and predicate logic.	3	3	1							3				2
CO 305.2	**Demonstrate** the ability to solve problems using counting techniques and combinatorics in the context of discrete probability.	3	2	2							2			2	2
CO 305.3	**Solve** problems involving recurrence relations	3	2	2							2				2
CO 305.4	**Construct** proofs using direct proof, proof by contraposition, proof by contradiction, proof by cases, and mathematical induction	3	2	2							2				2
CO 305.5	**Ability** to Explain and distinguish graphs and their properties.	3	2	2							2			2	2