DISCRETE MATHEMATICAL STRUCTURES
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER – III

Subject Code	**17CS36**	**IA Marks**	**40**
Number of Lecture Hours/Week	**04**	**Exam Marks**	**60**
Total Number of Lecture Hours	**50**	**Exam Hours**	**03**

CREDITS – 04

Module -1	**Teaching Hours**
Fundamentals of Logic: Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference. Fundamentals of Logic contd.: The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems,	**10Hours**
Module -2	
Properties of the Integers: Mathematical Induction, The Well Ordering Principle – Mathematical Induction, Recursive Definitions. Principles of Counting. **Fundamental Principles of Counting:** The Rules of Sum and Product, Permutations, Combinations – The Binomial Theorem, Combinations with Repetition,.	**10 Hours**
Module – 3	
Relations and Functions: Cartesian Products and 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.	**10 Hours**
Module-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. **Recurrence Relations:** First Order Linear Recurrence Relation, The Second Order Linear Homogeneous Recurrence Relation with Constant Coefficients,	**10 Hours**
Module-5	
Introduction to Graph Theory: Definitions and Examples, Sub graphs, Complements, and Graph Isomorphism, Vertex Degree, Euler Trails and Circuits , **Trees**: Definitions, Properties, and Examples, Routed Trees, Trees and Sorting, Weighted Trees and Prefix Codes	**10 Hours**

Course outcomes: After studying this course, students will be able to:

- Make use of propositional and predicate logic in knowledge representation and truth verification.
- Demonstrate the application of discrete structures in different fields of computer science.
- Solve problems using recurrence relations and generating functions.
- Apply different mathematical proofs, techniques in proving theorems.
- Compare graphs, trees and their applications.

Question paper pattern:

The question paper will have ten questions.
There will be 2 questions from each module.
Each question will have questions covering all the topics under a module.
The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, , 5th Edition, Pearson Education. 2004. (Chapter 3.1, 3.2, 3.3, 3.4, Appendix 3, Chapter 2, Chapter 4.1, 4.2, Chapter 5.1 to 5.6, Chapter 7.1 to 7.4, Chapter 16.1, 16.2, 16.3, 16.5 to 16.9, and Chapter 14.1, 14.2, 14.3).

Reference Books:

1. Basavaraj S Anami and Venakanna S Madalli: Discrete Mathematics – A Concept based approach, Universities Press, 2016
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.

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