| Unit | Contents of the Unit | Hours | COs |
|---|---|---|---|
| 1. | **SET THEORY:** Sets and Subsets, Set Operations and the Laws of Set Theory, Addition Principle, A First Word on probability | 08 | CO1 & CO2 |
| 2 | **FUNDAMENTALS OF LOGIC:** Basic Connectives and Truth Tables, Logical Equivalence: The laws of Logic, Logical Implication: Rules of Inference, The Use of Quantifiers – Open Statements, Quantifiers, and Logical Implication involving Quantifiers. | 08 | CO1 & CO3 |
| 3 | **RELATIONS AND FUNCTIONS**: Cartesian Products and Relations, Functions, Types of functions, Stirling Numbers of the Second Kind, The Pigeonhole Principle, Function Composition of functions and Invertible Functions. | 08 | CO4 & CO5 |
| 4 | **RELATIONS:** Zero-one matrices and directed graphs, Properties of Relations, Equivalence Relations, Partial Orders – Hasse Diagrams, Groups: Groups, Subgroups, Cyclic groups. | 08 | CO4 |
| 5 | **PRINCIPLES OF COUNTING:** The Rules of Sum and Product, Permutations, Combinations, Principle of Inclusion and Exclusion, Derangements, Rook Polynomials. | 08 | CO6 |

**Self-study component:**

**Note: 1. Questions for CIE and SEE not to be set from self-study component.**

**2. Assignment Questions should be from self-study component only.**

1. Coset Decomposition of a group: Lagrange's Theorem, Homomorphism, Isomorphism
2. Binomial and Multinomial Theorem, Combinations with repetitions, Catalan Numbers.

## TEXT BOOK:


1. Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education, 2004.
2. Dr. D.S.C, Discrete Mathematical Structures, 3rd Edition, PRISM


## REFERENCE BOOKS:


1. Kenneth H. Rosen: Discrete Mathematics and its Applications, 7th Edition, McGraw Hill, 2010.
2. JayantGanguly: A Treatise on Discrete Mathematical Structures, Sanguine-Pearson, 2010.
3. D.S. Malik and M.K. Sen: Discrete Mathematical Structures: Theory and Applications, Cengage Learning, 2004.