

## II SEMESTER

MTE 451	Discrete Mathematics and Applications	3 Credits (36 Hours)
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Prerequisite: Basic Mathematics up to class XII/PU.

### Unit I - Number Theory and Cryptography:

Divisibility and Modular Arithmetic, Integer Representations and Algorithms, Primes and Greatest Common Divisors, Solving Congruences, Applications of Congruences, Cryptography.

8 Hours

### Unit II - Counting Techniques:

The Basics of Counting, The Pigeonhole Principle Permutations and Combinations, Binomial Coefficients and Identities, Generalized Permutations and Combinations, Applications of Recurrence Relations, Solving Linear Recurrence Relations, Recurrence Relations, Generating Functions, Principle of Inclusion–Exclusion, Applications of Inclusion–Exclusion.

12 Hours

### Unit III - Order Relations and Structures:

Product Sets and Partitions, Relations, Properties of Relations, Equivalence Relations, Partially Ordered Sets, Extremal Elements of Partially Ordered Sets, Lattices, Finite Boolean Algebras, Functions on Boolean Algebras, Boolean Functions as Boolean Polynomials.

8 Hours

Unit IV - Groups and Coding Theory:

Binary Operations Revisited, Semigroups, Products and Quotients of Semigroups, Groups, Products and Quotients of Groups, Coding of Binary Information and Error Detection, Decoding and Error Correction.

8 Hours

References:

1. Kenneth H. Rosen - Discrete Mathematics and Its Applications, Tata Mc-Graw-Hill, 7<sup>th</sup> Edition, 2012.
2. Bernard Kolman, Robert C. Busby, Sharon Cutler Ross-Discrete Mathematical Structures- Prentice Hall, 3<sup>rd</sup> Edition, 1996.
3. Grimaldi R-Discrete and Combinatorial Mathematics. 1-Pearson, Addison Wesley, 5<sup>th</sup> Edition, 2004.