

## KEY TOPICS FOR UPCOMING EXAM (DS-SE2A)

- 1 The Foundations: Logic and Proofs 15%**
  - 1.3 Propositional Equivalences ..
  - 1.4 Predicates and Quantifiers ...
  - 1.5 Nested Quantifiers .....
  - 1.6 Rules of Inference .....
  - 1.7 Introduction to Proofs .....
- 2 Basic Structures: Sets, Functions, Sequences, Sums, and Matrices ..... 5%**
  - 2.3 Functions .....
  - 2.4 Sequences and Summations .
- 4 Number Theory and Cryptography . 15%**
  - 4.3 Primes and Greatest Common Divisors ..
  - 4.4 Solving Congruences .....
  - 4.5 Applications of Congruences .....
  - 4.6 Cryptography .....
- 5 Induction and Recursion . 5%**
  - 5.1 Mathematical Induction
  - 5.3 Recursive Definitions and Structural Induction .
- 6 Counting .. 5%**
  - 6.2 The Pigeonhole Principle .....
  - 6.3 Permutations and Combinations .....
  - 6.4 Binomial Coefficients and Identities .
- 8 Advanced Counting Techniques 5%**
  - 8.2 Solving Linear Recurrence Relations
  - 8.5 Inclusion–Exclusion .

## 9 Relations . . 5%

9.1 Relations and Their Properties .

9.5 Equivalence Relations .

## 10 Graphs . 25%

10.1 Graphs and Graph Models . . . . .

10.2 Graph Terminology and Special Types of Graphs

10.3 Representing Graphs and Graph Isomorphism . . .

10.4 Connectivity . . . . .

10.5 Euler and Hamilton Paths . . . . .

10.6 Shortest-Path Problems . . . . .

10.7 Planar Graphs . . . . .

10.8 Graph Coloring . . . . .

## 11 Trees . 20%

11.1 Introduction to Trees . . . . .

11.2 Applications of Trees . . . . .

11.3 Tree Traversal . . . . .

11.4 Spanning Trees . . . . .

11.5 Minimum Spanning Trees