Here are the topics you’ll want to know for the exam:

• Induction (Chapter 2)
  – Induction and Strong Induction
  – How to structure an inductive proof
  – How to recognize when induction might be useful

• Pigeonhole Principle (Chapter 1)
  – Pigeonhole Principle
  – Generalized Pigeonhole Principle
  – Use in packing problems
  – Recognizing other applications

• Basic Counting Techniques (Chapter 3)
  – Addition Rule
  – (Generalized) Multiplication Rule
  – Exponent Rule
  – (Falling) Factorials
  – Multinomial/Binomial Coefficients
  – Using rules in combination to solve counting problems

• Balls in Bins Problems (Chapter 5)
  – Distinguishability
  – (Weak) Compositions
  – Stars and Bars
  – Set Partitions
  – Sterling Numbers of the Second Kind
  – Bell Numbers
  – Integer Partitions
  – Ferrers Diagrams
  – Conjugate Partitions
  – Self-Conjugate Partitions and Partitions into distinct odd parts
  – Partitions into odd parts and partitions into distinct parts

• Permutations and Cycle Structure (Chapter 6)
  – Cycles
– Cycle notation for permutations
– Canonical Cycle Notation
– Counting permutations with a given cycle structure
– Sterling numbers of the first kind
– EVEN, ODD

• Inclusion-Exclusion (Chapter 7)
  – Generalized Addition Rule
  – Inclusion-Exclusion Principle
  – How to recognize applications of Inclusion-Exclusion
  – Derangements