1. Introduction to databases
   
   Sub-topics:
   a. Database Management Systems benefits

2. Data Modeling with the Entity-Relationship Model
   
   Sub-topics:
   a. Entities
      • Identifiers /Composite identifiers
      • Attributes
      • Strong entities
      • Weak entities
      • Id-dependent entities
   b. Relationships
      • Has-A relationships
         Maximum and minimum cardinality
         Identifying/non-identifying relationships
      • Is-A relationships (supertype/subtype)
         Inclusive/Exclusive

3. The Relational Model
   
   Sub-topics:
   a. Relation /Table
      • Attributes
   b. Integrity Constraints
   c. Keys
   d. Primary key
   e. Candidate key
   f. Surrogate key
   g. Foreign key
      • Referential integrity constraint

4. Transforming ER diagrams to Relational Model
   
   Sub-topics:
   a. Transform entities
      • Specify primary key
      • Specify candidate (alternate keys)
      • Specify properties for each column
         1. data type
2. null/not null
3. default values
4. other constraints
b. Transform relationships (foreign keys used here)
   • 1:1 relationships, 1:N relationships
     - identifying relationships
     - non-identifying relationships
   • N:M relationships
   • Supertype/subtype relationships
c. Specify logic to enforce minimum cardinalities

5. Normalization

   Sub-topics:
   a. Purpose
   b. Insert/delete/update anomalies
   c. Functional dependencies
      • Definition of key based on functional dependencies
d. Normal forms
   • First normal form
   • Second normal form
   • Third normal form
   • Boyce-Codd Normal Form
   • Decomposition into relations that are in Boyce-Codd Normal Form
e. Multivalued dependencies (not required for exam)
   • Fourth Normal Form

6. SQL

   Sub-topics:
   a. CREATE
   b. DROP
   c. ALTER
   d. INSERT
   e. DELETE
   f. UPDATE
g. SELECT…FROM… WHERE… framework
h. DISTINCT keyword
i. ORDER BY
j. Aggregate operators: COUNT, MIN, MAX, AVG, SUM
k. GROUP BY… HAVING
l. Subqueries
m. Joins (select from multiple tables)