

MEng Software Engineering – Database Systems

Midterm Practice Test

WEEK 1–2: Database Foundations

1. Define data, information, and knowledge.
2. Explain the difference between a DBMS and a database.
3. List the advantages of a DBMS over file-based systems.
4. What are the four major components of a database system?
5. Describe the role of the DBMS catalog.
6. What does data independence mean, and why is it important?
7. Compare logical vs physical data independence.
8. Explain data integrity and consistency.
9. Describe two problems solved by migrating from spreadsheets to a DBMS.
10. Name two common database tools (e.g., pgAdmin, MySQL Workbench).

WEEK 3: Data Models & ER Diagrams

1. Compare hierarchical, network, and relational models.
2. What are the main components of an ER diagram?
3. Define entity, attribute, relationship, and cardinality.
4. Differentiate strong and weak entities.
5. What are derived and composite attributes?
6. Draw an ER diagram for Students, Courses, and Professors (with relationships).
7. Identify PKs and FKs for your diagram.
8. Explain 1:N vs M:N relationships and how to represent M:N in schema form.

WEEK 4: Enhanced ER & Relational Models

1. Define generalization, specialization, and aggregation.
2. Differentiate total vs partial participation.
3. Explain inheritance in Enhanced ER (EER) models.
4. Define primary, foreign, composite, and candidate keys.
5. Convert the STUDENT–COURSE–ENROLLMENT model into a relational schema.
6. Explain referential integrity enforcement.
7. What happens if a parent record in a 1-to-many relation is deleted?

WEEK 5–6: Advanced Relational Model & Normalization

1. Define functional dependency (FD).
2. List insertion, deletion, and update anomalies.
3. Describe 1NF, 2NF, and 3NF rules.
4. When is BCNF required?
5. Define multivalued dependency and 4NF.
6. Normalize the given table (Student_ID, Course_ID, Instructor, Instructor_Office, Grade) to 3NF.
7. Convert one-to-one, one-to-many, and many-to-many relationships to tables.

8. Rewrite a BCNF-violating table to satisfy BCNF.
9. Which normalization form is typically enough in practice, and why?

PRACTICE TEST STRUCTURE

Part A – Multiple Choice / True-False (20 marks): Concepts, keys, relationships, normalization theory.
Part B – Short Answer (30 marks): Definitions and comparisons (FDs, anomalies, EER features).
Part C – Applied Design (50 marks): ERD from business scenario → Relational schema → Normalization to 3NF/BCNF.