বাংলাদেশ আর্মি ইন্টারন্যাশনাল ইউনিভার্সিটি অব সায়েন্স এন্ড টেকনোলজি, কুমিল্লা
BANGLADESH ARMY INTERNATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY (BAIUST), CUMILLA

Mid Term Examination, Spring 2025

Department of Computer Science and Engineering

Level-3 Term-I

Course Code: CSE-313

Course Title: Database Management Systems

Exam Duration: 1 Hours 30 Minutes

Full Marks: 90

Notes:

a. Figure on the right of each question indicate marks for respective question.
b. Use different answer scripts for each section.
c. Course Learning Outcomes are

CO1: Describe the theoretical concepts of database systems such as database architecture, database security, data models, relational algebra, query processing, and transactions.
CO2: Design and Apply database systems using ER/EER diagrams from given data requirements and relational schema algorithm for mapping ER/EER models.
CO3: Prepare standard queries using structured query Languages (SQL) for storage and manipulation of data.
CO4: Develop completed database applications using SQL and other effective programming languages and tools as a group project.
CO5: Apply functional dependencies, normalization, and integrity constraints for superior database design.
CO6: Critically evaluate alternative designs and architectures for databases and data warehouses.
CO7: Develop the communication skill by presenting topics on database management system.

Consider the following scenario to answer Question1 and Question2:

A university plans to migrate from a traditional file-based student record system to a DBMS for better student information management and academic performance tracking and Course management.

The system maintains various records, including:

Students: Student_ID, Name, Date_of_Birth, Contact, Major, Year_of_Enrollment, Department_ID

Courses: Course_ID, Course_Name, Credits, Department_ID, Instructor_ID

Instructors: Instructor_ID, Name, Department_ID, Contact, Office_Number

Departments: Department_ID, Department_Name, HOD_ID, Building

Enrollments: Enrollment_ID, Student_ID, Course_ID, Enrollment_Date, Grade

1. a. Identify the schemas of the tables required for this student management system. Clearly mention the table names, attributes, primary keys (PK), and foreign keys (FK). **[CO1→C1,C2]** 10

b. Draw a schema diagram for the student management system. [CO1→ C6] 10

c. Explain the advantages of using a DBMS for managing student records over a manual paper-based system. [CO1→ C1] 10

OR

a. Write relational algebra for the following queries: 15

i) List all courses taught by a specific instructor (e.g., Dr. Smith).
ii) Retrieve the names of students who have enrolled in a specific course (e.g., Database Management Systems).
iii) Find the total number of students in each department.
iv) Find the list of instructors who do not teach any course.
v) Get all students who have received a grade 'A' in any course of department "Computer Science and Engineering". [CO1→C6]

b. Give your reasoning why should the university authority will move from traditional file-based system to Database management System? Is there any importance of view abstraction in this scenario? [CO1→C4] 15

2. a. Write SQL queries to 30

i) Create a database for this University Management System and select to use it from other databases.
ii) Create any two tables with primary key, foreign key, not null, and unique key constraints.
iii) Insert three rows, with possible NULL supported columns of created tables in Question. 2.a.(ii).
iv) Now Update the Null values with proper values.
v) Drop the first table you created. Is there any error occurs? If yes why? [CO3→C3]

3. A large hospital wants to digitize its patient management system to efficiently manage patient records, staff, and treatment plans. The hospital maintains the following information:

Patients: Each patient has a unique Patient ID, Name, Date of Birth, Contact Details, and Emergency Contact. Patients may have multiple medical histories and appointments.

Medical Histories: Each medical history record is associated with a specific patient and includes a unique History ID, Diagnosis Details, Treatment Notes, and Date of Diagnosis. Medical histories are uniquely identified by the patient and the history record, making this a weak entity.

Doctors: Each doctor has a unique Doctor ID, Name, Specialization, Contact Number, and Years of Experience. Doctors are assigned to various patients based on their specialization.