National University of Computer & Emerging Sciences, Karachi
Fall-2025 School of Computing (BSCS, BSSE, BSCY, BSAI)

Assignment # 1

Subject: Database Systems -CS2005	**Post Date: 5/9/2025**
Total Marks: 40	**Due Date:** 21/9/2025
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Instructions to be strictly followed.

- For all questions involving SQL Queries:
  - ***Submit the SQL Scripts in a .txt file.***
- It should be obvious that submitting your work after the due date will result in zero points being awarded.
- Plagiarism (copying/cheating) and late submissions result in a zero mark.

Question #1: Briefly answer the following questions **[10 points]**

a) What are the problems with File system data management?

b) Explain the usage of the Composite Primary key with an example.

c) what operations are performed by the application program when DBMS is used.

d) which independence is difficult to achieve in three schema architectures and why. Elaborate with an example.

e) A key is a superkey but not vice versa. Explain this statement with an example.

Question #2: You are tasked with designing and managing a **Library Management System (LMS)** database. Apply your knowledge of **DDL queries, DML queries, database catalog, constraints, and constraint violations** to complete this assignment. **[15 points]**

1. **Database Design using DDL**

Write SQL CREATE TABLE statements for the following entities Specify at least **five constraints** in your table definitions (e.g., PRIMARY KEY, FOREIGN KEY, CHECK, etc):

- **Members**: MemberID (PK), Name, Email (unique), JoinDate (default current date).
- **Books**: BookID (PK), Title, Author, CopiesAvailable (cannot be negative).
- **IssuedBooks**: IssueID (PK), MemberID (FK), BookID (FK), IssueDate (default current date), ReturnDate.

2. **Database Catalog Design**

Create the databse catalog for the provided schema in part 1

3. **DML Queries for Daily Operations**

Write SQL statements for the following:

a. Insert at least **3 Members** and **3 Books**.

b. Record the **issuance of a book** to a member and update the available copies.

c. Display the **names of all members and their issued books** using a JOIN query.

4. **Constraint Violation Demonstration**

Write SQL statements that would result in the following errors (Do NOT correct them):

a. **Key constraint Violation** – Try inserting a duplicate MemberID.

b. **Referential integrity Violation** – Try issuing a book to a non-existent MemberID.

c. **Check Constraint Violation** – Try setting a negative value for CopiesAvailable.

5. Critical Thinking

Suggest **two improvements** you would add to this Library Management System in the future.

6. Nested queries:

Write **SQL queries using subqueries** (nested queries) to solve the following problems based on a sample **Library Management System** schema:

a. Find Members with No Issued Books

b. Find Books with Highest Copies

c. Find the Most Active Member

d. Find the Books Not Issued

e. Members with Books Overdue (Assume books are overdue if the ReturnDate is **NULL** and IssueDate is **more than 30 days ago.**

Question #3: Consider the following details given below and write each of the following queries in SQL. [15 points]

- Create a table Patient with attributes: Patient_ID, Name, Gender, DOB, Email, Phone, Address, Username, and Password.
- Create a table Doctor with attributes: Doctor_ID, Name, Specialization, Username, and Password.
- Create a table Appointment with attributes: Appointment_ID, Appointment_Date, Appointment_Time, Status, Clinic_Number, Patient_ID, and Doctor_ID.
- Create a table Prescription with attributes: Prescription_ID, Date, Doctor_Advice, Followup_Required, Patient_ID, and Doctor_ID.
- Create a table Invoice with attributes: Invoice_ID, Invoice_Date, Amount, Payment_Status, Payment_Method, and Patient_ID.
- Create a table Tests with attributes (Test_ID, Blood Test, X-Ray, MRI, CT Scan)

Apply some constraints while Creating a Patient table that includes all of the following:

- Patient_ID as **PRIMARY KEY**
- Name as **NOT NULL**
- Email as **UNIQUE**
- Gender with a **CHECK constraint** allowing only 'M' or 'F'

DML Queries:

a) Update the phone number and email of a patient in the Patient table.
b) Update the payment status of an invoice in the Invoice table from "Unpaid" to "Paid".
c) Delete all cancelled appointments from the Appointment table.
d) Delete an invoice from the Invoice table for a patient who has been refunded.
e) Select all appointments that are still "Booked".
f) Select all invoices that are "Unpaid".
g) Select all lab tests of type "Blood Test".
h) Select all prescriptions issued on '2025-09-02'.

Advance SQL:

a) Show all patients with their doctors booked.
b) Show all lab tests of patients and the doctor who requested them.
c) Show prescriptions with medicines **only for patients named "Ali Khan"**.
d) Show prescriptions with doctors **where follow-up is required**.

Good Luck!