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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Semester Examination, Spring 2025
Course Code: CSE 311, Course Title: Database Management System
Level: 3 Term: 1 Batch: 64

Time: 2:00 Hrs **Marks: 40**

Answer ALL Questions [Optional]

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. a) You are given the following unnormalized table that stores student course enrollment information. **Apply** the principles of database normalization to systematically transform the table step by step into Third Normal Form (3NF). Clearly demonstrate each step (1NF, 2NF, 3NF) by identifying functional dependencies, keys, and necessary decomposition to eliminate anomalies.

S_ID	S_Name	Course_ID	Course_Name	Instructor	Instructor_Office	Department	Course_Fee
101	Alice	CSE101, CSE102	Database, OOP	Dr. Smith, Dr. Brown	R-101, R-102	CSE	5000, 6000
102	Bob	CSE101	Database	Dr. Smith	R-101	CSE	5000
103	Charlie	CSE103, CSE102	PPS, OOP	Dr. Green, Dr. Brown	R-103, R-102	SWE, CSE	5500, 6000

[6] CO1

b) Explain the differences between partial and transitive dependencies in the context of database design. Support your explanation with appropriate examples for each. [4] CO1

2. a) [6] CO2

- Doctors(DoctorID , Name, Specialty ,Phone)
- Patients(PatientID , Name, DOB,Phone,Gender
- Appointments(AppointmentID,DoctorID, PatientID, AppointmentDate, Diagnosis, Treatment)

Based on the given Schemas, **construct** the SQL queries to answer the following questions:

i) Use an inner join to find each doctor's name and the total number of appointments they handled in the year 2024.

ii) Use a left join to list all doctors along with their latest appointment date, if any, including doctors who have never had an appointment. Sort the results by appointment date in descending order.

iii) Use a full outer join , list all doctors and their corresponding appointments. Include doctors who do not have any appointments, and appointments that do not have a corresponding doctor. Show the doctor's name and the appointment date, with null values where appropriate.

iv) Write an sql query to find the doctor with the most appointments.

b) Based on the provided schemas, answer the following questions: CO2

- Books (BookID, Title, Author, Genre, Price)
- Sales (SaleID, BookID, Quantity, SaleDate)

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		i) **Construct** a stored procedure named "getBooksByGenre" that accepts a genre name as a parameter. It should fetch the BookID, Title, and Author of all books belonging to the specified genre. ii) **Design** a view named "monthlySalesView" that calculates the total sales for each book in a given month. The total sales should be computed by multiplying the price of each book by the quantity sold. The view should display the BookID, Title, and the total sales for each book during the month.	[6]	
	c)	In an E-commerce system, the sales department needs to track customer orders for auditing and analysis purposes. The database includes an Orders table with details like OrderID, CustomerID, ProductID, Quantity, and OrderDate. To achieve this, create an OrderLog table with LogID (auto-increment, primary key), OrderID, OrderDate, Quantity, InsertedBy (e.g., 'adminUser'). **Analyze** the scenario and provide an SQL for creating both tables. Additionally, Implement a trigger on the OrderLog table to automatically log details of new order entries into the OrderLog table upon insertion.	[4]	
	d)	**Apply** the concept of transactions to the following scenario: You are tasked with transferring $200 from Account A to Account B in a banking system. Using SQL, construct the code for a transaction that does the following: ○ Verify that Account A has a balance of at least $200 and subtract $200 from Account A. ○ Add $200 to Account B. ● Commit the transaction if both operations are successful. ● If Account A does not have enough funds (less than $200), rollback the transaction, ensuring that no changes are made to the database. ● Handle any potential errors during the transaction, ensuring the transaction is rolled back to maintain data consistency.	[4]	
3.	A university database system manages student records, faculty details, and administrative operations, enforcing different access levels for various users. Students can only view their own grades and update personal details, while faculty members can modify grades for their own courses but not those of others. Administrative staff have broader access, including modifying course assignments, but cannot alter faculty credentials or system policies. The university has expanded its campus to a different location. Now it wants to install a database in the new campus for faster processing. But since the hardware for the old database server has become old and unavailable in the market, a new server model needs to be purchased.			**CO3**
	a)	**Identify** with proper justification the type of Access Control that can be applied to the university database.	4	
	b)	**Analyze** the application of distributed database in the scenario and also identify which type of Distributed Database Management System (DDBMS) can be used?	3	
	c)	**Differentiate** between the capabilities of Relational Databases and NoSQL Databases on the basis of the Scenario.	3	