Daffodil International University

Department of Software Engineering

Faculty of Science & Information Technology

Final Examination, Fall 2024

Course Code: SE 223; Course Title: Database Systems

Sections & Teachers: All

Time: 2.00 Hrs **Marks: 40**

Answer ALL Questions

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

1.	Consider the following Schema and **Solve** with Relational Algebra for the following questions. **Customer:** (CustomerID, Name, Email, Phone) **Order:** (OrderID, CustomerID, OrderDate, TotalAmount) **Product:** (ProductID, Name, Price, Stock) **OrderDetails:** (OrderID, ProductID, Quantity) a. Retrieve the names of customers who placed an order on '2024-11-18'. b. List all products with stock less than 10. c. Find the total number of orders placed by each customer. d. List all customers who ordered the product named "Laptop". e. Retrieve the details of customers who have placed orders totaling more than $1,000.	[Marks-5]	CLO-2 *Level-4*
2. a)	**Develop** SQL queries for the given question and follow the schema on question 1: **i)** Retrieve the average of the total amount for all orders. **ii)** Find all customers who placed an order with a TotalAmount greater than $500. **iii)** Retrieve all products whose price is higher than the average product price. **iv)** Find customers who placed more orders than the average number of orders per customer. **v)** Retrieve the details of orders placed on the same date as the highest total order. **vi)** Get the name of the customer who placed the largest order by total amount.	[Marks-6]	CLO-3 *Level-3*
2. b)	**Consider the following 2 tables find the output of Inner, Left, Right and Full outer join**	[Marks-4]	CLO-3 *Level-3*

flightNo	from	to	distance	departs	aircraftId
101	New York	Los Angeles	4500	10:00 AM	A1
102	Chicago	Miami	2000	2:00 PM	A2
103	Dallas	Seattle	3000	6:00 PM	A2
104	Boston	Houston	2600	8:30 AM	A6

aircraftId	airName	range
A1	Boeing 737	5000
A2	Airbus A320	4500
A3	Embraer E175	3500
A4	Bombardier CRJ	4000

3. Consider the following Information

Hospital Management System Data

PatientID: 021222000123456789
PatientName: John Doe
DepartmentName: Cardiology
DepartmentNo: 10
PatientEmail: johndoe@mail.com
PatientPhoneNo: 01589955454

VisitID: V001
VisitDate: 20-11-24
NextVisitDate: 04-12-24

Prescription:

MedicineID: M001
MedicineName: Aspirin
Dosage: 75 mg daily
MedicineManufacturer: Bayer

MedicineID: M002
MedicineName: Atorvastatin
Dosage: 10 mg nightly
MedicineManufacturer: Pfizer

DoctorID	DoctorName	DoctorSpecialization	DoctorPhoneNo
D001	Dr. Jane Smith	Cardiologist	01712233445
D001	Dr. Jane Smith	Cardiologist	01712233445

	a)	**Normalize** the table from 1NF up to BCNF; examining every step of the process from those tables given in question 3 with proper explanation.	[Marks-8]	CLO-4 *Level-4*
	b)	**List** the normalization rules and explain why we need normalization to design databases.	[Marks-4]	CLO-4 *Level-4*
	c)	**Distinguish** between full functional dependency and partial dependency and transitive dependency from the above tables.	[Marks-4]	CLO-4 *Level-4*
	d)	**Establish** an Entity relationship diagram based on the normalized tables with appropriate attribute type, cardinality, and relationship.	[Marks-4]	CLO-4 *Level-4*
4.		**Imagine a Banking System where a user is transferring funds from Account A to Account B. The transaction consists of several steps:** 1. **Check Account A for sufficient funds.** 2. **Debit Account A by the transfer amount.** 3. **Credit Account B with the transfer amount.** 4. **Commit the transaction if all steps succeed; otherwise, rollback if any step fails.**		
	a)	**Explain the** states of the transaction from scenario given in question 4.	[Marks-3]	CLO-5 *Level-2*
	b)	**Define** each component of ACID properties, and how they ensure reliability, integrity, and concurrency control in database transactions from scenario given in question 4.	[Marks-2]	CLO-5 *Level-2*