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Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Final Examination, Summer 2026

Course Code: SE 223; Course Title: Database System

Sections & Teachers: A,C,H(NJN),B,D,G(TRT),E(KRA),F,I,J(MKH),K(ZNM),L(FT)

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. a)

Table 1: Participants

participant_id	participant_name	email	city	registration_date
101	Alice Johnson	alice@gmail.com	New York	2025-07-01
102	Brian Smith	brian@gmail.com	Chicago	2025-07-03
103	Catherine Lee	catherine@gmail.com	Boston	2025-07-05
104	David Wilson	david@gmail.com	Seattle	2025-07-08
105	Emma Brown	emma@gmail.com	Miami	2025-07-10

Table 2: Event_Registration

registration_id	participant_id	event_name	registration_fee	payment_status
201	101	AI Conference	150.00	Paid
202	102	Cyber Security Workshop	100.00	Pending
203	103	Data Science Summit	200.00	Paid
204	104	Cloud Computing Expo	180.00	Paid
205	105	Web Development Bootcamp	120.00	Pending

Solve SQL queries for the given question:

a. Find all participants who live in New York.
b. Find all participants whose names start with the letter 'A'.
c. Find all event registrations where the registration fee is between 100 and 180.
d. Display participant names and their event names for participants who have Paid their registration fee.
e. Find the names of participants who registered for an event with a fee greater than 150. (Subquery)
f. Display participant name, city, event name, and payment status by joining both tables.
g. Find the total number of participants registered for each event where the number of participants is more than 1.

[Marks-10] **CLO-3** ***Level-3***

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h. Calculate the maximum registration fee for each payment status where the maximum fee is greater than 150.
i. Find the participants who paid more than the average registration fee. (Subquery)
j. Find the participant details who registered for the "AI Conference" event using a subquery.

2. Consider the following tables:

Topic: Hospital Appointment System

Patient_ID	Patient_Name	Phone	Doctor_ID	Doctor_Name	Specialty	Appointment_Date	Tests	Test_Result
P101	John Smith	01710000001	D201, D202	Dr. Rahman, Dr. Karim	Cardiology, Neurology	2026-01-10, 2026-01-15	Blood Test, MRI	Normal, Clear
P102	Maria Jones	01710000002	D201	Dr. Rahman	Cardiology	2026-01-12	ECG	Normal
P103	David Lee	01710000003	D203, D202	Dr. Ahmed, Dr. Karim	Orthopedics, Neurology	2026-01-18, 2026-01-20	X-Ray, MRI	Fracture, Clear

a) **Analyze** the given table and normalize it from 1NF to 3NF, examining every step for the tables given in question 2, with a proper explanation. [Marks-10] CLO-4 *Level-4*

b) Using the given Hospital Appointment System database, **explain** and differentiate between partial dependency and transitive dependency with suitable examples from the tables. [Marks-5]

c) **Identify** anomalies that may exist in the unnormalized table and explain with proper justification based on Question 2. [Marks-5]

3. *a)* **Illustrate** an Entity-Relationship (ER) Diagram for the normalized hospital appointment system from Question 2. with appropriate attribute types, cardinality constraints, and relationships between entities. [Marks-5] CLO-2 *Level-4*

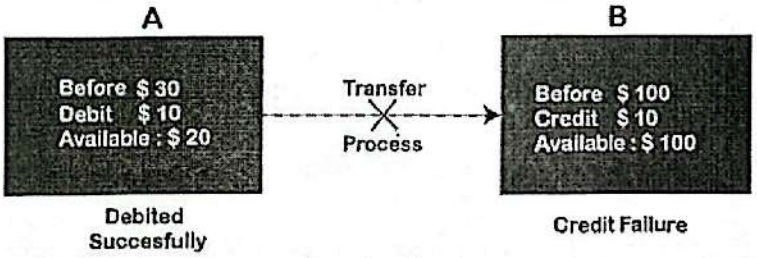
4. *a)* Transaction **#9749521** was transferring **$500** from Account **"Alice"** to **"Bob"**. Due to a **system crash**, the transaction did **not complete**. [Marks-3] CLO-5 *Level-2*

TRANSACTION LOG (Before Crash)

LSN	Time	Transaction ID	Log Record	Details
10	10:15:01	9749521	<START>	Transaction 9749521 started
11	10:15:02	9749521	<UPDATE>	Alice balance: 1000 → 500
12	10:15:03	9749521	<WRITE>	Alice balance written to disk
13	10:15:04	9749521	<UPDATE>	Bob balance: 2000 → 2500
--	--:--:--	--	--	CRASH OCCURRED BEFORE WRITE & COMMIT
14	--:--:--	9749521	<COMMIT>	NOT WRITTEN (Crash)

Describe the current state of the transaction and explain which action the system should take after recovery.

b) [Marks-2]



Describe which ACID properties is violated in the given scenario, and explain how to solve the issue.