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Daffodil International University
Faculty of Science & Information Technology
Department of Software Engineering
Midterm Examination, Fall 2026
Course Code: SE 223; Course Title: Database Systems
Sections & Teachers: 46- SS(A),KRA(B,F,G),TRT(C,D,E),AR(H,I),NJN(J,K,O),IBN(L,M,N),RRB(N)

Time: 1:30 Hrs **Marks: 25**

Answer ALL Questions

1. CarePulse is a digital healthcare platform that connects patients with doctors for online consultations and medicine deliveries. Patients register with a unique Patient_ID and provide their Name, Email, Phone_No, Date of Birth and Age. Doctors registered on the platform have a unique Doctor_ID, Doctor_Name (First Name, Last Name), Specialization, Contact_No, and Consultation_Fee. When a patient books an appointment, the system generates an Appointment ID and records the Appointment_Date, Time_Slot, Consultation_Status, and Fee_Paid. Prescriptions issued by doctors' store a unique Prescription_ID, Doctor_ID, Patient_ID, Prescription_Date, and Instructions, which list multiple prescribed medicines. Each medicine has a unique Medicine_ID, Medicine_Name, Manufacturer, and Unit_Price. During a high-traffic morning, the database server suddenly crashes, and the team discovers that several newly created prescription and appointment records were lost because an unauthorized staff member accidentally deleted table rows while attempting manual database cleanup. — **CLO-1, Level-4]**

a) CarePulse is planning to improve its database system after a sudden server crash. **Explain** the major database components required for the effective operation of the CarePulse database system. — **[Marks-3]**

b) Will the server crash impact the logical level of the database, or will deleting the rows impact the physical level? **Analyze** it in terms of data independence. — **[Marks-4]**

c) **Identify** the key, composite, multivalued, and derived attributes for each entity in the CarePulse system if exists, providing suitable examples from the given scenario. — **[Marks- 3]**

2. *a)* Consider the Following Ticket booking system — **[Marks-5]** **[CLO-2, Level-4]**

Customer

Customer_ID	Name	Phone_No	Address
C101	Sarah Ahmed	01711000111	Dhaka
C102	Tanvir Hossain	01811000222	Chittagong
C103	Ayesha Rahman	01911000333	Sylhet
C104	Rafiq Islam	01511000444	Khulna

Ticket

Ticket ID	Customer ID	Tech_ID	Status	Total_Cost
T501	C101	T801	Completed	1500
T502	C103	T802	In Progress	3000
T503	C101	T803	Pending	800
T504	C105	T801	Completed	2200

i) **Figure out** the output for the following algebra expressions:

A. $\pi_{\text{Customer_ID, Ticket_ID, Total_Cost}}(\text{Customer} \bowtie \text{Ticket})$

B. $\pi_{\text{Customer_ID, Name, Ticket_ID, Status}}(\text{Customer} \bowtie \text{Ticket})$

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		ii) **Figure out** the relational algebra expressions for each of the following cases: A. Find the tickets with prices over 1000 and which booking process is completed. B. Find the Customer Name and their ticket details. C. Find the Customers details who are from Dhaka and Khulna.		
	b) 3	**Illustrate** an Entity-Relationship (ER) diagram for the CarePulse healthcare platform showing all entities, their attributes, primary keys, and relationships with appropriate cardinalities.	[Marks-5]	
3.	a) 1	**Complete** the following SQL operations. You must write and execute each SQL statement (consider the CarePulse System): i. Create Patient table with appropriate primary Key, data type and no attribute should contain any NULL value ~~ii. Insert two relavant record in Patient table~~ iv. Add Patient_NID column in appropriate table where it should contain unique value for each individual record.	[Marks- 3]	[CLO- 3, Level-3]
	b) 1	**Show** the Candidate Key, Unique Key and alternate key from patient and Doctor Table of CarePulse System	[Marks-2]	

16 Max

Min → 10