



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.

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.

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.

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.

CLO-1, Level-4]

[Marks-3]

[Marks-4]

[Marks- 3]

2

a) Consider the Following Ticket booking system

Customer

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

Ticket

Ticket ID	Customer ID	Tech_ID	Status	Total_Cost
T301	C101	T801	Completed	1500
T502	C103	T802	In Progress	3000
T303	C101	T803	Pending	800
T304	C105	T801	Completed	2200

CLO-2, Level-4]

[Marks-5]

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

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

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

	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.	[Marks-5]	
	b) Illustrate an Entity-Relationship (ER) diagram for the CarePulse healthcare platform showing all entities, their attributes, primary keys, and relationships with appropriate cardinalities.		
3	a) 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 relevant 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) Show the Candidate Key, Unique Key and alternate key from patient and Doctor Table of CarePulse System	[Marks-2]	