SE SEM III Choice Based R-19 'C' Scheme JUNE 2025 12.6.2025

Time: 3 Hours **Max. Marks: 80**

ECS

NB:

1. **Question No. 1 is compulsory and solve any THREE questions from remaining questions**
2. **Assume suitable data if necessary**
3. **Draw clean and neat diagrams**

Q.1 Attempt any four Marks

a. Explain Data Independence with an example. 5
b. Explain ACID properties of Transactions in DBMS. 5
c. Differentiate between Primary Key and Unique Key with examples. 5
d. What are Functional Dependencies? Explain with an example. 5
e. Explain Pitfalls in Relational-Database designs. 5

Q.2. a. Draw an ER diagram for an Online Food Ordering System. Convert the ER diagram into a relational schema and specify keys and relationships. 10

b. Explain Relational Algebra with at least four operations and examples. 10

Q.3.a a) Consider the following schema for a Hospital Database:
Patient (PatientID, Name, Age, Gender)
Doctor (DoctorID, Name, Specialization, Department)
Appointment (PatientID, DoctorID, Date_of_Appointment, Diagnosis)

Write SQL queries for:
i) List PatientID and Name of all patients who are above 50 years old.
ii) Find the names of doctors who have scheduled appointments in the Cardiology department.
iii) List the diagnosis details of patients treated by Dr. Anil Sharma.
iv) Find appointments scheduled before March 1, 2023. 10

b What is Multivalued Dependency (MVD) in DBMS? Explain with an example. How does it lead to Third Normal Form (3NF). 10

Q.4.a. Construct a Nested Query for the following scenario and explain the output: 10
A company maintains an employee database with the following schema:

Employee (EmpID, Name, Age, Department, Salary)
Department (DeptID, DeptName, Location)

Write an SQL query to find the names of employees who earn more than the average salary of their department.

b. Write an SQL Trigger for the following scenario. 10

A university maintains a Student Grades Database with the following schema:

Student (StudentID, Name, Department)

Grades (GradeID, StudentID, Course, Marks, Grade)

Task:

Write a BEFORE INSERT trigger on the Grades table that automatically assigns a Grade based on the Marks:

- Marks >= 90 → 'A'
- Marks 80 - 89 → 'B'
- Marks 70 - 79 → 'C'
- Marks Below 70 → 'F'

Q.5.a Consider the following schema for a Retail Store Management System: 10
Customer (CustID, Name, Email, PhoneNumber)
Product (ProdID, ProdName, Category, Price)
Orders (OrderID, CustID, OrderDate, TotalAmount)
OrderDetails (OrderID, ProdID, Quantity, Subtotal)

Write SQL queries using different types of JOIN operations:
i) INNER JOIN: Retrieve the names of customers and the products they have ordered.
ii) LEFT JOIN: Display all customers along with their orders, including those who haven't placed any orders.
iii) RIGHT JOIN: List all products along with customer names, ensuring that products that have never been ordered are also displayed.
iv) SELF JOIN: Find customers who have the same email domain (e.g., customers with Gmail accounts).

b. Explain the concept of Domain Constraints, Key Constraints, and Referential Integrity Constraints in the Relational Model with suitable examples. 10

Q.6 Write notes on **any two**

a). Role of Database Administrator 10

b) Timestamp-Based Concurrency Control 10

c) Deadlock prevention 10

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