Roll Number: 102203230

Thapar Institute of Engineering and Technology, Patiala

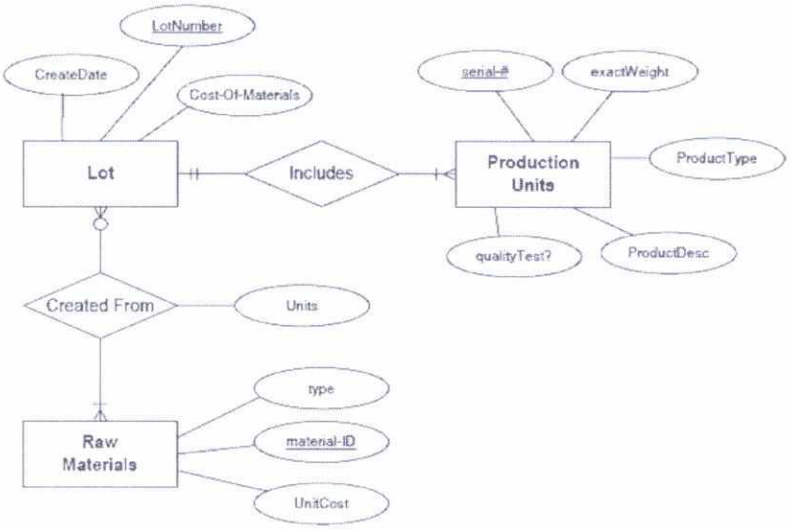
Department of Electrical and Instrumentation Engineering

AUXILIARY EXAMINATION

EE	Course Code: UCS312 Course Name: Database Management System
Aug 20, 2024	Thursday, 5:30 – 08.30 pm
Time: 3 Hours, M. Marks: 100	Name of Faculty: Dr. Ravinder Kaur

Note: Attempt any 5 questions. Assume any missing data if required.

Q.1 (a)	Enlist the difference/s between following terms by considering SQL syntax and adequate examples i) Alter and Update ii) Delete and Truncate iii) Primary key and Foreign key iv) Composite and Multivalued attributes v) Inner and outer Join	(10)
(b)	Briefly discuss with the help of adequate examples about the requirements of triggers in PL/SQL. Write a SQL trigger that automatically updates the last_modified column of a user's table whenever a user's data is updated.	(10)
Q.2 (a)	What is canonical cover of functional dependency? Find the canonical cover by considering the following set F of functional dependencies: $F = \{ A \rightarrow BC, B \rightarrow A, C \rightarrow AB, AB \rightarrow C \}$	(10)
(b)	Elaborate the significance of using normalization in database system. Also, highlight the differences between 3NF and BCNF. Consider a relation R (A,B,C,D,E) with flowing set of functional dependencies as {BC->D, AC->BE, B->E} Determine given relation R is in which normal form (check up to 3NF)?	(10)
Q.3 (a)	Discuss the different types of anomalies in DBMS with suitable example. A table has a composite attribute that combines address into a single column (street, city, state, zip). Discuss potential anomalies that could arise from this design.	(10)
(b)	Outline the differences between generalization, specialization and aggregation with suitable examples. Consider the entities Teacher and Student, which both share common attributes such as Name and Address. Use generalization to design an ER diagram that includes a generalized entity.	(10)
Q.4 (a)	Why Concurrency control is required in DBMS? Discuss with examples. You are designing a system for a banking application where multiple users can transfer money simultaneously. What concurrency control mechanisms would you implement to ensure data consistency?	(10)
(b)	Consider the following schedules S : r1 (A) ; r2 (A) ; r1(B) ; r2(B) ; r3(B) ; w1 (A); w2(B) Check whether the given schedule is conflict serializable or not and explain why? What is two phase locking (2PL) protocol? How does 2PL ensures conflict serializability? Explain with appropriate example.	(10)
Q5	Production tracking is important in many manufacturing environments (e.g., the pharmaceuticals industry, children's toys, etc.). The following ER diagram captures important information in the tracking of production. Specifically, the ER diagram captures relationships between production lots (or batches), individual production units, and raw materials.	
(a)	Convert the given ER diagram into a relational database schema. Be certain to indicate primary keys and referential integrity constraints.	(10)
(b)	Identify an attribute in the above ER diagram that might represent a composite attribute, and explain why/how it might represent a composite attribute.	(10)

<table>
<tr><td></td><td> 
</td><td></td></tr>
<tr><td>Q6 (a)</td><td>Consider the following table schemas, Write SQL queries

Employees (EmployeeID (PK), FirstName, LastName, DepartmentID (Foreign Key), Salary, HireDate)

Departments(DepartmentID (PK), Department Name, Location)

(i) To retrieve all employees and their corresponding department names:
(ii) To find the total number of employees in each department
(iii) To get the average salary of employees in each department
(iv) To List employees who were hired in the last year
(v) To Find the department with the highest average salary
(vi) To retrieve employees who do not belong to any department
(vii) To find the highest-paid employee in each department
(viii) To get the total salary expenditure for each department
(ix) To list all employees along with their department and location
(x) To find departments without any employees</td><td>(10)</td></tr>
<tr><td>(b)</td><td>Briefly discuss about the concept of stored procedures and views in DBMS with adequate examples</td><td>(10)</td></tr>
</table>

----------END----------