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### Fifth Semester B.E. Degree Examination, June/July 2024

### Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

#### Module-1

- 1 a. Discuss the main characteristics of database approach over file-processing approach. (10 Marks)
- b. Explain the operations of 2-Tier and 3-Tier client/server architecture of DBMS. (10 Marks)

OR

- 2 a. What is a weak entity type? Explain the role of partial key in design of weak entity type. (05 Marks)
- b. Design an ER diagram for the mail order database considering the following requirements.  
Employee takes order for parts from customers:
  - i) Employees are identified by unique employee ID, first name and last name, address, gender, zip code.
  - ii) Customer is identified by a unique customer ID, first and last name, address, location, zip code.
  - iii) Part is identified by a unique part number, part name, price and quantity.
  - iv) Order is identified by a unique order number, date of receipt, expected ship date, actual ship date. Each order contains specified quantities of one or more parts.
  - v) Each customer can place number of orders and each order is placed by one customer only.
  - vi) Each employee can take any number of orders but each order belongs to only one employee.
  - vii) Each part is placed by number of customers and each customer can place order for number of parts.

Write assumptions made. (10 Marks)
- c. Differentiate specialization and generalization, giving suitable examples. (05 Marks)

#### Module-2

- 3 a. List and explain the different characteristics of relations. (08 Marks)
- b. With an example, discuss the basic constraints that can be specified when you create a table in SQL. (06 Marks)
- c. Write queries in relational algebra for the following: [Refer tables given in question 5(b)].
  - i) Retrieve the number of dependents for an employee named "Ram".
  - ii) Retrieve the name of managers working in location named "XYZ" who has no female dependents.
  - iii) Retrieve the name of employee who works in the same department as that of "Raj". (06 Marks)

OR

- 4 a. Briefly discuss the different types of update operations on relational database. Give examples for the violation of referential integrity in each of the update operation. (10 Marks)
- b. With examples, explain the steps of ER to relational mapping algorithm. (10 Marks)

**Module-3**

- 5 a. What is a view in SQL? Explain with examples. Discuss the problems that may arise when one attempts to update a view. (10 Marks)
- b. Consider the following tables:  
 Employee (Name, Ssn, Salary, Superssn, Dno)  
 Department (Dname, Dno, Mgrssn, Mgrstartdate)  
 Project (Pname, Pno, Plocation, Dno)  
 Dept\_Location (DNum, Dlocation)  
 Works\_on (Essn, Pnum, Hours)  
 Dependent (Essn, Depname, Sex)
- List the names of managers who have at least one dependent.
  - For each employee, retrieve the employee's name and name of his or her immediate supervisor.
  - For each project on which more than two employees work, retrieve the project number, project name and the number of employees who work on that project.
  - Retrieve the name of employees whose salary is greater than salary of all the employees working in either department 5 or 6. (10 Marks)

**OR**

- 6 a. What is a cursor in embedded SQL? Explain with examples. (10 Marks)
- b. With examples, explain the following:
- Java Script
  - Style sheets. (10 Marks)

**Module-4**

- 7 a. List and explain the informal design guidelines for relation schema. (10 Marks)
- b. What are prime and non-prime attributes? Explain with examples. (04 Marks)
- c. Consider the relation  $R = \{A, B, C, D, E, F, G, H, I, J\}$  and the set of functional dependencies (FDs)  $F = \{AB \rightarrow C, BD \rightarrow EF, AD \rightarrow GH, A \rightarrow I, H \rightarrow J\}$ . What is the key of R? Decompose R into ZNF and 3NF relations. (06 Marks)

**OR**

- 8 a. Consider the two sets of FD's:  
 $F = \{A \rightarrow B, B \rightarrow C, AC \rightarrow D\}$  and  $G = \{A \rightarrow B, B \rightarrow C, A \rightarrow D\}$ . Show that they are equivalent. (06 Marks)
- b. Consider a relation  $R(A, B, C, D)$  with FDS =  $\{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C\}$ . Find the minimal cover for the set of FDs. (06 Marks)
- c. Write and explain the algorithm for dependency-preserving and non additive join decomposition into 3NF schemes with suitable example. (08 Marks)

**Module-5**

- 9 a. What is serializability? Explain serial, non serial and conflict-serializable schedules with appropriate examples. (10 Marks)
- b. Discuss the time stamp ordering algorithm for concurrency control. How does strict time stamp ordering differ from basic time stamp ordering? (10 Marks)

**OR**

- 10 a. What is a Deadlock? Consider the following sequences of actions listed in the order they are submitted to DBMS sequence S1 : R1(A), W2(B), R1(B), R3(C), W2(C), W4(B), W3(A). Draw waits for graph in case of deadlock situation. (06 Marks)
- b. Explain shadow paging with suitable example. (06 Marks)
- c. Briefly explain the recovery techniques based on deferred update and immediate update. (08 Marks)

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