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18CS53

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:
- Employees are identified by unique employee ID, first name and last name, address, gender, zip code.
 - Customer is identified by a unique customer ID, first and last name, address, location, zip code.
 - Part is identified by a unique part number, part name, price and quantity.
 - 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.
 - Each customer can place number of orders and each order is placed by one customer only.
 - Each employee can take any number of orders but each order belongs to only one employee.
 - 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)].
- Retrieve the number of dependents for an employee named "Ram".
 - Retrieve the name of managers working in location named "XYZ" who has no female dependents.
 - 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)
- i) List the names of managers who have at least one dependent.
- ii) For each employee, retrieve the employee's name and name of his or her immediate supervisor.
- iii) 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.
- iv) 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:
- i) Java Script
- ii) 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)
