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18CS53

Fifth Semester B.E. Degree Examination, July/August 2022
Database Management System

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 advantages of using the DBMS approach. **(06 Marks)**
  b. Explain three-schema architecture with a neat diagram. Why do we need mapping between schema levels? **(06 Marks)**
  c. Explain the component modules of DBMS and their interaction with the help of a diagram. **(08 Marks)**

OR

2 a. Define the following terms:
     (i) Weak entity   (ii) DBMS catalog   (iii) Snapshot
     (iv) Value sets   (v) Cardinality ratio   (vi) Degree of a relationship **(06 Marks)**
  b. Explain the different categories of data models. **(06 Marks)**
  c. Write the ER diagram for an employee database. The constraints are as follows:
     (i)   An employee works for a department
     (ii) Every department is headed by a manager
     (iii) An employee works on one or more projects
     (iv) An employee has dependents
     (v)   A department controls the projects **(08 Marks)**

Module-2

3 a. What is meant by Integrity Constriant? Explain the importance of referential integrity constraint. How referential integrity constraint is implemented in SQL. **(08 Marks)**
  b. Write the relational algebra operations to perform the following queries:
     (i)   Retrieve the name and address of all employees who work for the "Accounts" department.
     (ii) Retrieve the names of employers who have no dependents.
     (iii) Find the names of employees who work on all the projects controlled by department number 2. **(06 Marks)**
  c. Explain the relational algebra operations from Set theory, with examples. **(06 Marks)**

OR

4 a. Explain the ER to relational mapping algorithm with suitable example for each step. **(10 Marks)**
  b. Write the SQL queries for the following database schema:
     Student (USN, NAME, BRANCH, PERCENTAGE)
     Faculty (FID, FNAME, DEPARTMENT, DESIGNATION, SALARY)
     Course (CID, CNAME, FID)
     Enroll (CID, USN, GRADE)
     (i)   Retrieve the names of all students enrolled for the course 'CS_54'
     (ii) List all the departments having an average salary of the faculties above Rs.10,000.
     (iii) List the names of the students enrolled for the course'CS_51' and having 'B' grade. **(06 Marks)**
  c. Explain with examples in SQL: (i) INSERT command   (ii) UPDATE command **(04 Marks)**

Module-3

5 a. How are assertions and triggers defined in SQL? Explain with examples. **(08 Marks)**

b. Explain stored procedures in SQL with an example. **(06 Marks)**

c. List out and explain the different types of JDBC drivers. **(06 Marks)**

OR

6 a. What is a three-tier architecture? What advantages it offer over single tier and two tier architectures? Give a short overview of the functionality at each of the three-tier. **(10 Marks)**

b. How to create views in SQL? Explain with an example. **(06 Marks)**

c. What is SQLJ? How it is different from JDBC? **(04 Marks)**

Module-4

7 a. Explain an informal design guidelines for relational schema design. **(08 Marks)**

b. What is the need for normalization? Explain 1NF, 2NF and 3NF with examples. **(08 Marks)**

c. What do you understand by attribute closure? Give an example. **(04 Marks)**

OR

8 a. What is functional dependency? Explain the inference rules for functional dependency with proof. **(08 Marks)**

b. Define 4NF. When it is violated? Why is it useful? **(06 Marks)**

c. Consider two sets of functional dependency $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and $G = \{A \rightarrow CD, E \rightarrow AH\}$. Are they equivalent? **(06 Marks)**

Module-5

9 a. Why concurrency control is needed? Demonstrate with an example. **(10 Marks)**

b. Discuss the UNDO and REDO operations and the recovery techniques that use each. **(06 Marks)**

c. Explain the ACID properties of a database transaction. **(04 Marks)**

OR

10 a. Discuss Two-Phase Locking Technique for concurrency control. **(10 Marks)**

b. When deadlock and starvation problem occur? Explain how these problems can be resolved. **(10 Marks)**

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