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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 22CS3PCDBM **Max Marks: 100**
Course: Database Management Systems **Date: 17.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Explain three schema architecture of database system with neat diagram. **10**

b) Explain the basic constraints that can be specified when a table is created in SQL. **10**

OR

2 a) Write the SQL queries for the following database schema as given below. **10**
Supplier (Sno, Sname, Status, City)
Product (Pno, Pname, Color, Weight, City)
Shipments (Sno, Pno, Qty)

i. Retrive names of supplier who supply part P2
ii. Retrieve the names of suppliers who do not supply any part supplied by S2.
iii. Retrieve part numbers for all parts supplied by more than one supplier.
iv. For each part supplied, get part number, maximum quantity and minimum quantity supplied for that part.

b) With respect to SQL, explain the following with an example. **10**
i)Create Command ii) Insert Command
iii)Drop Command iv) Update Command

UNIT - II

3 a) Design a database and draw an ER diagram for STUDENT database, taking into account at least five entities. Indicate all keys, constraints and assumptions that are made. **10**

b) Enumerate the steps involved in converting the ER diagram to corresponding relational tables **10**

OR

4 a) Consider the following COMPANY database **6**
EMP(Name,SSN,Salary,SuperSSN,Gender,Dno)
DEPT(DNum,Dname,MgrSSN,Dno)
DEPT_LOC(Dnum,Dlocation)
DEPENDENT(ESSN,Dep_name,Sex)
WORKS_ON(ESSN,Pno,Hours)
PROJECT(Pname,Pnumber,Plocation,Dnum)

Write the "Relational Algebra Expressions" for the following:

i. Retrieve the name, address, salary of employees who work for the Research department.
ii. Find the names of employees who work on all projects controlled by department number 4.
iii. Retrieve the SSN of all employees who either in department number 4 or directly supervise an employee who work in department number 4

b) Discuss equijoin and natural join with suitable examples using Relational Algebra notations. **6**

c) With respect to ER diagram, explain the following with examples **8**

(i) Recursive Relationship (ii) Entity Type
(iii) Weak Entity Type (iv) Cardinality Ratio

UNIT - III

5 a) Explain Multivalued dependency and 4NF with an example. **10**

b) Suppose you are given a relation R with four attributes ABCD. For each of the following sets of FDs, assuming those are the only dependencies that hold for R, do the following: **10**

i. Identify the candidate key(s) for R.
ii. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF).
iii. If R is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies

$A \rightarrow B,\ BC \rightarrow D,\ A \rightarrow C$

UNIT - IV

6 a) Define NoSQL Database. Tabulate the major differences between NOSQL and SQL. **10**

b) List the different storage types in NOSQL. Explain. **10**

UNIT - V

7 a) List and explain the desirable properties of a transaction. **8**

b) Let $R_i(z)$ and $W_i(z)$ denote read and write operations on a data element z by a transaction T_i, respectively. Consider the below schedule S with four transactions and find the conflict equivalent to S? **6**
S: $R_4(x)$ $R_2(x)$ $R_3(x)$ $R_1(y)$ $W_1(y)$ $W_2(x)$ $W_3(y)$ $R_4(y)$.

c) Illustrate with a State transition diagram the states for transaction execution and explain. **6**

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