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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B E **Semester: IV**
Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**
Course Code: 20AM4PCDBM **Max Marks: 100**
Course: Database Management Systems **Date: 15.09.2023**

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) Elucidate three-schema architecture with a neat diagram. Explain different levels involved in the architecture and what are its advantages. **6**

b) Consider the following relation: **6**

Student(<u>Sid</u>, Sname, marks, address, dno)

Department(<u>dno</u>,dname)

Note: dno is a foreign key in Student referring to Department's primary key

Specify the SQL statements for the following:

i) Add a column "deptmanager" to Department table which can take string values and with default value 'John'.

ii) Retrieve the name and address of all the Students who belong to 'CSE' Department.

iii) Find the number of students in "CSE" department.

c) Considering the following Employee Table, specify the output for the given SQL queries: **4**

Employee Table:

Ssn	Ename	Salary
111	Ram	10000
222	Shyam	20000
333	Bob	Null
444	Bob	Null

i) Select count(*) from Employee;
ii) Select count(Ename) from Employee;

d) Elucidate the need of triggers with an example **4**

OR

2 a) Enlist the main characteristics of database approach. **6**

b) Consider the following Employee Table, specify the output for the given SQL queries: **4**

Employee Table:

Ssn	Ename	Salary
111	Ram	10000
222	Shyam	20000
333	Bob	Null
444	Bob	Null

i) Select count(Salary) from Employee;
ii) Select avg(Salary) from Employee;

c) What are Virtual tables, justify the usage with an example **4**

d) Consider the following relation: **6**

Student(<u>Sid</u>, Sname, marks, address, dno)

Department(<u>dno</u>,dname)

Note: dno is a foreign key in Student referring to Department's primary key

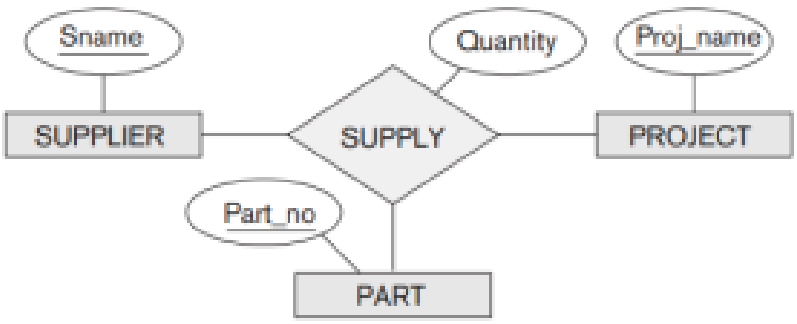
Specify the SQL statements for the following:

i) Delete all students who belong to dno = 5
ii) Find the maximum marks of the student of 'CSE' department.
iii) Remove the column 'address' from student table.

UNIT-II

3 a) Enlist 3 different types of attributes with an example for each and mention its notation used in the Entity Relationship Diagram. **6**

b) Refine the below ternary relationship "SUPPLY" to a set of binary relationships **6**



c) What information is illustrated by participation constraint and cardinality ratio in ER diagram? Illustrate with relevant examples. **4**

d) Define Strong and Weak Entity. Give the notation and an example for each. **4**

UNIT - III

4 a) Consider the following relations: **10**

Driver (<u>Did</u>, Dname, Rating, Age)

Car (<u>Cid</u>, Cname, Color)

Reserves (<u>Did,Cid</u>,Day)

Give the Relational Algebraic expressions for the following queries:

i) Find the names of the Drivers who have reserved a blue car

ii) Find the names of the Drivers who have reserved red or blue car

iii) Find the names of the Drivers who have reserved all cars with name "SUV400"

iv) Find the names of the Drivers who have reserved at least one car.

v) Find the id of the Drivers whose age is >20 and not reserved a 'red' car

b) Discuss the following Constraints in Relational Model in a line or two: **6**

i) Inherent model based constraints

ii) Schema based constraints

iii) Application based constraints

c) State how Cartesian product is different from theta join with an example. **4**

UNIT - IV

5 a) Define the following **4**

i) Normalization

ii) Second normal form

b) Given a relation R(P, Q, R, S, T) and Functional Dependency FD = { PQ → R, S → T }, determine whether the given R is in 2NF? If not convert it into 2 NF. **10**

c) Define the following and give an example for each **6**

a) Prime and non prime attribute

b) De-normalization

c) Candidate Key

UNIT - V

6 a) What are ACID properties of a transaction? Why are they required? **4**

b) Consider the three transactions T1, T2, and T3, and the schedules S1 and S2 given below. Draw the serializability (precedence) graphs for S1 and S2, and state whether each schedule is (conflict) serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s). **10**

T_1: $r_1(X)$; $r_1(Z)$; $w_1(X)$;
T_2: $r_2(Z)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$;
T_3: $r_3(X)$; $r_3(Y)$; $w_3(Y)$;
S_1: $r_1(X)$; $r_2(Z)$; $r_1(Z)$; $r_3(X)$; $r_3(Y)$; $w_1(X)$; $w_3(Y)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$;
S_2: $r_1(X)$; $r_2(Z)$; $r_3(X)$; $r_1(Z)$; $r_2(Y)$; $r_3(Y)$; $w_1(X)$; $w_2(Z)$; $w_3(Y)$; $w_2(Y)$;

c) Which are the problems that occur when concurrent execution is uncontrolled. Explain each with an example **6**

OR

7 a) Consider the following schedule S of transactions T1, T2, T3, T4: **6**

T1	T2	T3	T4
	R(X)		
		W(X)	
		commit	
W(X)			
commit			
	W(Y)		
	R(Z)		
	commit		
			R(X)
			R(Y)
			commit

Draw the precedence graph and answer the following:

i) Is S conflict-serializable?
ii) Is S serializable? If so, give all possible serial orderings.
iii) Is S recoverable?

b) Differentiate between basic 2PL, conservative 2PL and Strict 2PL **6**

c) Distinguish two main categories of immediate update algorithms. **8**

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