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

Autonomous Institute Affiliated to VTU

August 2024 Supplementary Examinations

Programme: B.E **Semester: IV**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 19CS4PCDBM **Max Marks: 100**
Course: Database Management Systems

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) Discuss the characteristics of database approaches **8**

b) Consider a table employee with the following information **6**

Empno	Ename	Job	Designation	Hiredate	salary

Write the following SQL queries.

i. List the employee details who are working from 2018.
ii. Display the name of employee who are drawing highest salary.
iii. Display the name of the employee whose name is beginning with 'a'.

c) Consider student (tid, name, subj1, subj2, tot, per).Create a trigger so that the total and average of specified marks is automatically inserted whenever a record is inserted. **6**

UNIT - II

2 a) Consider the following information about a university database: **10**

Professors have an SSN, a name, an age, a rank, and a research specialty. Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget. Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.). Each project is managed by one professor (known as the project's principal investigator). Each project is worked on by one or more professors (known as the project's co-investigators). Professors can manage and/or work on multiple projects. Each project is worked on by one or more graduate students (known as the project's research assistants). When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one. Departments have a department number, a department name, and a main office. Departments have a professor (known as the chairman) who runs the department. Professors work in one or more departments and for each department that they work in, a time percentage is associated with their job.

Design and draw an ER diagram that captures the information about the university. Use only the basic ER model here; that is, entities, relationships, and attributes.

b) Explain the following with examples: **10**

i. Recursive Relationship
ii. Entity Type
iv. Weak Entity Type
v. Cardinality Ratio
v. Ternary Relationship

OR

3 a) A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game and the result of the game. Design an ER diagram for this application, stating any assumptions you make. Choose your favourite sport (e.g Cricket, Baseball, Football). **10**

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

UNIT - III

4 a) Teachers of various departments publish their research papers in different journals. The following relation schemas are based on this scenario. **10**

Teacher (TID, name, designation, salary, address, doj, qualification, DNo)
Department (DNo, Dname, strength, Dtype)
Journal (Jname, ISSN, frequency, year_of_inception)
Publication (TID, ISSN, No_of_paper, VolumeNo, Month, Year)
Write the following queries using Relational Algebra.

i. Find the name of the teacher who has published in the journal whose name as "IJMDM"
ii. Find the total number of papers published by the teacher whose name is Prof. Ramesh in 2019.
iii. Find the department name of the teachers who publish in journals whose year of inception is 2002.
iv. Find the name of the teacher who have highest number of publications.

b) Analyze and write the relational algebra statements for the given SQL Queries: **10**

i. SELECT movieTitle FROM StarsIn, MovieStar WHERE starName = name AND birthdate = 1990.
ii. SELECT * FROM R R_2 WHERE R_2.A = R_1.B
iii. (SELECT name, address from MovieStar) EXCEPT (SELECT name, address from MovieExec)
iv. SELECT name, SUM(length) FROM MovieExec, Movie WHERE cert# = producerC# GROUP BY name HAVING MIN(year) < 1960
v. SELECT SUM(B) FROM R GROUP BY A HAVING SUM(B) = C

OR

5 a) Consider relations P, Q and perform the following operations: Theta join, Equi join and outer join and also write the result of each operation. **05**

P		
Roll	**Name**	**Age**
1	Sita	18
2	Ram	20
7	Sam	22
8	Jhon	25
9	Siya	22
10	Riya	44

Q		
Roll	**Name**	**Age**
1	Sita	18
2	Ram	20
3	Jagadish	22
4	Jeevan	24
5	Harini	30
6	Harshitha	35

b) Consider the following database: **10**

Sailors(<u>sid</u>: integer, sname: string, rating: integer, age: real)
Boats(<u>bid</u>: integer, bname: string, color: string)
Reserves(<u>sid</u>: integer, <u>bid</u>: integer, <u>day:</u> date).

Illustrate the following using Relational Algebra operators.

i. Find names of sailors who've reserved boat #103.
ii. Find names of sailors who've reserved a red boat.
iii. Find the colors of boats reserved by Lubber.
iv. Find the names of sailors who have reserved at least one boat.
v. Find sailors who've reserved a red or a green boat.

c) Discuss the any five relational algebra operations from set theory with suitable example. **05**

UNIT - IV

6 a) State the informal guidelines for relational schema design. Illustrate how violation of these guidelines may be harmful the database. **10**

b) For the given Functional Dependencies (FD). Find the irreducible set of Functional Dependencies. **10**

FD= {A → C, AB → C, C → DI, CD → I, EC → AB, EI → C}

UNIT - V

7 a) Briefly explain the ARIES Recovery Algorithm. **06**

b) What is Serializability? Create a precedence graph for the following schedule assess if it is a serializable schedule or not: **08**

R1(X), W1(X),R2(X),W2(X),R1(Y),W1(Y)

Write down the algorithm for the same.

c) List and explain the desirable properties of a transaction. **06**

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