Enroll. No. _____

END SEMESTER EXAMINATION: JANUARY, 2019

CSE201
[ET]

DATABASE MANAGEMENT SYSTEMS

Time: 3 Hrs. Max Marks: 70

Note: Attempt questions from all sections as directed.

Section - A: Attempt any Five questions out of Six . Each question carries 6 marks. **[30 Marks]**

Q1. Discuss the importance of architectural design of Database management system? Also throw some light on the following case study

Digital libraries are not going to replace the physical existence of document completely but no doubt to meet the present demand, to satisfy the non-local user digitization must be introduced so that at least libraries becomes of hybrid nature. The initial cost of digitization is high but experiment shows that once digitization is introduced then the cost to manage this collection will be cheaper than that of any traditional library.

Q2. Music database contains information about Songs (identified by a unique song id# and the title of the song), Bands (identified by a unique brand name and the number of members in the band), and Albums (identified by a unique album id#, the title of the album, the number of songs on the album).Bands sing Songs and produce Albums. Songs are parts of an Album. Draw an ER diagram for each of the situations below:

- A Song may be part of more than one Album.
- A Song must be part of at least one Album.
- A Song appears on one and only one Album.
- Each Album must have at least one Song.
- A Band may sing more than one version of a Song, but each version must appear on a different Album.

Q3. (I) Consider the relations: PROJECT(proj#,proj_name,chief_architect), EMPLOYEE(emp#,emp_name), ASSIGNED(proj#,emp#). Use relational algebra to express the following queries:

I - Category

(i) Get the employee number of employees who work on all projects.

(ii) Get details of project on which employee with name 'RAM' is working.

(II)Consider the relations:

EMP (ENO, ENAME, AGE. BASIC_SALARY), WORK_IN (ENO,DNO), EPT(DNO,DNAME,CITY)

Express the following queries in SQL

(i) Find names of employees who work in a department in Delhi.

(ii) Get the department. number in which more than one employee is working.

(iii) Find name of employee who earns highest salary in 'HR' department.

Q4. Give the algorithm to find the non-redundant cover. Also find the minimal cover of following set of FDs

F= {A→ BC, CD→ E, E→ C, D→ AEH, ABH→ BD, DH→ BC}

Q5. What is a query evaluation plan? Explain with the help of an example.

Q6. Focus on phases of optimistic concurrency control method. How do optimistic concurrency control techniques differ from other concurrency techniques while mining?

***Section - B:** Attempt any two questions out of three. Each question carries 10 marks.* **[20 Marks]**

Q7. Consider a relation named EMP_DEPT with attributes: ENAME, SSN, BDATE, ADDRESS, DNUMBER, DNAME, and DMGRSSN. Consider also the set G of functional dependencies for EMP DEPT: G = {SSN → {ENAME, BDATE, ADDRESS, DNUMBER}; DNUMBER → {DNAME, DMGRSSM} }.

a) Calculate the closures SSN+ and DNAME+ with respect to G.

b) Is the set of functional dependences G minimal? If not, find a minimal set of functional dependencies that is equivalent to G.

c) List an update anomaly that can occur for relation EMP_DEPT.

d) List an insertion anomaly that can occur for relation EMP_DEPT.

e) List a deletion anomaly that can occur for relation EMP_DEPT.

Q8. "If a relation is broken into BCNF, it will be lossless and dependency preserving". Prove or disprove this statement with the help of an example. Compare BCNF with fourth normal form.

Q9. Discuss the various steps involved in query processing with the help of a block diagram. What is the goal of query optimization? Why it is important? Also explain how does heuristics help in reducing cost of execution of a query?

***Section - C:* Compulsory question.** **[20 Marks]**

Q10. **(a)** Consider the following two transactions

T31: Read (A)

Read (B)

If A=0 then B:=B+1;

Write (B)

T32: Read (B)

Read (A)

If B=0 than A: =A+1

Write (A)

Add lock and unlock instructions to transactions T31 and T32 so that they observe the two phase locking protocol. Can the execution of these transactions result in a deadlock. (8)

(b) How we test Conflict Serializability? Draw the precedence graph for schedule S1 and S2 and state whether each schedule is serializable or not. Write the equivalent serial schedule.

T1: r1(X); r1(Z); w1(X);

T2: r2(Z); r2(Y); w2(Z); w2(Y);

T3: r3(X); r3(Y); w3(Y);

S1: r1(X); r2(Z); r1(Z); r3(X); r3(Y); w1(X); w3(Y); r2(Y); w2(Z); w2(Y);

S2: r1(X); r2(Z); r3(X); r1(Z); r2(Y); r3(Y); w1(X); w2(Z); w3(Y); w2(Y); (6)

(c) Consider the following relational schema

Employee (person-name, street, city)

Works (person-name, company-name, salary)

Company (company-name, city)

Manages (person-name, manager-name)

Represent the following queries using SQL.

a. Find the names of all employees who live in the same city and on the same street as do their managers.

b. Find the names of all employees in this database who do not work for First Bank Corporation.

c. Find the names of all employees who earn more than every employee of Small Bank Corporation. (6)

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