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B.TECH.
(SEM V) THEORY EXAMINATION 2022-23
DATABASE MANAGEMENT SYSTEM

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2x10 = 20

(a) List any four disadvantages of file system approach over database approach.
(b) Differentiate between physical and logical data independence.
(c) What is the difference between DROP and DELETE command?
(d) What are different Integrity Constraints?
(e) List all prime and non-prime attributes In Relation R(A,B,C,D,E) with FD set F = {AB→C, B→E, C→D}.
(f) Explain MVD with the help of suitable example.
(g) Discuss Consistency and Isolation property of a transaction.
(h) Draw a state diagram and discuss the typical states that a transaction goesthrough during execution.
(i) Discuss Conservative 2PL and Strict 2PL.
(j) Describe how view serializability is related to conflict serializability.

SECTION B

2. Attempt any *three* of the following: 10x3 = 30

(a) A database is being constructed to keep track of the teams and games of a sport league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of players participating in each game for each team, the positions they play in that game and the result of the game.
  (i) Design an E-R schema diagram for this application.
  (ii) Map the E-R diagram into relational model
(b) What are Joins? Discuss all types of Joins with the help of suitable examples.
(c) A set of FDs for the relation R{A, B, C, D, E, F} is AB →C, C → A, BC → D,ACD → B, BE → C, EC → FA, CF → BD, D→ E. Find a minimum cover forth is set of FDs
(d) What is a schedule? Define the concepts of recoverable, cascade less and strict schedules, and compare them in terms of their recoverability.
(e) Discuss the immediate update recovery technique in both single-user and multiuser environments. What are the advantages and disadvantages of immediate update?

SECTION C

3. Attempt any *one* part of the following: 10x1 = 10

(a) Describe the three-schema architecture. Why do we need mappings between schema levels? How do different schema definition languages support this architecture?
(b) What are the different types of Data Models in DBMS? Explain them.

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4. Attempt any *one* part of the following: 10 x1 = 10

(a) Consider the following schema for institute library:
Student (RollNo, Name, Father_ Name, Branch)
Book (ISBN, Title, Author, Publisher)
Issue (RollNo, ISBN, Date-of –Issue)
Write the following queries in SQL and relational algebra:
(i) List roll number and name of all students of the branch 'CSE'.
(ii) Find the name of student who has issued a book published by 'ABC' publisher.
(iii) List title of all books and their authors issued to a student 'RAM'.
(iv) List title of all books issued on or before December 1, 2020.
(v) List all books published by publisher 'ABC'

(b) Explain different types of Triggers in SQL/PL SQL.

5. Attempt any *one* part of the following: 10x1 = 10

(a) Given the following set of FDs on schema R (V,W,X,Y,Z)
{Z→V, W→Y, XY→Z, V→WX}State whether the following decomposition are loss-less-join decompositions or not.
(i) R1=(V,W,X) , R2=(V,Y,Z)
(ii) R1=(V,W,X), R2=(X,Y,Z)

(b) Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F = { {A, B}→{C}, {A}→{D, E}, {B}→{F}, {F}→{G,H}, {D}→{I, J} }. What is the key for R? Decompose R into 2NF and then3NF relations.

6. Attempt any *one* part of the following: 10x1 = 10

(a) Consider schedules S1, S2, and S3 below. Determine whether each schedule is strict, cascade less, recoverable, or non recoverable. (Determine the strictest recoverability condition that each schedule satisfies.)
S1: r1 (X); r2 (Z); r1 (Z); r3 (X); r3 (Y); w1 (X); c1; w3 (Y); c3; r2 (Y); w2 (Z); w2 (Y); c2;
S2: r1 (X); r2 (Z); r1 (Z); r3 (X); r3 (Y); w1 (X); w3 (Y); r2 (Y); w2 (Z); w2 (Y); c1;c2; c3;
S3: r1 (X); r2 (Z); r3 (X); r1 (Z); r2 (Y); r3 (Y); w1 (X); c1; w2 (Z); w3 (Y); w2 (Y);c3; c2;

(b) Consider the three transactions T1, T2, and T3, and the schedules S1 and S2given below. State whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s).
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);

7. Attempt any *one* part of the following: 10x1 = 10

(a) Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering?

(b) How do optimistic concurrency control techniques differ from other concurrency control techniques? Why they are also called validation or certification techniques? Discuss the typical phases of an optimistic concurrency control method.

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