JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2021

B.Tech (Bioinformatics & Biotechnology) Third Semester

COURSE CODE: 20B11BI311   MAX. MARKS: 35

COURSE NAME: Bioinformatics Data Management

COURSE CREDITS: 4   MAX. TIME: 2 Hours

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Marks for each question is mentioned along with the question.

Q1:   **(2, 2, 1)**

   a) Given a relation $R(A1,A2,A3\ldots\ldots\ldots An)$ having two candidate keys {A1 & A2A3}. Find out the number of superkeys possible for this relation?

   b) Given the following relation instance

X	Y	Z
1	4	2
1	5	3
1	6	3
3	2	2

Rule out the functional dependencies from the given set of functional dependencies.

{(i) XY→Z and Z→Y, (ii) YZ→X and Y→Z, (iii) YZ→X and X→Z, (iv) XZ→Y and Y→X}

   c) Given a relation R(A,B,C,D,E,F) with functional dependencies {C→F, E→A, EC→D & A→B}. Find the key for this relation?

Q2:   **(2, 2, 3, 3)**

   a) Given a relation R(A,B,C) with functional dependencies {A→B, B→C}. Find out all the additional functional dependencies that can be derived from the given set of functional dependencies.

   b) State whether {AB→C, D→E and E→C} is the minimum cover of {AB→C, D→E, AB→E and E→C}.

   c) Consider a relation for published book

     Book (Book_title, Author_name, Book_type, List_price, Author_affiliation, Publisher)

[P.T.O]

Author_affiliation refers to the affiliation of the author. Suppose the functional dependencies that exist are {Book_title→Publisher, Book_type, Book_type→ List_price and Author_name→Author_affiliation}. Decompose the given relation into third normal form.

d) Given a relation R(A,B,C,D,E,F,G,H,I,J) and functional dependencies {AB→C, B→D, D→EF, A→GH, H→IJ}. Decompose the given relation into BCNF.

Q3:   (3, 3, 2, 2)

a) What is the difference between domain relational calculus (DRC) and tuple relational calculus (TRC)? Explain with the help of an example.

b) What is the difference between a complete schedule and a recoverable schedule? Explain with the help of an example.

c) Database table by name "Loan_Records" is given below:

Borrower	Bank_Manager	Loan_Amount
Ramesh	Sunderajan	10000.00
Suresh	Ramgopal	5000.00
Mahesh	Sunderajan	7000.00

What is the output of the following SQL query?

SELECT COUNT (*) FROM (SELECT Borrower, Bank_Manager FROM Loan_Records) AS S NATURAL JOIN (SELECT Bank_Manager, Loan_Amount FROM Loan_Records) AS T);

d) The relation book(title, price) contains the "titles" and "prices" of different books. Assuming that no two books have the same price. What does the following SQL query return?

SELECT title FROM book AS B WHERE (SELECT COUNT (*) FROM book AS T WHERE T.price > B.price) < 5;

Q4:   (2.5, 2.5)

a) Find whether the given schedule is view serializable or not?
S → {T1: R(x), T1: R(y), T1: W(x), T2: R(y), T3: W(y), T1: W(x), T2: R(y)}

b) Consider the transactions "T1", "T2" & "T3" and the schedules "S1" & "S2" given below.

T1: {r1(x), r1(z), w1(x), w1(z)}

T2: {r2(y), r2(z), w2(z)}

T3: {r3(y), r3(x), w3(y)}

S1: {r1(x), r3(y), r3(x), r2(y), r2(z), w3(y), w2(z), r1(z), w1(x), w1(z);}

S2: {r1(x), r3(y), r2(y), r3(x), r1(z), r2(z), w3(y), w1(x), w2(z), w1(z);}

Find out whether the given two schedules are conflict serializable or not?

Q5: (4, 1)

a) Consider a B-Tree of order 4. Insert the following keys {2, 5, 10, 11, 1, 6, 9, 4, 3, 12, 18, 20, 25}.

b) Why size of block pointer is less than record pointer in B-Trees?

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