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MCS-023

MCA (Revised) / BCA (Revised)

Term-End Examination, 2019

MCS-023 : INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

Time : 3 Hours] **[Maximum Marks : 100**

Weightage 75%

Note : Question No. **1** is **Compulsory**. Attempt **any three** questions from the rest.

1. (a) Consider the following relation which keeps records of employees joining and leaving the projects. Employee can work on many projects :

Project (emp_id emp_name, project_id, project_name, joining_date, leaving_date)

(i) What are the anamolies in the relation above ? Explain with examples. [6]

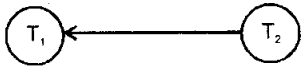
(ii) What are the functional dependencies in the relation ? [4]

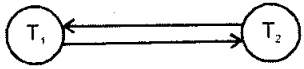
(iii) Normalize the above relation into 2NF [5]

(b) Which precedence graph for the following schedule is correct ? State whether the schedule is serializable or out : [5]

Schedule	T_1	T_2
Read X	Read X	-
Add 500	Add 500	-
Read X	-	Read X
Write X	Write X	-
Read Y	-	Read Y
Read Y	Read Y	-
Substract-200	Substract 200	-
Display X+Y	-	Display X+Y
Write Y	Write Y	-

(i) 

(ii) 

(iii) 

(c) Consider the following relational schema: [4]

Student (Student_ID, student_name, program)

Course (Course_ID, Course_name, school_of_studies)

Taught (Student_ID, Course_ID, Year, Instructor_ID)

Write SQL statements for the following :

(i) To retrieve the names of all 3rd year students of MCA Program who have done courses under Instructor ID-001

(ii) To retrieve the names of all courses taught by instructor-002 between 1996-2001 and total number of students attended the courses.

(d) Explain wound-wait scheme for deadlock prevention with the help of an example. [6]

(e) How do we implement "B-Trees" as an Index ? Give an example to illustrate. What are its advantages ? [5]

(f) Explain the concept of a simple authorization with the help of an example. [5]

2. (a) Consider the relation between R_1 and R_2 and use them to preform the operations given below : [3]

R1 :

A	B
A_1	B_1
A_2	B_2
A_3	B_3
A_4	B_4

R_2 :

X	Y
A_1	B_1
A_7	B_7
A_2	B_2
A_4	B_4

(i) $R_1 \cap R_2$

(ii) $R_1 - R_2$

(iii) $R_2 - R_1$

(b) Design an E-R diagram for a Bank database schema for the following statement : [5]

"Each bank can have multiple branches and each branch can have multiple accounts and loans."

Convert the diagram into tables.

(c) Differentiate between the Basic 2PL and Strict 2PL with respect to atomicity, concurrency and deadlock. [7]

(d) What are the advantages of a view ? What are its limitations with respect to applying DM_2 operations ? [5]

3. (a) What is the dependency preservation property for a decomposition ? Why is it important ? [6]

(b) How do we recover from a transaction failure using "log" ? Illustrate through an example. [10]

(c) Differentiate between centralised databases and distributed databases. [4]

4. (a) What is a system log ? What are the typical kinds of entries in a system log ? [5]

(b) Describe the benefits of data replication in DDBMS. What typical units of data are replicated in the process of data replications ? [5]

(c) Explain any two problems of concurrent transactions with the help of an example. [6]

(d) Prove the statement "Any relation which is in BCNF is in 3NF but the converse is not true". [4]

5. (a) With the help of an example, explain the process of vertical fragmentation. [6]

(b) Discuss the optimistic concurrency control with the help of an example. [8]

(c) How does a checkpoint mechanism help in database recovery ? Explain through an example. [6]

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