No. of Printed Pages : 5

MCS-023

MCA (Revised) / BCA (Revised)

Term-End Examination

February, 2021

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) Determine the output when the following operations are applied on Relation R_1, R_2 and R_3 given below : 5

R_1 :

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

R_3 : A ⟶ empty

(i) Union ($R_1 \cup R_2$)

(ii) Intersection ($R_1 \cap R_2$)

(iii) Difference ($R_1 - R_2$)

(iv) Cartesian Cross Section ($R_1 \times R_2$)

(v) Division ($R_1 \div R_3$)

(b) How do weak entities differ from strong entities ? Discuss with the help of an example. Briefly discuss the role of keys in identification of the entity type, i.e. weak or strong. *5*

(c) What do you understand by functional dependency in a Relational DBMS ? For the relation given below, check whether the given functional dependencies hold or not. Give proper justification. *5*

J	K	L
x	1	2
x	1	3
y	1	4
y	1	3
z	2	5
p	4	7

(i) $J \rightarrow K$

(ii) $K \rightarrow J$

(iii) $J, K \rightarrow L$

(iv) $K, L \rightarrow J$

(d) List the properties of concurrent transactions. Consider the concurrent schedule of the transactions T_1 and T_2 given below :

Schedule	T_1	T_2	SUM
T_1 : Read(Sum)	Read(Sum)		500
T_1 : Sum=Sum–100	Sum=Sum–100		
T_2 : Read(Sum)		Read(Sum)	
T_2 : Sum=Sum+500		Sum=Sum+500	
T_1 : Write(Sum)	Write(Sum)		
T_2 : Write(Sum)		Write(Sum)	

Referring to the schedule above, answer the following questions : 5

(i) Which property of transaction is violated ?

(ii) Identify the final status of sum.

(iii) The given schedule contributes to which problem in databases ?

(e) What are the advantages and disadvantages of distributed databases ? 5

(f) What is the difference between DBMS and RDBMS ? Under what situations is it better to use File-based System than Database System ? 5

(g) Explain database recovery using system log with the help of an example. 5

(h) Explain the following terms : 5

(i) Candidate key

(ii) Primary key

(iii) Foreign key

(iv) Super key

(v) Alternate key

2. (a) What are checkpoints ? Discuss the role of checkpoints in database recovery. Give suitable example in support of your discussion. 10

(b) Explain 3NF. Discuss the Insert, Delete and Update anomalies associated with 3NF. 10

3. Differentiate the following : 20

(i) Centralized and Distributed DBMS

(ii) Deadlock avoidance and Deadlock prevention protocols

(iii) 2 Phase locking and 2 Phase commit

(iv) 3NF and BCNF

4. Write short notes on following : 20

(i) Precedence graph for serializability check

(ii) Types of Indexes in DBMS

(iii) Data fragmentation and its objectives

(iv) Problems of serial schedule and serializable schedule

5. (a) Can we use Binary Search Tree (BST) as Indexes ? Justify. If we use BST as Index, then what can be the possible problems ? What will be the solution for those problems ? *10*

(b) Consider "Library Management System" which keeps the following tables :

Book (isbn_no, title, author, publisher, edition, year)

Book_Access (access_no, isbn_no, date_of_purchase)

Member (m_name, m_id, m_address, m_phone)

Issue_Return (access_no, m_id, expected_return_date, actual_return_date)

Specify the following queries in SQL : *10*

(i) Find m_id and m_name of the members who have got at least one book issued to themselves.

(ii) List the book details for the books which were purchased after January 2017.

(iii) List all the books on title "Databases". This list should be sorted on author's name.

(iv) Find the members who have not got any book issued.