No. of Printed Pages : 4

MCS-023

MCA (Revised) / BCA (Revised)

Term-End Examination

June, 2018

09775

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) Justify the statement "BCNF is stronger than 3NF" with the help of a suitable example. *5*

(b) Why is data replication useful in DDBMS ? What do you understand by the term complete and selective replication ? *5*

(c) How can system log be used for recovery when multiple concurrent transactions are going on ? Explain with the help of an example. *5*

(d) What is the role of views in DBMS ? Can we perform delete, modify or insert operations, if the view contains group function ? Justify. *5*

(e) What do you understand by the term "closure of any relation" ? How is closure used to determine key of relation ? Explain with an example. 5

(f) Can we use Binary Search Tree (BST) for indexing ? Justify. 5

(g) What is Query Optimization ? Discuss the role of Relational Algebra in query optimization. 5

(h) What is a Database manager ? Explain the components of database manager with the help of a diagram. 5

2. (a) Explain ANSI SPARC 3 level architecture of DBMS, with the details of languages associated at different levels and the type of data independence in between different levels. Give suitable diagram in support of your explanation. 7

(b) Consider the relation SUPPLIER given below, where S# and P# are keys, the functional dependency set FD is FD = {S# P# $\rightarrow$ city, S# $\rightarrow$ city}

SUPPLIER

S#	X	X	X	Y	Y
P#	1	2	3	1	2
CITY	DELHI	DELHI	DELHI	GOA	GOA

Now, perform the following :

(i) Determine the highest normal form of the relation SUPPLIER. 2

(ii) Normalize the relation SUPPLIER to the next higher normal form. 2

(iii) Discuss the Deletion and Insertion anomalies, which can occur in the relation SUPPLIER. 2

(c) Construct an ER diagram for the loan management system of a finance company. Loans are given on the purchase of various items with different interest rates. The company keeps track of defaulters and takes appropriate steps against them. Make and state suitable assumptions (if any). 7

3. (a) What is a serializable schedule in concurrent transaction ? How does serializable schedule differ from serial schedule ? Give suitable example in support of your discussion. The problems of deadlock and starvation are addressed by which schedules respectively ? Justify. 7

(b) What is Write-Ahead log protocol ? How is this protocol utilized in database recovery process ? Discuss with suitable example. 5

(c) Discuss the term wait-for graph. What is the utility of wait-for graph in describing deadlocks ? Give suitable example in support of your discussion. 8

4. (a) Differentiate between the following : *10*

(i) Two-phase locking vs Two-phase commit protocol

(ii) Wait-wound vs Wait-die protocol

(b) Discuss the term optimistic scheduling. How is this technique used to manage concurrent transactions in databases ? What is the difference between timestamping and optimistic scheduling ? Give suitable examples in support of your discussion. *10*

5. Write short notes on the following : *4×5=20*

(a) Distributed DBMS

(b) Clustering Indexes and their Implementation

(c) Shadow Paging

(d) Weak Entity along with an example.

(e) Specialisation in ERD with an appropriate example.