

MCA (Revised)

Term-End Examination

June, 2013

13567

MCS-043 : ADVANCED DATABASE
MANAGEMENT SYSTEMS

Time : 3 hours

Maximum Marks : 100

Note : Question number 1 is compulsory. Answer any three questions from the rest.

1. (a) Consider the following instance of a relation : 2+2+4=8

| Employee Name | Project Name | Equipment |
|---------------|-------------------|-----------|
| Sanjay | Inventory control | Computer |
| Sanjay | Secure website | Mobile |
| Sanjay | Secure website | Computer |
| Sanjay | Inventory control | Mobile |
| Harish | Intranet | Computer |
| Harish | Secure website | Computer |

You may assume that projects are independent of equipments that may be allocated to a person. Also assume that employee name, project name and equipment are unique. Perform the following tasks for the description given above :

- (i) Identify the primary key of the relation. Justify your selection.
- (ii) Identify the FDs and MVDs in the relation. Give reasons for your selection.
- (iii) Normalise the relation upto 4th Normal Form (4NF). Show that your decomposition is lossless.

(b) Consider the following two tables :

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| Employee | | | Project | |
|----------|--------|----------------|----------------|--------------|
| EID | Name | Project | Project | Project Name |
| 1 | Mohan | P ₁ | P ₁ | DBMS |
| 2 | Shyam | P ₂ | P ₂ | OS |
| 3 | Deep | P ₃ | P ₃ | Networks |
| 4 | Deepak | P ₄ | P ₄ | OOPS |
| . | | | . | |
| . | | | . | |
| . | | | . | |

Consider the query

“List the names of all the employees working on DBMS project.”

- (i) Draw the query tree for the query.
- (ii) Assume that hash join is to be used to join the two table, show the process of joining the two tables using the hash join.

- (c) Assume that a departmental store has many branches, it has many products and the sales information is recorded for every year. For example, 6

| Year | Product Code | Branch code | Sales amount |
|------|--------------|-------------|--------------|
| 2009 | A001 | B001 | 5000 |
| 2009 | A001 | B002 | 6000 |
| 2010 | A001 | B002 | 3000 |
| 2010 | A002 | B002 | 2000 |
| . | | | |
| . | | | |
| . | | | |
| . | | | |

Identify the dimension tables and fact tables and create the star schema for above.

- (d) Differentiate between the following : 5
- (i) JDBC versus ODBC
 - (ii) B-Tree indexes versus R-Tree indexes used in postgre SQL
- (e) What is a system catalogue ? Write SQL command to show all the table names in a database. 2
- (f) Consider that the adjustment of salary of the faculty members is done as follows, where Fac_Salary i represents the salary of i^{th} faculty member : 6

Transaction 1 : $\text{Fac_Salary } i := \text{Fac_Salary } i + 1025$

Transaction 2 : $\text{Fac_Salary } i := \text{Fac_Salary } i * 1.1$

If the above two transactions are run concurrently, what type of problems can occur. Justify.

5. (a) Define the following giving an example/ diagram, if needed. 15
- (i) Data Grid
 - (ii) Data Mart
 - (iii) Deadlock
 - (iv) Check Point
 - (v) Referential Integrity constraint
- (b) What are the different types of security features needed for a multilevel security system ? Explain the process of partitioning and encryption in a multilevel security system. 5
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- (g) What is a multimedia database ? What are the challenges in designing a multimedia databases ? 5
2. (a) A University has many programmes. A student can enrol only one of these programme as full time or part time student. Create an EER diagram for the above. Make suitable assumptions. Convert the EER diagram into suitable relations. 7
- (b) What is the need of exclusive and shared mode locks ? Explain how these locks may be used in transaction management with the help of an example ? 6
- (c) What is data mining ? Explain with the help of an example situation. What is classification approach of data mining ? How is it different then clustering ? 7
3. (a) Explain the process of log based recovery using immediate database modification scheme with the help of an example. 5
- (b) (i) What is difference between serial schedule and serializable schedule ? What are the conditions for a schedule of transactions to be serializable, give an example of a serializable schedule ? 6

- (ii) What are the different types of θ - join operations available in relational algebra ? 5
- (iii) Explain the concept of "cursor" and "Trigger" in SQL 4
4. (a) Consider the following DTD in XML : 6
- ```

<[
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE Customer>
<!ELEMENT Customer (Person, Address+)>
<!ELEMENT Person (F name, L name)>
<!ELEMENT F name (# PCDATA)>
<!ELEMENT L name (# PCDATA)>
<! ELEMENT Address (#PCDATA)>
]>

```
- Create at least two customer records in XML format using the DTD.
- (b) Define the term join dependency with the help of an example. 4
- (c) Explain Horizontal and Vertical Fragmentation in distributed DBMS. 5
- (d) Explain the role of the following files in oracle 5
- (i) Control files
- (ii) Data files