

MCA (Revised)
Term-End Examination
December, 2015

**MCS-043 (S) : 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 situation :

A subject can be taught by several teachers. The subject has defined textbooks (may be one or more). The following represents this information :

Course	Can be taught by	Textbooks to be used
MCS-01	<ul style="list-style-type: none"> • Mr. X • Mr. Y 	<ul style="list-style-type: none"> • C.J. Date book • IGNOU material • Korth book
MCS-02	<ul style="list-style-type: none"> • Mr. A • Mr. B 	<ul style="list-style-type: none"> • Fundamentals • IGNOU material

Perform the following tasks for the above :

- (i) Represent the data shown above in a relation Course_Teacher_Text (Course, Teacher, Text).

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- (ii) Identify the FDs and MVDs in the relation created as above. Also identify the primary key. 3
- (iii) Normalise the relation into 4NF. 3
- (iv) Show that the normalisation of relations as above will result in lossless decomposition. 2

(b) Consider the following relations :

Student (enrolmentno, name, programme)

Result (enrolmentno, subjectcode, marks)

Consider the query on these relations :

“List the enrolment number, name, subject code and marks of a student whose enrolment number is “120000111”.”

- (i) Represent the query using SQL. 2
- (ii) Convert the SQL query into equivalent relational algebraic query. 2
- (iii) Draw the query tree for the above relational algebraic query. 2

- (iv) Using the query tree, transform the relation algebraic query to an equivalent relation algebraic query, which may reduce the query evaluation cost. 4
- (c) Differentiate between object relational database management system and object oriented database management system. 5
- (d) What is a star schema in the context of a data warehouse ? Explain with the help of an example. 5
- (e) Explain the use of JDBC with the help of an example. Compare JDBC with ODBC. 5
- (f) Explain the data integrity and triggers in Oracle database management system. 5

2. (a) A University has many Professors. Some of these Professors are full time employees, whereas some of them are visiting faculties. Every Professor teaches one or more courses. University stores the name, qualification and experience of every Professor. In case the Professor is a full time Professor his/her date of employment is stored. In case the Professor is a visiting Professor his/her host institution's name is recorded. Every course of the University has a course name, credits and course code.
- (i) Draw an EER diagram for the University as defined above. 4
- (ii) Convert the EER diagram to equivalent relations having proper keys and constraints. 4
- (b) Explain any two security failures that are possible in a database system. What is meant by table access control in the context of database security ? Explain two SQL commands that can be used for access control with the help of examples. 8
- (c) List any four transaction management features of PostgreSQL. 4

3. (a) Consider the following transactions :

T1 : Transfer ₹ 5,000 from Account A to Account B. You may assume that the required amount is available in Account A.

T2 : Add an amount ₹ 1,000 as interest in both the accounts — Account A and Account B.

(i) Write the pseudocode of the two transactions. You must assume read-before-write protocol. 3

(ii) What are the different problems that can occur if both the transactions are executed concurrently? 3

(iii) Rewrite the pseudocode of transactions including Lock and Unlock statements to ensure that the transactions execute without any concurrency related problem. 2

(b) What is Data Mining ? Why is it useful ? What is meant by classification in data mining ? Explain with the help of an example. 6

(c) List the features of the following database models : 6

(i) Mobile databases

(ii) Multimedia databases

4. (a) Explain the utility of XML with the help of an XML document that shows the list of customers of an organisation. You need to store customer name, current address and one or more phone numbers for each customer. Create the customer list with at least two customers. Also create the DTD that verifies the created XML document. 8

- (b) What is meant by the term "View" in the context of Database Management System ? Why is it used ?

Consider a student database :

Student (enrolmentno, name, programme)

Course (course_code, course_name)

Registration (enrolmentno, course_code)

Create a view for a student whose registration number is "101" and shows the list of all the courses registered by him/her. The list should show the course_code and course_name registered by the student whose enrolment number is "101". 6

- (c) Define the following giving their purpose : 6
- (i) Object definition language
 - (ii) Semi-structured data
 - (iii) Data Mart

5. Explain each of the following with the help of an example/diagram, if needed :

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- (a) Knowledge database
- (b) Data Dictionary
- (c) Data Replication in distributed database
- (d) Properties of transactions
- (e) Checkpoints in the context of database recovery
