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MCS-023

M. C. A. (REVISED)/B. C. A. (REVISED)

Term-End Examination

June, 2021

MCS-023 : INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

Time : 3 Hours *Maximum Marks : 100*

Weightage : 75%

Note : (*i*) *Question No.* ***1*** *is compulsory.*

(*ii*) *Attempt any* ***three*** *questions from the rest.*

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1. (a) What are integrity constraints ? Discuss the entity integrity and referential integrity constraints with suitable example. 5

   (b) Explain the three-level architecture of DBMS with the help of a diagram. 5

   (c) Explain the concept 3rd normal form with the help of an example. 5

(d) Consider the following three tables : 10

student (student_id, name, date_of_birth)

registers ((student_id, course_id)

course (course_id, course_title, credits)

Write the SQL commands for the following queries :

(i) List all the courses in alphabetical order of course title.

(ii) Make a list of students who have registered for course whose course_id is "MCS-23".

(iii) Count the total number of students in each course.

(iv) List all the courses whose credits are less than 4.

(v) List all the students who have registered for more than one course.

(e) What is a transaction in the context of DBMS ? Explain the properties of a transaction with the help of an example. 7

(f) Differentiate between primary and secondary indexes in the context of file organisation. 3

(g) Describe the utility of data replication in distributed DBMS with the help of an example. 5

2. (a) Draw an ER diagram for the situation given below : 10

"A company has many employees, working on several projects. A project is controlled by a manager who is an emloyee of the company." Perform the following tasks for the description given above :

(i) Identify entities, attributes, relationships, cardinalities, and draw an ER diagram.

(ii) Convert the ER diagram into tables and show relationship among the tables as per the ER diagram.

(b) Describe the relationship between data security and data integrity, with the help of a diagram. 5

(c) Compare strong and weak entities in the context of ER diagram with the help of an example. 5

3. (a) What are concurrent transactions ? Briefly discuss the problems encountered by concurrent transactions. 10

(b) Briefly discuss the term normalization in DBMS. Write statement for Second Normal Form (2NF) and discuss the insert, delete and update anomalies associated with 2NF. 10

4. (a) Explain database recovery using system log, with the help of an example. Compare the backward recovery with forward recovery with the help of an example of each. 10

(b) Discuss the role of database manager of a DBMS. Draw diagram to show the important components of database manager. Explain the role of each component shown in the diagram. 10

5. Explain any ***five*** of the following : 5×4=20

(a) 2-phase locking protocol

(b) Deadlock prevention protocol

(c) Data fragmentation in DDBMS

(d) Cartesian product and division operations in relational algebra

(e) Inverted file organisation

(f) Client-server databases