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MCS-023

**MASTER OF COMPUTER
APPLICATIONS/BACHELOR OF
COMPUTER APPLICATIONS (MCA/BCA)
(REVISED)**

Term-End Examination

December, 2025

**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.*

1. (a) Draw an E-R diagram for a Hospital Management System (HMS) and convert it into a relational schema. Make necessary assumptions. 10
- (b) Normalize the following relation up to Boyce-Codd Normal form (BCNF) :
EMP (EmpID, EmpName, DeptID, DeptName, DeptLocation). Add field, if necessary. Also explain the process. 10
- (c) Explain the transaction recovery process using log-based recovery and checkpointing with a suitable example. 10
- (d) Consider the following relation : 10
STUDENT (SID, SName, Major, AdvisorID)

Write relational algebra expressions to :

- (i) Get names of students majoring in 'CS'
- (ii) List all students advised by advisor "101".

Make necessary assumptions.

2. (a) Explain 2-Phase Locking (2PL) protocol with a proper schedule. How does it help in achieving serializability ?

10

- (b) With the help of a neat diagram, explain the structure of client-server database management systems. Mention any *two* advantages of this architecture.

10

3. (a) Given the transaction schedule below, determine whether it is conflict serializable :

T1 : R(A), W(A)

T2 : R(A), W(A)

T1 : R(B), W(B)

T2 : R(B), W(B)

Explain your answer using a precedence graph. 8

- (b) Create a comparative table to explain the differences between Heap file, Sequential file and Hashed file organizations. 6

- (c) Briefly explain any *two* differences between database integrity and security with relevant examples. 6

4. Write short notes on the following : $4 \times 5 = 20$
- (a) Referential Integrity
 - (b) Data fragmentation in distributed database
 - (c) Boyce-Codd Normal Form (BCNF)
 - (d) Role of the Database Administrator (DBA)
5. Differentiate between the following : $4 \times 5 = 20$
- (a) Flat File Systems *vs.* Relational Database Systems
 - (b) Data Definition Language (DDL) *vs.* Data Manipulation Language (DML)
 - (c) Logical DBMS Architecture *vs.* Physical DBMS Architecture
 - (d) Centralized *vs.* Distributed Database

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