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MCS–023

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

Term-End Examination

June, 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.*

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1. (a) Explain the concept of database normalization upto 3NF with the help of a suitable example. 10

   (b) Design an Entity-Relationship (E-R) diagram for an e-commerce platform that facilitates online shopping. The platform allows customers to browse products, place orders and make payments. List all the entities, their attributes and relationships among entities. Make suitable assumptions. 10

   (c) Describe three levels of database architecture with suitable diagram. Discuss its advantages. 10

(d) Determine the output when the following operators are applied on relations R_1, R_2 given below : 10

R_1

A	B
x_1	y_1
x_2	y_2
x_3	y_3
x_4	y_4

R_2

A	B
x_1	y_1
x_5	y_5
x_2	y_2
x_3	y_3

(i) Union $(R_1 \cup R_2)$

(ii) Intersection $(R_1 \cap R_2)$

(iii) Difference $(R_1 - R_2)$

(iv) Cartesian Product

2. (a) Describe the concept of ACID properties in database transactions and their role in ensuring data consistency. 7

(b) Discuss different types of database locks used in concurrency control and transaction management. 7

(c) What is a primary index in a database ? How does it improve query performance ? Explain with suitable diagram. 6

3. (a) Consider the student table having the following tuples : 10

Name	Class	Gender	Marks
Nanda	10	M	551
Sonal	11	F	462
Trisha	12	F	400
Shruti	12	F	450
Nishant	10	M	367
Somya	11	F	250

Write the SQL queries for the following problems :

(i) Display name, class of the student having marks in between 450 and 551.

(ii) Display the records in alphabetical order as per the name of the student.

(iii) Find the highest marks among all students.

(iv) Find the classwise highest marks.

(v) Find the number of students in each class.

(b) Explain the purpose of the following constraints in SQL with examples : 10

(i) Primary key

(ii) Foreign key

(iii) UNIQUE

(iv) CHECK

(v) NOT NULL

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

(a) Precedence graph

(b) Role of system administrator

(c) Data fragmentation

(d) Views in SQL

5. Differentiate between the following : 4×5=20

   (a) Centralised *vs.* Distributed DBMS

   (b) Deadlock avoidance *vs.* Deadlock prevention protocols

   (c) Wait-wound protocol *vs.* Wait-die protocol

   (d) B-tree indexes *vs.* Binary search tree indexes

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