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MCS-023

**MASTER OF COMPUTER
APPLICATIONS/BACHELOR OF
COMPUTER APPLICATIONS
(MCA/BCA) (REVISED)
Term-End Examination**

December, 2024

**MCS-023 : INTRODUCTION TO DATABASE
MANAGEMENT SYSTEMS**

Time : 3 Hours

Maximum Marks : 100

Weightage : 75%

Note : *Question No. 1 is compulsory. Attempt any
three questions from the rest.*

1. (a) What are integrity constraints ? Explain various types of integrity constraints with the help of an example of each. 10
- (b) Design an Entity-Relationship (E-R) diagram for a university course registration system. The system allows students to enroll in courses offered by the

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university. Make the necessary assumptions if required and mention them. 10

- (c) What do you understand by the term functional dependency ? Explain the types of functional dependencies, with suitable examples for each. Also, explain the role of functional dependency in normalization. 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
x	2
y	1

R_2	
A	B
x	2
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) What is log based recovery system ?
Explain the kind of information stored in transaction log. Describe which transactions are chosen for redo and undo during database recovery. Present an example to illustrate these concepts. 10
- (b) Explain the concept of BCNF and 3NF with suitable example highlighting their differences and similarities. 10
3. (a) Consider the following table of employees :

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ID	E-Name	Salary	Age	Department
1	John	50,000	30	HR
2	Emma	60,000	35	Finance
3	Liam	55,000	40	IT
4	Olivia	65,000	35	Marketing
5	Noah	52,000	45	Operations
6	Ava	58,000	42	HR

Design SQL queries for the following output from the above employee table :

- (i) Find the highest salary among all employees.
 - (ii) Count the number of employees earning between 50,000 and 60,000.
 - (iii) Calculate the total salary expense of each department.
 - (iv) Count the number of employees in each department.
- (b) Explain lossless decomposition and dependency preserving decomposition with the help of suitable examples. 6
- (c) Explain the following with the help of an example : 6
- (i) Secondary key
 - (ii) Candidate key
 - (iii) Alternate key

4. Write short notes on the following : $4 \times 5 = 20$
- (a) ACID properties of transaction
 - (b) Checkpoints
 - (c) Distributed Database
 - (d) B-tree Indexes
5. Differentiate between the following : $4 \times 5 = 20$
- (a) Serial file organizational technique with Indexed sequential technique
 - (b) Logical data independence and Physical data independence
 - (c) Backward recovery and Forward recovery
 - (d) Weak entity and Strong entity

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