MCA (Revised) / BCA (Revised)
Term-End Examination
June, 2022

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) Draw ANSI-SPARC 3-level architecture of DBMS. Write the languages associated with different levels of ANSI-SPARC 3-level architecture. 5

   (b) In terms of DBMS, what is a transaction ? Discuss ACID properties of transaction. 5

   (c) Compare and contrast serial file organization technique with indexed sequential technique in terms of storage, access and other features. 5

   (d) Define a JOIN operation, How is this different from Cartesian product in relational algebra ? Explain with the help of an example. 5

(e) Compare BCNF and 3NF. Discuss insert, delete and update anomalies in 3NF, with a suitable example of each. *10*

(f) Discuss the role of views in DBMS ? Can we perform insert, delete or modify operations, if the view contains a group function ? Justify. *5*

(g) Explain the terms data replication and data fragmentation, with the help of a suitable example. *5*

2. (a) Create an ER diagram for "LOAN MANAGEMENT SYSTEM" of a finance company. The company offers various kinds of loans like Personal loans, Vehicle loans, Home loans, Marriage loans, etc. To avail them, they had put some criteria as well as need for submission of support documents. Various loans come with variable interest rates. The company keeps track of all the customers whether they are paying regularly or not. It tracks defaulters and takes appropriate steps to recover the loan/instalments. Make and state suitable assumptions (if any). *10*

(b) What do you understand by Query Optimization in DBMS ? How does relational algebra help in Optimizing the Query ? Discuss with suitable example. List the operators used in relational algebra and briefly explain them. *10*

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3. (a) What is Normalization ? Compare the Synthesis and Decomposition approach of Normalization. Discuss Lossless decomposition and Dependency preserving decomposition, with a suitable example of each. *10*

(b) What are Checkpoints ? How does this technique of Checkpoints contribute to database recovery ? *4*

(c) Consider the following schema :

Employee (<u>ENo</u>, EName, City, Basic_Sal,
Job_Status)

Projects (<u>PNo</u>, PName, PCategory)

Works_In (<u>PNo</u>, <u>ENo</u>, PDuration)

Write the appropriate SQL queries for the following : *3×2=6*

(i) Display all the names of the employees who are working in "PAY_ROLL FOR ABC COMPANY" project.

(ii) Display the ENo, EName of all the employees who are working in PNo = 123.

(iii) Find the average salary of all the employees working in a project with PName "ADMINISTRATION MODULE OF XYZ" Company.

4. Differentiate between the following (give example for each) : $4 \times 5 = 20$

    (a)   Client-Server vs. Distributed Database

    (b)   Centralized DBMS vs. Distributed DBMS

    (c)   DBMS vs. File Base Systems

    (d)   2-Phase Locking vs. 2-Phase Commit

5. Write short notes on the following : $4 \times 5 = 20$

    (a)   Concurrent Transactions

    (b)   Hashed File Organization

    (c)   DML Commands used in DBMS (any four)

    (d)   Functional Dependency

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