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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CSE / AI&ML)(Sem-5)
DATABASE MANAGEMENT SYSTEM

Subject Code :BTCS-501-18

M.Code :93171

Date of Examination : 20-11-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) Identify how data independence benefits both users and database designers.
- b) Highlight the main purpose of a data manipulation operation in the relational model.
- c) Point out the reason behind introducing object-relational models in modern DBMS.
- d) Calculate the result of the relational algebra expression: $\pi_{\text{name}} (\sigma_{\text{marks} > 70} (\text{STUDENT}))$.
- e) Choose the normalization form violated when a non-key attribute depends on another non-key attribute.
- f) Mention one advantage and one drawback of using hash-based indexing.
- g) Suggest a scenario where multiversion concurrency control is ideal.
- h) Indicate how optimistic concurrency control differs from locking in terms of performance.
- i) Identify a security loophole that might be exploited during poor authentication handling.
- j) State one reason for the rising popularity of NoSQL and distributed databases in web applications.

SECTION - B

2. Design a relational algebraic expression to find customers who ordered all products in a specific category.
3. Demonstrate the process of converting an un-normalized form to BCNF with a simple relation.
4. Analyze how MySQL and Oracle differ in their transaction isolation levels and indexing mechanisms.
5. Simulate a serial schedule and non-serial schedule for two transactions and evaluate serializability.
6. Construct a rolebased access model for a university database and explain permissions for each role.

SECTION - C

7. Design an airline reservation database using E-R diagram, convert it into relations and normalize it up to 3NF.
8. Write an SQL program for a banking database that performs transaction logging, rollback on failure and includes exception handling.
9. Compare MAC, DAC and RBAC models for security with use-cases in a cloud-based multi-user DBMS environment.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.