BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – Dip.CSE-2022/Dip.CSE-2023
Course Name – Introduction to DBMS
Course Code - DCSE-PC403
(Semester IV)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select the correct definition of Armstrong's axioms in the context of relational database design.

a) A set of inference rules for relational databases
b) A type of join operation
c) Constraints on primary keys
d) Indexing technique

(ii) Select the correct statement about query equivalence.

a) Two queries are equivalent if they produce the same result for all databases
b) Query equivalence is not a relevant concept in database systems
c) Equivalent queries always have the same execution plan
d) Equivalent queries may produce different results in certain cases

(iii) Identify the differences between SQL and SQL3 in terms of their support for object-oriented features.

a) SQL has better support for object-oriented features than SQL3
b) SQL3 has better support for object-oriented features than SQL
c) They both have equal support for object-oriented features
d) Neither SQL nor SQL3 support object-oriented features

(iv) Identify the normal form that ensures every non-prime attribute is fully functionally dependent on the primary key, and there are no transitive dependencies.

a) 2NF
b) 3NF
c) BCNF
d) 4NF

(v) Select the correct statement about the purpose of Armstrong's axioms.

a) Armstrong's axioms are used for query optimization
b) Armstrong's axioms are used for integrity constraints
c) Armstrong's axioms are used for indexing
d) Armstrong's axioms are used for normalization

(vi) Select the difference between UNION and JOIN operations in SQL.

a) UNION combines rows from two or more tables, JOIN combines columns
b) UNION combines columns, JOIN combines rows from two or more tables
c) UNION is a relational algebra operation, JOIN is a SQL operation
d) UNION and JOIN are equivalent operations

(vii) Select the correct option from the following that is NOT a function of DBMS.

a) Data Manipulation
b) Data Security
c) Data Backup
d) Data Compression

(viii) Identify the language used to query relational databases.

a) SQL (Structured Query Language)
b) HTML (Hypertext Markup Language)
c) CSS (Cascading Style Sheets)
d) none of these

(ix) Select the proper option of SQL statement is used to modify existing data in a database table.

a) SELECT
b) ALTER
c) UPDATE
d) INSERT

(x) Identify the SQL statement is used to remove data from a database table.

a) SELECT
b) DELETE
c) DROP
d) TRUNCATE

(xi) Select the proper option from following best describes a database in the context of a Database Management System (DBMS).

a) A collection of software applications used for managing data.
b) A set of rules governing data integrity and security.
c) A structured collection of data that is stored and organized for easy retrieval.
d) A physical device used for storing data files.

(xii) Select the proper option from the following best describes redundancy in a database.

a) Redundancy refers to the presence of outdated data in the database.
b) Redundancy is the result of unauthorized access to the database.
c) Redundancy occurs when data is unnecessarily duplicated in the database.
d) Redundancy refers to the inconsistency of data stored in the database.

(xiii) Choose the storage strategy that is efficient for range queries and equality searches.

a) Indices
b) B-trees
c) Hashing
d) Linked Lists

(xiv) Predict the impact of increasing the degree of a B-tree on search performance.

a) Improved search performance
b) Decreased search performance
c) No impact on search performance
d) Improved insert performance

(xv) Choose the role of locking in transaction processing.

a) To speed up data retrieval operations
b) To ensure data consistency
c) To manage simultaneous transactions without conflicts
d) To automatically recover from database failures

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Apply the principles of ACID properties to design a transaction for a banking system for ensuring the reliability of financial transactions. (3)
3. Explain single-valued attributes and multi-valued attributes with examples. (3)
4. Define domain constrain with suitable example. (3)
5. Compare 1NF and 2NF in terms of their requirements for database tables. (3)
6. Explain the terms 'Fully Functional Dependency' and 'Multivalued Dependency' with examples. (3)

OR

Explain the concept of Primary Indexing with a suitable example. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain the concept of B-trees in the context of storage strategies. (5)
8. Explain that "Deadlock cannot occur in time stamp-based protocol." (5)
9. Apply timestamp-based schedulers in a database environment. (5)
10. Explain with examples the terms Super key, Candidate key and Primary key. (5)
11. Suppose you are given a relation R = {A, B, C, D, E} with the following functional dependencies F= {CE→D, D → B, C → A} a. Find all candidate keys. b. Evaluate the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF). c. If the relation is not in BCNF, decompose it until it becomes BCNF. (5)
12. Estimate various issues while transactions are running concurrently in DBMS. (5)

OR

Illustrate database Recovery? Explain Shadow paging in detail. (5)

****