Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination Dec-2023

CB3CO07 Database Management Systems

Programme: B.Tech. Branch/Specialisation: CSBS

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. DBMS should provide following feature(s) _____. **1**

(a) Protect data from system crash
(b) Safety of the information stored
(c) Authorized access
(d) All of these

ii. Database is an organized collection of related _____. **1**

(a) Modules (b) Data (c) Programs (d) None of these

iii. A relational database consists of a collection of **1**

(a) Tables (b) Fields (c) Keys (d) Records

iv. A person name, birthday and social security number are all examples of _____. **1**

(a) Entities (b) Attributes (c) Relationships (d) Descriptors

v. Consider a relation R(A, B, C, D) with the following functional dependencies: **1**

A -> (B, C, D), (A, D) -> (B, C) and (C, D) -> (A, B). What is/are the candidate key(s).

(a) (A, CD) (b) (AC, A) (c) (CD, BCD) (d) None of these

vi. Which of the following is not a type of Normal Form? **1**

(a) 2NF (b) BCNF (c) PJNF (d) None of these

vii. When dealing with database transactions, there is often a need for multiple users to use a database to perform different operations. In this case, _____ of the database occurs. **1**

(a) Concurrent connection (b) Concurrent reduction
(c) Concurrent execution (d) Concurrent revolution

viii. What are the two main operations in the database transaction? **1**

(a) READ (b) WRITE (c) Both (a) and (b) (d) None of these

ix. Compromising confidential information comes under _____. **1**
(a) Bug (b) Threat (c) Vulnerability (d) Attack

x. Lack of access control policy is a _____. **1**
(a) Threat (b) Vulnerability
(c) Bug (d) Attack

Q.2 i. What do you mean by DBMS? Also mention its applications. **2**

ii. What are the main differences between a file processing system and a DBMS? **3**

iii. Discuss the three-level architecture of database system. **5**

OR iv. Explain the concept of specialization and generalization with respect to database. **5**

Q.3 i. Discuss integrity and referential integrity constraints. **3**

ii. Explain with syntax and example: **7**
(a) Select operation (b) Project operation
(c) Union operation (d) Join operation
(e) Theta join (f) Set intersection
(g) Aggregate functions

OR iii. Consider the relational database given below: **7**
employee (person-name, street, city)
works (person-name, company-name, salary)
company (company-name, city)
manages (person-name, manager-name)
Give an expression in relational algebra to express each of the following queries:
(a) Find the names of all employees who work for First Bank Corporation.
(b) Find the names and cities of residence of all employees who work for First Bank Corporation.
(c) Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000 per annum.
(d) Find the names of all employees in this database who live in the same city as the company for which they work.

Q.4 i. What is normalization? What are the advantages of normalization? **2**

ii. Write any six equivalence rule of query optimization with example. **3**

iii. Consider a relation R(A,B,C,D,E) with the following functional dependencies is given: **5**
A->B,C->B,B->E,E->D and decomposition of R into R1(A,B,C) and R2(B,D,E).
(a) Does this decomposition have the lossless join property? Is it possible to reconstruct R from R1 and R2 using Natural Join? Give reason for your answer?
(b) What is/are the candidate key(s) of R?

OR iv. What are the steps of query processing? Explain in detail. **5**

Q.5 i. What is transaction processing system? Explain with example. **4**

ii. What do you Understand by ACID properties? Explain the different states of transaction with suitable diagram. **6**

OR iii. Explain the following: **6**
(a) Two phase locking protocol
(b) Time stamp protocol

Q.6 Attempt any two:

i. Explain authentication, authorization and access control. **5**

ii. What is DAC, MAC and RBAC models in DBMS? **5**

iii. Describe distributed and web databases. **5**

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