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

**Enrollment No.....**

# Faculty of Engineering
## End Sem Examination May-2024
### IT3CO05 Database Management Systems

Programme: B.Tech. Branch/Specialisation: IT

**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. Before use of DBMS information was stored using? **1**

(a) Cloud storage (b) Data system

(c) File processing system (d) None of these

ii. Which of the following is known as a set of entities of the same type that share same properties, or attributes? **1**

(a) Relationship set (b) Tuples

(c) Entity set (d) Entity relation model

iii. DDL stands for- **1**

(a) Database definition level (b) Data definition language

(c) Data device latency (d) None of these

iv. Procedural language among the following is- **1**

(a) Domain relational calculus

(b) Tuple relational calculus

(c) Relational algebra

(d) Query language

v. For designing a normal RDBMS which of the following normal form is considered adequate? **1**

(a) 4NF (b) 3NF (c) 2NF (d) 5NF

vi. Which SQL constraint is used to enforce referential integrity? **1**

(a) CHECK (b) UNIQUE

(c) PRIMARY KEY (d) FOREIGN KEY

vii. What is a database transaction? **1**

(a) A query to retrieve data

(b) A set of SQL commands

(c) A logical unit of work that is performed on a database

(d) A physical storage unit

viii. Which of the following properties is essential for a database transaction? **1**
(a) Durability (b) Availability (c) Scalability (d) Flexibility

ix. What is the goal of query optimization? **1**
(a) Minimize the number of queries in a database
(b) Minimize the time taken to execute a query
(c) Maximize the number of indexes in a database
(d) Maximize the number of concurrent users in a database system

x. Which of the following is an advantage of using indexes in a database? **1**
(a) Decreased disk space usage (b) Increased data redundancy
(c) Faster data retrieval (d) Simplified data modelling

Q.2 i. What are the applications of DBMS? **2**

ii. Describe the three-schema architecture (view of data) and data independence. **3**

iii. What are the main categories of data models? Give the basic differences between the relational model and the object model. **5**

OR iv. Design an E-R diagram for a banking enterprise. **5**

Q.3 i. Define the following terms as they apply to the relational model of data: relation, domain, attribute, tuple and view. **4**

ii. Explain various relational algebra operations including JOIN with their purpose. **6**

OR iii. Write SQL statements based on given database schema: **6**
Emp (<u>empno</u>, ename, job, mgr, hiredate, sal, comm, deptno)
Dept (<u>deptno</u>, dname, dloc)
(a) List the name those are starting with 'A' and with five characters long
(b) Display the names of all employees who are working in department number 10
(c) Display the names of employees who are working as clerk, salesman or analyst and drawing a salary more than 10000
(d) Display the names of employees who are working in the company for the past 5 years
(e) Find the details of second highest paid employee
(f) List the employee names and his annual salary department wise

Q.4 i. Define functional dependency and trivial functional dependency with example. **3**



ii. Define a KEY; also list different types of keys with example. **7**

OR iii. Specify the purpose of normalization and give difference between 3NF and BCNF. **7**

Q.5 i. Define transaction and list desirable ACID properties with their usefulness. **4**

ii. Explain two phase locking protocol with example. State its advantages and disadvantages. **6**

OR iii. Draw a state diagram and discuss the typical states that a transaction goes through during execution. **6**

Q.6 Attempt any two:

i. Write and explain types of single-level index (primary, secondary, clustering). **5**

ii. What is meant by cost-based query optimization? **5**

iii. What do you mean by distributed database? Explain fragmentation and replication techniques. **5**

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# Marking Scheme
# Database Management System (DBMS) IT3CO05

| | | | | |
|---|---|---|---|---|
| Q.1 | i) | (c) File Processing System | | **1** |
| | ii) | (c) Entity set | | **1** |
| | iii) | (b) Data Definition Language | | **1** |
| | iv) | (c) Relational algebra | | **1** |
| | v) | (b) 3NF | | **1** |
| | vi) | (d) FOREIGN KEY | | **1** |
| | vii) | c) A logical unit of work that is performed on a database | | **1** |
| | viii) | (a) Durability | | **1** |
| | ix) | b) Minimize the time taken to execute a query | | **1** |
| | x) | c) Faster data retrieval | | **1** |
| Q.2 | i. | Application | (0.5 Mark*4) | **2** |
| | ii. | 3 Schema - | 2 Marks | **3** |
| | | Data Independances - | 1 Marks | |
| | iii. | Categories – | 3 Marks | **5** |
| | | Difference - | 2 Marks | |
| OR | iv. | ER-Diagram - | 5 Marks | **5** |
| Q.3 | i. | Relation algebra | 1 Mark | **4** |
| | | Domain | 1 Mark | |
| | | Attribure | 1 Mark | |
| | | Tuple | 0.5 Mark | |
| | | Uew | 0.5 Mark | |
| | ii. | Relation algebra | 4 Marks | **6** |
| | | Join | 2 Marks | |
| OR | iii. | 1 Mark for each | (1 Mark*6) | **6** |
| Q.4 | i. | FD | 1.5 Marks | **3** |
| | | Trival functional dep | 1.5 Marks | |
| | ii. | Key | 2 Marks | **7** |
| | | Difference types | 5 Marks | |
| OR | iii. | Purpose | 4 Marks | **7** |
| | | Difference | 3 Marks | |
| Q.5 | i. | Transcution | 2 Marks | **4** |
| | | Acid Properties | 2 Marks | |
| | ii. | 2 Phase locking protocol | 3 Marks | **6** |
| | | Advantages. | 1.5 Marks | |
| | | Disadvantages | 1.5 Marks | |
| OR | iii. | State diagram | 2 Marks | **6** |
| | | States | 4 Marks | |
| Q.6 | | | | |
| | i. | Primary | 2 Marks | **5** |
| | | Secondary | 2 Marks | |
| | | Clusting | 1 Mark | |
| | ii. | Cost based query optimisation | 5 Marks | **5** |
| | iii. | Distributed database | 1 Mark | **5** |
| | | Fregmentation | 2 Marks | |
| | | Replication techniques | 2 Marks | |

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