

MCA  
 (Sem - I) Odd Semester  
 Minor Test: 2022-23  
**Subject: Database Management System**

Time: 2 Hrs.

Max. Marks: 20

**Note:** Attempt all questions. Each question carries equal marks.

**Q 1. Attempt any three parts of the following. Question 1 (a) is compulsory.**

- (a) Draw the overall structure of database and explain its various components in brief. 4
- (b) What is the significance of Database language in database management system? Illustrate the various database languages provided by DBMS to facilitate its users. 2
- (c) What is the significance of Relational Algebra in DBMS? Describe the selection, projection and join operations of relational algebra with a suitable example. 2
- (d) What are the various functions in SQL? Illustrate the five aggregate functions of SQL with a suitable example. 2

**Q 2. Attempt any two parts of the following. Question 2 (a) is compulsory.**

- (a) Draw the three-level architecture of database and explain its various components in detail. 4
- (b) Illustrate Generalization and Specialization with a suitable example. 2
- (c) What is the significance of Data Model in database management system? Explain the Hierarchical data model along with its advantages and disadvantages. 2

**Q 3. Attempt any two parts of the following. Question 3 (a) is compulsory.**

- (a) Consider the following Employee database  
 Employee (Employee\_name, street, city)  
 Works (Employee\_name, company\_name, salary) ✓  
 Company (Company\_name, city)  
 Manages (Employee\_name, manager\_name) ✓
- Write SQL queries for the following:

- (i) Find the names of all employees who work for First Bank Corporation.
- (ii) Find the names of all employees who belongs to New Delhi.
- (iii) Find the names of all the employees who work for Small Bank Corporation and company is situated at Chennai.
- (iv) Give all employees of First Bank Corporation a 10% raise.
- (v) Find the names of all employees who are managers of the company.
- (vi) Delete all tuples in the works relation for employees of Small Bank Corporation.
- (b) Describe the various characteristics and advantages of SQL. 2
- (c) What is the significance of Key in database management system? Define the term Primary Key, Super Key and Foreign Key with a suitable example. 2

MCA

(SEM - I) ODD SEMESTER

MINOR TEST: 2021-22

Subject: Introduction to Database Management System

Time: 1 Hrs.

Max. Marks: 20

Note: Attempt all questions. Each question carries equal marks.

Q 1. Attempt any three parts of the following. Question 1 (a) is compulsory.

- (a) Describe the three-level architecture of database with the help of a diagram. Why do we need mappings between different schema levels? 4
- (b) What is the significance of Database language in database management system? Illustrate the various database languages provided by DBMS in order to facilitate its users. 2
- (c) Illustrate the Relational Tuple Calculus (RTC) with a suitable example. 2
- (d) Describe the various characteristics of SQL in detail. 2

Q 2. Attempt any two parts of the following. Question 2 (a) is compulsory.

- (a) Draw the overall structure of DBMS and explain its various components in detail. 4
- (b) Bring six differences between database system and file system. 2
- (c) The people's bank offers five types of account: Loan, Checking, Premium savings, Daily interest saving and money market. It operates several accounts. An account can be joint, i. e, more than one client may be able to operate a given account. Identify entities and draw the E-R Diagram. 2

Q 3. Attempt any two parts of the following. Question 3 (a) is compulsory.

- (a) Consider the following Employee database  
 Employee (Employee\_name, street, city)  
 Works (Employee\_name, company\_name, salary)  
 Company (Company\_name, city)  
 Manages (Employee\_name, manager\_name)

Write SQL queries for the following:

- (i) Find the names of all employees who work for First Bank Corporation.

- (ii) Find the names of all employees who belongs to New Delhi.
  - (iii) Find the names of all the employees who work for Small Bank Corporation and company is situated at Chennai.
  - (iv) Give all employees of First Bank Corporation a 10% raise.
  - (v) Find the names of all employees who are managers of the company.
  - (vi) Delete all tuples in the works relation for employees of Small Bank Corporation.
- (b) Explain the concept of Relational Algebra and discuss various set-oriented operations of relational algebra with a suitable example. 2
- (c) What are the various functions in SQL? Illustrate the five aggregate functions of SQL with a suitable example. 2

Sr. No. 70019

MCA-112

Roll No. 2022104027

MCA

(SEM - I) ODD SEMESTER

MAJOR EXAMINATION 2022-23

Subject: Database Management System

Time: 3Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carries equal marks.

**Q 1. Attempt any five parts of the following.**

**5X2 = 10**

- (a) Describe the various functionalities of Database Administrator (DBA) in DBMS.
- (b) Explain how the data is organized in Network DBMS? How is it different from Hierarchical DBMS?
- (c) Draw an E-R diagram for a garment manufacturing company. The entities include warehouses, production units, marking wing, vendor, and product types. Define the relationships between each of these entities. Take the attributes so that they can define a particular entity properly.
- (d) What is the difference between a database schema and a database instance? Which of them is liable to be changed frequently and why?
- (e) What is Referential Integrity? Define the terms primary key constraint and foreign Key constraint. How are these constraints expressed in SQL?
- (f) What are the various characteristics of SQL? Describe the four types of number functions of SQL with a suitable example.
- (g) What do you mean by Query and Sub-query in SQL? Discuss cursors in SQL also.

**Q 2. Attempt any two parts of the following.**

**2x5 = 10**

- (a) What is the importance of FDs in database design? Let R be a relation with attributes as shown below:  
 $R = \{A, B, C, G, H, I\}$  and a set of FDs are given are  $\{A \rightarrow B, A \rightarrow C, CG \rightarrow H, CG \rightarrow I, B \rightarrow H\}$ . Find  $F^+$ ?
- (b) List the various Armstrong's axioms. Given a relation  $R = \{A, B, C, D, E\}$  and corresponding set of FDs are  $\{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$ . Find out candidate keys of relation R.

- (c) Explain 3NF and BCNF with appropriate examples. Prove BCNF is stronger than 3NF.

**Q 3. Attempt any two parts of the following.**

**2x5 = 10**

- (a) What are the lossless join decomposition and dependency preserving decomposition?

Consider the relational schema R {A, B, C, D}. The FDs defined over R are given by the set F: {A → B, C → D}. Decomposed relations are R1 = {A, B} and R2 = {C, D}.

Determine whether the decomposition of R is lossless or lossy. Check the decomposition for dependency preserving also.

- (b) Describe the term MVD in the context of RDBMS by giving an example. Illustrate fourth and fifth normal form with appropriate examples.

(c) Illustrate the Inclusion and Join Dependencies with a suitable example.

**Q 4. Attempt any two parts of the following.**

**2x5 = 10**

- (a) What is log based recovery? Compare the deferred and immediate modification versions of the log-based recovery scheme in terms of ease of implementation and overhead cost.

- (b) What do you mean by schedule in the context of concurrent execution of transactions in RDBMS? Describe the various types of serializability with a suitable example.

- (c) How does timestamp ordering protocol can be used for concurrency control? Describe this with the help of example.

**Q 5. Attempt any two parts of the following.**

**2x5 = 10**

- (a) What is Recoverability? Describe the various steps involved in recovery from transaction failures.

- (b) Discuss the validation-based protocol with a suitable example.

- (c) Briefly describe the multiple granularity and multi-version scheme with a suitable diagram.

MCA

(SEM - I) EVEN SEMESTER

MAJOR EXAMINATION 2021-22

DATABASE MANAGEMENT SYSTEM

Time: 3Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carries equal marks.

**Q 1. Attempt any five parts of the following.  $5 \times 2 = 10$** 

- (a) Differentiate between database system and file system.
- (b) What is the significance of Data Model in database management system? Explain the Hierarchical data model in brief.
- (c) Draw the E-R diagram for course registration process of a student. Convert the diagram into tables also. Assume the appropriate entity and attributes of your own.
- (d) Draw the overall structure of DBMS and explain its main components in brief.
- (e) What is the significance of Relational Algebra in DBMS? Describe the selection, projection and join operations of relational algebra with a suitable example.
- (f) Illustrate the various aggregate functions of SQL with a suitable example.
- (g) Define the concept of Super Key, Candidate Key, Primary Key and Foreign Key with a suitable example.

**Q 2. Attempt any two parts of the following.  $2 \times 5 = 10$** 

- (a) What is Functional Dependency? Describe the various Armstrong's axioms with a suitable example.
- (b) What is partial functional dependency? Describe the second normal form (2NF) with a suitable example.
- (c) What is the significance of Lossless Join Decomposition of a relation? Consider the relation schema,  $R = \{A, B, C, D, E\}$  is decomposed into relations  $R1 = \{A, B, C\}$  and  $R2 = \{A, D, E\}$ . The FDs defined over R are given by set F:  
 $\{A \rightarrow CD, B \rightarrow D, CD \rightarrow E, E \rightarrow A\}$ . Determine whether the decomposition of R is lossless or not.

**Q 3. Attempt any two parts of the following.  $2 \times 5 = 10$** 

- (a) What is Transitive Dependency? Describe third normal form (3NF) WITH A SUITABLE EXAMPLE.

- (b) Consider a relation given below:

SP (Sno, Sname, Pno, Qty). Here Sname is considered unique for each Sno. So, FDs of above relation is:

(Sno, Pno) -----> Qty, (Sname, Pno) -----> Qty, Sno -----> Sname, Sname -----> Sno.

Is this relation in 3NF? Check for it to be in BCNF?

- (c) What is multivalued dependency (MVD)? Illustrate the fourth and fifth normal form with a suitable example.

**Q 4. Attempt any two parts of the following.**

$2 \times 5 = 10$

- (a) What is Transaction? Illustrate the ACID properties of transaction. Draw a state diagram and discuss the typical states that a transaction goes through during execution.
- (b) What do you mean by schedule in the context of concurrent execution of transactions in RDBMS? Describe the various types of serializability with a suitable example.
- (c) What is concurrency control? Describe the two-phase locking protocol (2PL) along with its limitations.

**Q 5. Attempt any two parts of the following.**

$2 \times 5 = 10$

- (a) How does timestamp ordering protocol work? Explain with a suitable example.
- (b) What is deadlock? How is deadlock detected? Describe the wait-die and wound-wait scheme of deadlock prevention with a suitable example.
- (c) What is Multiple granularity? Describe with a suitable example.