Course Code: 25MC9105 **R25**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY::PUTTUR
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QUESTION BANK (DESCRIPTIVE)

Subject with Code: Database Management Systems (25MC9105) **Course & Branch**: MCA
Year & Sem: I-MCA & I-Sem **Regulation:** R25

UNIT –I
INTRODUCTION TO DBMS AND RELATIONAL MODEL

1	**a)**	Define database system and list any five applications.	**[L1][CO1]**	**[6M]**
	b)	Explain the purpose of a database system with suitable examples.	**[L2][CO1]**	**[6M]**
2	**a)**	Discuss the difference between file systems and database management systems.	**[L2][CO1]**	**[6M]**
	b)	Explain the advantages of using a DBMS.	**[L2][CO1]**	**[6M]**
3	**a)**	Define and explain the concept of data models, schemas, and instances.	**[L2][CO1]**	**[6M]**
	b)	Illustrate and explain the three-level architecture of data abstraction with a neat diagram.	**[L3][CO1]**	**[6M]**
4	**a)**	List different types of database languages.	**[L1][CO1]**	**[6M]**
	b)	Compare DDL, DML, and DCL with suitable examples.	**[L4][CO1]**	**[6M]**
5	Draw a labeled sketch of the Database Architecture structure and explain the function of each component shown in the diagram.		**[L3][CO1]**	**[12M]**
6	**a)**	Identify different types of database users.	**[L3][CO1]**	**[6M]**
	b)	Explain in detail how the database engine executes queries internally.	**[L2][CO1]**	**[6M]**
7	**a)**	Define relation, attribute, and tuple in the relational model.	**[L1][CO1]**	**[6M]**
	b)	Construct a relational schema for a university database with at least three relations.	**[L3][CO1]**	**[6M]**
8	**a)**	Explain Selection and Projection Operation with example.	**[L2][CO1]**	**[6M]**
	b)	Explain Union and Set Difference Operations with example.	**[L2][CO1]**	**[6M]**
9	Consider the relations COLLEGE (CNAME, STATE, ENROLLMENT) STUDENT(SID, SNAME, GPA, AGE) APPLY(SID, CNAME, MAJOR, DECISION) Construct Relational Algebra Expressions for the following queries i. Find the students whose GPA is greater than 7 and age is 25. ii. Find the students who join in sietk college with MCA as major. iii. Display names and GPA'S of students with age 25 who applied to MBA and where rejected. **iv.** Pick the students id and names whose GPA is lessthan 5 or age > 28.		**[L5][CO1]**	**[12M]**
10	**a)**	What are keys in relational databases? List different types of keys.	**[L1][CO1]**	**[6M]**
	b)	Analyze the importance of primary key and foreign key constraints with suitable examples.	**[L4][CO1]**	**[6M]**

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UNIT –II

INTRODUCTION TO SQL, ADVANCED SQL

1	**a)**	List out various DDL commands with Syntax & examples.	**[L1][CO2]**	**[6M]**
	b)	List out various DML commands with Syntax & examples.	**[L1][CO2]**	**[6M]**
2	**a)**	What are different Alter Commands in SQL? Explain with example.	**[L2][CO2]**	**[6M]**
	b)	What are different ways to insert row into the table? Explain with example.	**[L2][CO2]**	**[6M]**
3	**a)**	Explain the concept and use of NULL, NOTNULL values in SQL.	**[L2][CO2]**	**[6M]**
	b)	Write SQL queries using set operations such as UNION, INTERSECT, and EXCEPT.	**[L1][CO2]**	**[6M]**
4	**a)**	Explain the basic structure of an SQL Query with a suitable example.	**[L2][CO2]**	**[6M]**
	b)	Assume the table customer(cid,cname,country,age,phno) Construct an SQL Query for the following: i) Find the age and country of all customers who are living in India. ii) Find the details of customers whose age is greater than 25 and living in US. iii) Find the customer phone numbers who are not living in India.	**[L4][CO2]**	**[6M]**
5	**a)**	Explain the purpose of the set operations Union, Intersect, and Except in sql.	**[L2][CO2]**	**[6M]**
	b)	Consider two tables with columns TableA(ID, Name) and TableB(ID, Name) Write SQL queries that use set operations to: i) List all unique names present in either table. ii) List names present in both tables. iii) List names that are in TableA but not in TableB.	**[L5][CO2]**	**[6M]**
6	**a)**	List and analyze the commonly used aggregate functions available in SQL.	**[L4][CO2]**	**[6M]**
	b)	Consider the table Orders(O_ID, Cust_ID, ODate, OAmount). Write an SQL query to display each customer's total order amount, number of orders, & average order value, only for customers whose total order amount exceeds 5,000.	**[L5][CO2]**	**[6M]**
7	**a)**	Define nested subquery with an example	**[L1][CO2]**	**[6M]**
	b)	Demonstrate any four string functions in SQL with examples	**[L2][CO2]**	**[6M]**
8	**a)**	Explain the difference between a SQL function and a stored procedure.	**[L2][CO2]**	**[6M]**
	b)	Write the syntax and example of functions in SQL.	**[L1][CO2]**	**[6M]**
9	**a)**	Write the syntax of SQL stored procedure. Explain with an example.	**[L2][CO2]**	**[6M]**
	b)	Define Trigger. Write an SQL trigger to automatically update the COURSE table whenever a new course is added to the DEPARTMENT.	**[L1][CO2]**	**[6M]**
10	**a)**	Explain different types of joins in SQL with suitable examples.	**[L2][CO2]**	**[6M]**
	b)	Explain how an Outer Join works. Write an example Query and its expected output.	**[L2][CO2]**	**[6M]**

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UNIT –III

E-R MODEL AND RELATIONAL DATABASE DESIGN

1	**a)**	Explain the steps in the database design process.	**[L2][CO3]**	**[6M]**
	b)	Define the Entity-Relationship model and its components.	**[L1][CO3]**	**[6M]**
2	**a)**	Interpret the role of attributes in an ER diagram, using a sample student entity.	**[L3][CO3]**	**[6M]**
	b)	Explain the difference between strong and weak entity sets in an ER model, with suitable examples.	**[L2][CO3]**	**[6M]**
3	**a)**	Construct an ER diagram for the following case: "A hospital has several doctors. Each doctor treats many patients. Patients can be admitted to different wards. Each ward has a unique ward number and capacity."	**[L3][CO3]**	**[6M]**
	b)	Distinguish between one-to-one, one-to-many, and many-to-many relationships in ER modeling	**[L2][CO3]**	**[6M]**
4	**a)**	Describe the process of reducing E-R diagrams to relational schemas.	**[L3][CO3]**	**[6M]**
	b)	Discuss extended E-R features with suitable examples.	**[L2][CO3]**	**[6M]**
5	**a)**	Discuss techniques to remove redundant attributes in entity sets.	**[L2][CO3]**	**[6M]**
	b)	Demonstrate converting an ER diagram to a relational schema.	**[L2][CO3]**	**[6M]**
6	Design an ER model for a banking system that manages customers, accounts, transaction, and branches. Clearly define entity sets, attributes, and relationship constraints.		**[L3][CO3]**	**[12M]**
7	**a)**	Differentiate between entity, attribute, and relationship in an E-R diagram with suitable examples.	**[L2][CO3]**	**[6M]**
	b)	Explain about Multivalued and Transitive Functional dependencies.	**[L2][CO3]**	**[6M]**
8	**a)**	Define Normalization and explain various types of Normal Forms.	**[L2][CO3]**	**[6M]**
	b)	Explain the process of converting a relation from First Normal Form to Second Normal Form with an example.	**[L2][CO3]**	**[6M]**
9	**a)**	Apply the inference rules of Armstrong's axioms for functional dependencies.	**[L3][CO3]**	**[6M]**
	b)	Discuss different types of functional dependencies with examples.	**[L2][CO3]**	**[6M]**
10	**a)**	What is BCNF? How does it differ from 3NF.	**[L3][CO3]**	**[6M]**
	b)	Apply the definition of Third Normal Form (3NF) to determine whether the following relation is in 3NF: R(Employee_ID, Department, Manager, Location) with dependencies {Employee_ID → Department, Department → Manager, Manager → Location}. Explain your reasoning.	**[L3][CO3]**	**[6M]**

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UNIT –IV

QUERY PROCESSING AND QUERY OPTIMIZATION

1	**a)**	Explain the different phases involved in query processing with a neat diagram.	**[L2][CO4]**	**[6M]**
	b)	Discuss various measures of query cost.	**[L2][CO4]**	**[6M]**
2	**a)**	Describe different algorithms used to implement the selection using index in query processing.	**[L2][CO4]**	**[6M]**
	b)	Describe different algorithms used to implement the selection using Comparisons in query processing.	**[L2][CO4]**	**[6M]**
3	**a)**	Explain the sorting and join operations.	**[L2][CO4]**	**[6M]**
	b)	Explain the external merge sort technique used in query processing and analyze its efficiency for large datasets.	**[L4][CO4]**	**[6M]**
4	**a)**	Explain the working of a nested-loop join algorithm with an example. Discuss its advantages and disadvantages.	**[L4][CO4]**	**[6M]**
	b)	Illustrate how block nested-loop join improves performance over simple nested-loop join.	**[L3][CO4]**	**[6M]**
5	**a)**	Compare hash join and sort-merge join in terms of cost, memory usage, and data requirements.	**[L4][CO4]**	**[6M]**
	b)	Discuss the role of join ordering in query optimization and its impact on query execution cost.	**[L4][CO4]**	**[6M]**
6	**a)**	Explain how we can evaluate a query using Materialization.	**[L3][CO4]**	**[6M]**
	b)	Explain how we can evaluate a query using Pipelining.	**[L3][CO4]**	**[6M]**
7	Illustrate with an example how equivalence rules are used to transform relational expressions for better execution plans.		**[L3][CO4]**	**[12M]**
8	**a)**	List any six standard equivalence rules used in relational algebra.	**[L1][CO4]**	**[6M]**
	b)	List some equivalence rules related to selection and projection operations.	**[L1][CO4]**	**[6M]**
9	Illustrate various evaluation strategies used in query optimization.		**[L3][CO4]**	**[12M]**
10	Analyze different types of estimation in optimizing a query.		**[L4][CO4]**	**[12M]**

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UNIT –V

TRANSACTIONS, CONCURRENCY CONTROL AND RECOVERY SYSTEM

1	**a)**	Explain the concept of a transaction in DBMS.	**[L2][CO5]**	**[6M]**
	b)	Discuss how a transaction ensures the ACID properties	**[L2][CO5]**	**[6M]**
2	**a)**	Demonstrate with an example how atomicity can be maintained in case of a transaction failure.	**[L3][CO5]**	**[6M]**
	b)	Differentiate between transaction atomicity and durability using suitable examples.	**[L2][CO5]**	**[6M]**
3	**a)**	Explain what a schedule is in transaction processing with an example.	**[L2][CO5]**	**[6M]**
	b)	Describe serial and non-serial schedules and compare them.	**[L2][CO5]**	**[6M]**
4	Construct a schedule and show how to test its serializability using a precedence graph.		**[L3][CO5]**	**[12M]**
5	**a)**	Explain the concept of conflict serializability with a suitable example.	**[L2][CO5]**	**[6M]**
	b)	Describe view serializability and compare it with conflict serializability.	**[L2][CO5]**	**[6M]**
6	**a)**	Illustrate the types of locks and explain the process of acquiring and releasing locks in a lock-based protocol using a transaction example.	**[L3][CO6]**	**[6M]**
	b)	Illustrate, with an example, how deadlock can occur under 2PL and describe its detection.	**[L3][CO6]**	**[6M]**
7	**a)**	Apply the Two-Phase Locking protocol to a schedule and determine whether it ensures serializability.	**[L3][CO6]**	**[6M]**
	b)	Demonstrate lock conversion on a database item through a sequence of read and write operations.	**[L3][CO6]**	**[6M]**
8	**a)**	Apply deadlock prevention techniques to a sample set of transactions.	**[L3][CO6]**	**[6M]**
	b)	Apply the wait-for graph method to a given schedule and determine whether a deadlock exists.	**[L3][CO6]**	**[6M]**
9	**a)**	List and describe the different types of system failures in a database system.	**[L1][CO6]**	**[6M]**
	b)	Contrast the roles of volatile, non-volatile, and stable storage in database recovery.	**[L4][CO6]**	**[6M]**
10	**a)**	Define log-based recovery in database systems.	**[L1][CO6]**	**[6M]**
	b)	Compare deferred database modification and immediate database modification in terms of logging and recovery.	**[L4][CO6]**	**[6M]**

Prepared by:

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