

SRM VALLIAMMAI ENGINEERING COLLEGE
(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE



QUESTION BANK

III SEMESTER

AD3362-DATABASE DESIGN AND MANAGEMENT

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Prepared by

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SUBJECT : DATABASE DESIGN AND MANAGEMENT

SEM / YEAR: III Sem / II Year

UNIT I – CONCEPTUAL DATA MODELING

Database environment-Database system development lifecycle-Requirements collection-Database design-Entity-Relationship model-Enhanced-ER Model-UML class diagram

PART – A

Q.No	Questions	BT Level	Competence
1.	List out the application of DBMS.	BTL 1	Remembering
2.	Mention the steps in database development life cycle	BTL 1	Remembering
3.	What is database design?	BTL 1	Remembering
4.	List the characters of conceptual data model.	BTL 1	Remembering
5.	Define Entity-Relationship model.	BTL 1	Remembering
6.	What is an attribute?	BTL 1	Remembering
7.	List the components of ER Model.	BTL 1	Remembering
8.	Mention the characteristics that distinguish strong entity and Weak entity.	BTL 2	Understanding
9.	What is a database environment?	BTL 2	Understanding
10.	What is the enhanced ER Model?	BTL 1	Remembering
11.	Mention the purpose of the class diagram.	BTL 2	Understanding
12.	List out the application of ER Model	BTL 1	Remembering
13.	State the objectives of requirements collection in database design.	BTL 2	Understanding
14.	Mention the phases of database lifecycle.	BTL 2	Understanding
15.	Define multiplicity in UML class diagrams.	BTL 2	Understanding
16.	What is a Data Definition language.Give Example.	BTL 1	Remembering
17.	What do you mean by derived attributes?	BTL 2	Understanding
18.	Define metadata and state its importance in a database system	BTL 1	Remembering
19.	List the advantages of the Database System Development Life Cycle	BTL 1	Remembering
20.	What is a primary key.Give example.	BTL 1	Remembering
21.	Define Entity.	BTL 1	Remembering
22.	Mention the purpose of the Class diagram.	BTL 2	Understanding
23.	State the objectives of requirements collection in database design.	BTL 2	Understanding
24.	Define multiplicity in UML class diagrams.	BTL 2	Understanding
PART-B			
1.	Analyze the basic architecture of Database management system with a suitable diagram.(16)	BTL 4	Analyzing

2.	Write the short notes on (i) Notation for ER Diagram(6) (ii) Draw the components of ER models(7).	BTL 4	Analyzing
3.	Explain in detail about Conceptual Database Design(7)	BTL 4	Analyzing
4.	Explain Relationship Types with example.(16)	BTL 3	Applying
5.	Analyze the phases of the Database System Development Life Cycle (DBSDLC) and illustrate the activities carried out in each phase with suitable examples.	BTL 4	Analyzing
6.	(i)What is an Entity? Explain different type of Entities.(9) (ii) What is an Attribute? Explain different types of Attributes.(7)	BTL 3	Applying
7.	Explain the concept of entity types and its attributes(16)	BTL 4	Applying
8.	Explain in detail about Enhanced ER Model with example(16)	BTL 4	Applying
9.	Explain in detail about class hierarchies with an example (9)	BTL 4	Applying
10.	Explain the concepts of database development life cycle model(16)	BTL 3	Applying
11.	Design the Class diagram for the Hospital management system? Find and draw conceptual classes for the same?(16)	BTL 3	Applying
12.	Explain in detail about UML diagrams. (16)	BTL 4	Applying
13.	A university database contains information about professors (identified by social security number, or SSN) and courses (identified by courseid). Professors teach courses; each of the following situations concerns the Teaches relationship set. For each situation, draw an ER diagram that describes it (assuming that no further constraints hold). 1. Professors can teach the same course in several semesters, and each ordering must be recorded. 2. Professors can teach the same course in several semesters, and only the most recent such offering needs to be recorded. (Assume this condition applies in all subsequent questions.) 3. Every professor must teach some course. 4. Every professor teaches exactly one course (no more, no less).(16)	BTL 4	Analyzing
14.	Describe in detail the components of DB system environment.(16)	BTL 3	Applying
15.	Explain in detail about the Requirement collection.	BTL 5	Applying
16.	Draw and Explain an E-R diagram for a small marketing company database and assuming your own data requirements.(16)	BTL 4	Evaluating
17.	Design a UML class diagram and the corresponding EER model for an Online Shopping System, stating suitable assumptions	BTL 6	Creating

UNIT II			
PART – A			
Q.No	Questions	BT Level	Competence
1.	Define relational algebra	BTL 1	Remembering
2.	Define Domain Constraints	BTL 1	Remembering
3.	Differentiate between a candidate key and a primary key.	BTL 1	Remembering
4.	What is the role of foreign keys in relational databases?	BTL 1	Remembering
5.	List any four relational algebra operations.	BTL 2	Understanding
6.	What are the operations in the Relational Model?	BTL 1	Remembering
7.	What is the function of a primary key constraint in a table?	BTL 2	Understanding
8.	Define Key Constraints.	BTL 2	Understanding
9.	Define Integrity Constraints	BTL 2	Understanding
10.	Define Data Definition Language.	BTL 1	Remembering
11.	What is the role of the DELETE statement in SQL.	BTL 2	Understanding
12.	How does the SELECT statement retrieve data from a database table?	BTL 2	Understanding
13.	What does the CREATE TABLE statement do in SQL?	BTL 2	Understanding
14.	Differentiate DELETE and TRUNCATE commands.	BTL 2	Understanding
15.	Define referential integrity.	BTL 1	Remembering
16.	Differentiate between VARCHAR and CHAR data types in SQL	BTL 1	Remembering
17.	What is a view in SQL?	BTL 2	Understanding
18.	How is a view different from a table?	BTL 1	Remembering
19.	What are the benefits of using views in database design?	BTL 2	Understanding
20.	State the purpose of cursors in SQL programming.	BTL 2	Understanding
21.	What are stored procedures in SQL?	BTL 2	Understanding
22.	What is the main purpose of triggers in SQL?	BTL 1	Remembering
23.	What is the difference between a stored procedure and a function in SQL?	BTL 1	Remembering
24.	Describe the basic structure of an SQL trigger.	BTL 2	Understanding
PART – B			
1.	Explain the concepts of DDL, DML, DCL, DQL with example query. (16)	BTL 3	Applying
2.	Explain in detail about integrity constraints over relations. (16)	BTL 4	Analyzing
3.	Discuss the role of primary keys in maintaining data integrity. (16)	BTL 3	Applying
4.	Explain in detail about Domain Constraints over relations. (16)	BTL 4	Analyzing
5.	Explain the concepts of Key constraints over relations. (16)	BTL 4	Analyzing
6.	Explain SQL Data Types with examples. (16)	BTL 4	Analyzing
7.	Write a query for create, select, insert, update, delete, drop, truncate of your own example. (16)	BTL 5	Analyzing
8.	Design a Library Management database and write SQL statements to create tables, enforce constraints, insert records, and retrieve information using joins and aggregate functions	BTL 6	Creating
9.	Create a table with table name employees with attributes of	BTL 6	Creating

	name, id, age, department, salary and date of joining with exact data types. Make id as primary key. Insert 5 records with values. Change any employee department to another department. Delete any one record. Finally drop the table. Write the queries for all. (16)		
10.	Explain the concept of views. (16)	BTL 4	Applying
11.	i. Write a trigger program for age is less than or equal to 0 for the table.(8). ii. Write a PL/SQL program for finding the factorial of number(8)	BTL 4	Analyzing
12.	Explain in detail about SQL Data Manipulation. (6)	BTL 4	Analyzing
13.	Strengths and weaknesses of the trigger mechanism. Contrast triggers with other integrity constraints supported by SQL.	BTL 4	Applying
14.	Create a table Sales with attributes saleid, productid, quantitysold, saledate, totalprice and insert the values for each attribute. Write the queries for following(16) i. Retrieve all columns from the sales table ii. Retrieve the saleid and saledate from the sales table. iii. filter the sales table to show only with a total price greater than 100. iv. Retrieve the saleid and totalprice from the sales table for sales made in January. v. Calculate the total revenue generated from all sales in the Sales table.	BTL 5	Analyzing
15.	i. Write a PL/SQL program for finding the GCD number.(10) ii. Write a PL/SQL program for finding the greatest three number(6)	BTL 5	Analyzing
16.	Consider the following relations Employee (<u>Eno</u> , name, DOB, Gender, Date of join, Designation, BasicPay, Dno) Department(Dno, Dname) The primary key is underlined. Write sql queries to perform the following' i. Display the employee number, name, department number, and department name of all employees. ii. List the details of employee who earn less than basic pay of all employees iii. List the department number and number of employees in each department, iv. List the details of employees who work for Dno='CSE'	BTL 5	Analyzing
17.	i. Write a PL/SQL Program to generate the Fibonacci series ii. Write a PL/SQL program to handle divide by zero exception:	BTL 5	Analyzing

UNIT III			
PART – A			
Q.No	Questions	BT Level	Competence
1.	State the anomalies of 1NF	BTL 1	Remembering
2.	Define partial functional dependency.	BTL 2	Understanding
3.	What is transitive dependency?	BTL 1	Remembering
4.	What is a multivalued dependency?	BTL 2	Understanding
5.	Define the concept of a super key in terms of functional dependencies.	BTL 1	Remembering

6.	What is a candidate key in relation to functional dependencies?	BTL 1	Remembering
7.	Define the transitivity rule in Armstrong's axioms.	BTL 1	Remembering
8.	What is the union rule in the context of functional dependencies?	BTL 2	Understanding
9.	State the decomposition rule for functional dependencies.	BTL 1	Remembering
10.	Define attribute closure.	BTL 2	Understanding
11.	What is the purpose of finding a minimal cover?	BTL 1	Remembering
12.	Why is 4NF in Normal Form more desirable than BCNF?	BTL 2	Understanding
13.	State the purpose of dependency preservation	BTL 2	Understanding
14.	What is the significance of a minimal cover in normalization?	BTL 2	Understanding
15.	Differentiate lossless join decomposition and lossy decomposition.	BTL 2	Understanding
16.	Define Functional Dependency.	BTL 1	Remembering
17.	Define entity relationship model.	BTL 1	Remembering
18.	Explain how minimal cover is used in database design.	BTL 1	Remembering
19.	Define join dependency.	BTL 2	Understanding
20.	List the objectives of normalization	BTL 2	Understanding
21.	Define the first normal form (1NF).	BTL 2	Understanding
22.	What is the second normal form (2NF)?	BTL 1	Remembering
23.	Define the third normal form (3NF).	BTL 1	Remembering
24.	Define Boyce code normal form? Why is BCNF Stricter than 3NF?	BTL 2	Understanding
PART – B			
1.	Explain the process of mapping an ER diagram to a relational schema. Include detailed steps and examples.(16)	BTL 3	Applying
2.	Discuss the mapping of extended ER (EER) constructs such as specialization, generalization, and aggregation to relational schemas. Provide examples for each construct. (16)	BTL 3	Applying
3.	What is Normalization? Explain in detail about all Normal Forms. (16)	BTL 4	Analyzing
4.	What are update anomalies in relational databases? Explain the three types of update anomalies: insertion, deletion, and modification. Provide examples to illustrate each type. (16)	BTL 3	Applying
5.	Discuss how normalization can help prevent update anomalies. Use examples to show how different normal forms address various update anomalies. (16)	BTL 4	Analyzing
6.	Explain in detail about Functional Dependencies? Briefly discuss about the Functional Dependency Concepts? (16)	BTL 3	Applying
7.	Discuss the significance of functional dependencies in normalization. How do they help in determining the normal forms of a relationship? (16)	BTL 4	Analyzing
8.	Explain Armstrong's axioms and their use in deriving all possible functional dependencies from a given set of functional dependencies. Provide examples to illustrate the use of each axiom.	BTL 4	Analyzing
9.	Analyze the process of computing attribute closure and explain its significance in determining candidate keys with suitable example	BTL 4	Analyzing
10.	Define minimal cover (canonical cover) and explain the steps involved in computing a minimal cover for a set of functional	BTL 4	Analyzing

	dependencies. Provide a detailed example.		
11.	Evaluate the normalization process from UNF to BCNF for a given relation and justify each decomposition step.	BTL 5	Evaluating
12.	Explain the properties of relational decomposition.	BTL 3	Applying
13.	Discuss the importance of lossless join and dependency preservation properties in relational decomposition. Provide examples to illustrate why these properties are crucial.	BTL 3	Applying
14.	Explain the process of normalization and its importance in database design.	BTL 3	Applying
15.	Define Boyce-Codd normal form (BCNF) and explain how it differs from the third normal form (3NF). Provide examples to illustrate the differences and the process of achieving BCNF.	BTL 4	Analyzing
16.	Discuss the first normal form (1NF), second normal form (2NF), and third normal form (3NF) with examples.	BTL 4	Analyzing
17.	Discuss the concepts of lossless join decomposition and dependency preservation with examples.	BTL 3	Applying

UNIT-IV – TRANSACTION MANAGEMENT

Transaction Concepts - Properties - Schedules - Serializability - Concurrency Control - Two-phase locking techniques.

PART – A

Q.No	Questions	BT Level	Competence
1.	Define transaction.	BTL 1	Remembering
2.	What are the properties of a transaction?	BTL 1	Remembering
3.	Define a schedule in the context of database transactions.	BTL 1	Remembering
4.	Give the reasons for allowing concurrency.	BTL 2	Understanding
5.	Discuss the term aborted state.	BTL 2	Understanding
6.	Give the states of transaction	BTL 2	Understanding
7.	List the types of serializability.	BTL 1	Remembering
8.	What is serializability in database transactions?	BTL 1	Remembering
9.	List the phases of two-phase locking protocol	BTL 1	Remembering
10.	What is the purpose of concurrency control in databases?	BTL 2	Understanding
11.	Define strict two-phase locking.	BTL 1	Remembering
12.	State the purpose of checkpoints in transaction recovery	BTL 1	Remembering
13.	Why is atomicity important in transactions?	BTL 2	Understanding
14.	Define upgrade and downgrade.	BTL 1	Remembering
15.	How does a recoverable schedule differ from a non-recoverable schedule?	BTL 2	Understanding
16.	Define deadlock.	BTL 1	Remembering
17.	List the different modes of locks in database systems.	BTL 1	Remembering
18.	Define cascading rollback..	BTL 2	Understanding
19.	Define the concept of deadlock in concurrency control.	BTL 2	Understanding
20.	Differentiate shared lock and exclusive lock.	BTL 2	Understanding
21.	What are the timestamps associated with each data item in a database transaction?	BTL 1	Remembering
22.	Define starvation in concurrency control.	BTL 2	Understanding
23.	Give an example of a transaction state.	BTL 1	Remembering

24.	List the advantages of timestamp-based concurrency control	BTL 2	Understanding
PART – B			
1.	Illustrate the conflict serializability and view serializability with an example. (16)	BTL 3	Applying
2.	Analyze timestamp-based concurrency control and compare it with two-phase locking using suitable examples	BTL 4	Analyzing
3.	(i) When is a transaction said to be deadlocked? (7) (ii) Explain the deadlock prevention methods with an example? (9)	BTL 4	Analyzing
4.	Explain Two Phase Commit and Three-Phase Commit Protocols. (16)	BTL 4	Analyzing
5.	(i) What is a deadlock? How does it occur? (7) (ii) How transactions are to be written to Avoid deadlock and guarantee correct execution. Illustrate a suitable example. (9)	BTL 3	Applying
6.	(i) Analyze the ACID properties of a transaction. Discuss how each property contributes to the overall reliability and integrity of a transaction. (9) (ii) Analyze the benefits of rigorous two-phase locking. Compare it with other forms of two-phase locking by examining their effects on concurrency, deadlock prevention, and system performance. (7)	BTL 4	Analyzing
7.	(i) Evaluate the effectiveness of concurrency control methods in a DBMS. What are the strengths and weaknesses of these methods? (7) (ii) Evaluate concurrency control with an example. Compare different methods used in the example and decide which one is most effective. (9)	BTL 5	Evaluating
8.	Analyze the mechanisms for handling deadlocks in a DBMS. How does each mechanism work, and when is it most effective? (16)	BTL 4	Analyzing
9.	Evaluate the implications of dirty reads, non-repeatable reads, and phantoms in database transactions. Provide examples to illustrate how each violation can affect data integrity and system reliability. (16)	BTL 5	Evaluating
10.	Evaluate different transaction recovery techniques and justify the most appropriate method for large-scale database systems	BTL 5	Evaluating
11.	(i) Analyze the process of deadlock detection in database systems. Explain the techniques used, their advantages, and limitations in ensuring system stability. (9) (ii) Analyze the concepts of recoverable schedules and cascadeless schedules. Compare their implications on transaction management and database reliability. (7)	BTL 4	Analyzing
12.	Analyze the concept of a schedule in database transactions. Discuss different types of schedules and their impact on database performance and concurrency. (16)	BTL 4	Analyzing
13.	Evaluate the effectiveness of deadlock prevention schemes in database systems. Discuss various prevention strategies, their advantages, limitations, and suitability for different types of applications. (16)	BTL 5	Evaluating
14.	Discuss the role of concurrency control mechanisms in managing simultaneous transactions. Analyze different techniques such as locking, timestamps, and optimistic concurrency control. (16)	BTL 4	Analyzing
15.	Compare and contrast the ACID properties of a transaction.	BTL 5	Evaluating

	Evaluate how each property contributes to transaction reliability and database integrity. (16)		
16.	Evaluate the effectiveness of two-phase locking techniques in ensuring transaction isolation and database consistency. Compare strict two-phase locking with rigorous two-phase locking, highlighting their advantages and limitations. (16)	BTL 5	Evaluating
17.	Evaluate the importance of serializability in database transactions. Discuss how serializability ensures transaction consistency and discuss methods to test for serializability.(16)	BTL 5	Evaluating

UNIT V -

Mapping EER to ODB schema – Object identifier – reference types – rowtypes – UDTs – Subtypes and supertypes – user-defined routines – Collection types – Object Query Language; No-SQL: CAP theorem – Document-based: MongoDB data model and CRUD operations; Column-based: Hbase data model and CRUD operations.

PART – A

Q.No	Questions	BT Level	Competence
1.	Define object-relational database.	BTL 1	Remembering
2.	Draw the structure of object.	BTL 1	Remembering
3.	State the advantages of Object Query Language (OQL).	BTL 2	Understanding
4.	What is row type?	BTL 2	Understanding
5.	What is supertype and subtype?	BTL 1	Remembering
6.	What is NoSQL ?	BTL 2	Understanding
7.	Differentiate MongoDB and HBase.	BTL 2	Understanding
8.	Enlist features of MongoDB	BTL 2	Understanding
9.	Enlist the features of NoSQL.	BTL 1	Remembering
10.	Enlist the features of MongoDB.	BTL 1	Remembering
11.	What is mongoDB?	BTL 2	Understanding
12.	Why MongoDB is needed?	BTL 1	Remembering
13.	How the terms in MongoDB are different from SQL?	BTL 2	Understanding
14.	Define sharding in MongoDB.	BTL 1	Remembering
15.	Define the term document in MongoDB.	BTL 1	Remembering
16.	Enlist any four data types in MongoDB.	BTL 2	Understanding
17.	How to create collection in MongoDB?	BTL 1	Remembering
18.	List the applications of column-oriented databases	BTL 2	Understanding
19.	How to create Create Collection in MongoDB?	BTL 2	Understanding
20.	Give the syntax for insert the document. The document is analogous to rows in database.	BTL 1	Remembering
21.	How to delete Documents in MongoDB?	BTL 1	Remembering
22.	What are the methods used in updating the document in MongoDB?	BTL 2	Understanding
23.	What is a column-oriented database model? Give an example of it.	BTL 1	Remembering
24.	Enlist the features of HBase data model.	BTL 2	Understanding

PART – B

1.	Explain about Object Database Concept and Mapping EER and ODB Schema.	BTL 4	Analyzing
2.	Write about Reference types in detail?	BTL 5	Evaluating

3.	Write about Row Types in detail.	BTL 4	Analyzing
4.	Explain about User Defined Types in detail.	BTL 4	Analyzing
5.	Write a short notes on Subtypes and Supertypes.	BTL 4	Analyzing
6.	Write about User-Defined Routines in detail.	BTL 4	Analyzing
7.	Write about the collection types in detail.	BTL 4	Analyzing
8.	Give the details about Object Query Language(OQL) in Detail.	BTL 4	Analyzing
9.	What is NoSQL? What is the need for it. Enlist various features of NoSQL.	BTL 5	Evaluating
10.	Explain different types of NoSQL databases.	BTL 5	Evaluating
11.	Give the difference between RDBMS and NoSQL.	BTL 4	Analyzing
12.	Write a short note on CAP Theorem.	BTL 4	Analyzing
13.	Understanding NoSQL and MongoDB in Detail.	BTL 5	Evaluating
14.	What are the data types used in MongoDB? Explain in detail.	BTL 4	Analyzing
15.	Evaluate Object-Relational Databases and NoSQL databases by comparing their architecture, scalability, performance, and applications..	BTL 5	Evaluating
16.	Analyze the architecture of MongoDB and explain how CRUD operations are performed with suitable examples	BTL 4	Analyzing
17.	Write about Introduction to Hbase Data Model in detail.	BTL 5	Evaluating

