SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2023-24 (EVEN) SET – 2(BATCH 1)

ANSWER KEY

Test: CLA-T1 **Date: 09-02-2024**
Course Code & Title: 18CSC303J Database Management Systems **Duration:** 50 Minutes
Year & Sem: III Year / VI Sem **Max. Marks:** 25

Course Articulation Matrix:

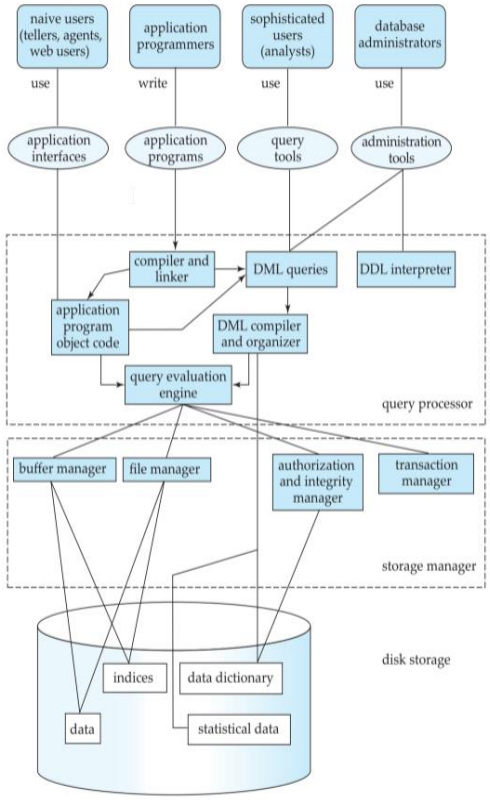
S. No.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	**CO1**	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-
2	**CO2**	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-
3	**CO3**	3	3	3	-	-	-	-	-	-	-	-	-	2	2	-
4	**CO4**	3	3	3	2	-	-	-	-	-	-	-	-	2	2	-
5	**CO5**	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-

Part - A
(10 x 1 = 10 Marks)

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	_____ abstraction describes the part of the entire database. a) File Level Abstraction b) Physical Level Abstraction c) Instance Level Abstraction **d) View Level Abstraction** **Answer : d**	**1**	**L1**	**1**	**1**	**1.6.1**
2	Modification of database can cause violation of _____. **a) Referential Integrity** b) Integrity Constraint c) Consistency Constraints d) Cardinality Constraints **Answer : a**	**1**	**L2**	**1**	**1**	**1.7.1**
3	_____ clause is used to give a table or column a temporary name. a) Like Clause b) Top Clause c) Null Clause **d) Aliases Clause** **Answer : d**	**1**	**L1**	**1**	**1**	**1.7.1**
4	The records of the relation / table in a particular point are termed to be _____ and _____ that describes the overall structure of the relation a) Attribute, Key **b) Instance, Schema** c) Schema, Key d) Schema, Attribute **Answer : b**	**1**	**L1**	**1**	**1**	**1.7.1**
5	The _____ users access the tools for retrieval of information from the database a) Naïve	**1**	**L1**	**1**	**1**	**1.6.1**

	b) Application **c) Sophisticated** d) End-users **Answer : c**					
6	Which of the following provides the ability to query information from the database and insert tuples into, delete tuples from, and modify tuples in the database? **a) DML (Data Manipulation Language)** b) DDL (Data Definition Language) c) Query d) Relational Schema **Answer : a**	**1**	**L1**	**1**	**1**	**1.6.1**
7	The DBMS acts as an interface between what two components of an enterprise-class database system? **a) Database application and the database** b) Data and the database c) The user and the database application d) Database application and SQL **Answer: a**	**1**	**L1**	**1**	**1**	**1.6.1**
8	In the architecture of a database system external level is the a) physical level b) logical level c) conceptual level **d) view level** **Answer: d**	**1**	**L2**	**1**	**1**	**1.6.1**
9	Entity is a _____ a) Object of relation b) Present working model **c) Thing in real world** d) Model of relation **Answer: c**	**1**	**L1**	**1**	**1**	**1.7.1**
10	One of the following is a valid record-based data model a) Object-oriented model **b) Relational model** c) Entity-relationship model d) Unstructured model. **Answer: b**	**1**	**L1**	**1**	**1**	**1.7.1**
Part B (1 X 7.5 = 7.5)						
11.a	With a neat sketch brief the components of DBMS architecture.	**7.5**	**L2**	**1**	**1**	**1.7.1**

	 Diagram- 5 Marks Explanation – 2.5 Marks					
	OR					
11.b	Define Data abstraction and discuss the levels of abstraction with respect to Stock inventory system **Answer:** Data abstraction is a concept in software engineering and database design that allows complex systems to be managed by simplifying their complexities. It involves hiding the complex implementation details and exposing only the necessary functionalities or information. In the context of databases, data abstraction is often achieved through different levels of abstraction, each providing a different perspective of the data. In the context of a Stock Inventory System, let's discuss the levels of abstraction: **1. Physical Level:** - This is the lowest level of abstraction and deals with how data is stored physically on the storage media. It includes details such as data structures, file formats, indexing mechanisms, and storage access methods. - Example: In a stock inventory system, at the physical level, we might be concerned with details like the disk storage format, file organization, and indexing methods used for storing product and stock information.	**7.5**	**L3**	**1**	**3**	**3.6.2**

	2. Logical Level: - The logical level deals with the representation of data and how relationships are managed. It abstracts away the details of the physical storage and focuses on the structure of the data, including tables, relationships, and constraints. - Example: At the logical level, the stock inventory system might have tables like `Products`, `StockLevels`, and `Transactions`, defining the relationships between them, such as how products are associated with stock levels. **3. View Level (or External Level):** - The view level is the highest level of abstraction and represents how the data is presented to end-users or applications. It hides the complexity of the underlying database structure and provides a specific view tailored to the needs of different users or applications. - Example: In a stock inventory system, different views might be created for different users, such as a view for warehouse managers displaying detailed stock levels, and a simplified view for sales representatives showing only product names and available quantities. In summary, for a Stock Inventory System: - Physical Level: Involves details of how data is stored on the storage media, such as disk storage format, file organization, and indexing methods. - Logical Level: Deals with the representation of data and the relationships between different entities in the stock inventory system, focusing on the structure of the data in terms of tables, relationships, and constraints. - View Level: Represents the highest level of abstraction, providing specific views of the data tailored to the needs of different users or applications, hiding the complexities of the underlying database structure.					
Part C (1 X 7.5 = 7.5)						
12	Consider the college student database system. (i) Examine how atomicity can be achieved by defining student registration number as primary key.(2.5 Marks) Atomicity in the context of databases refers to the property of a transaction being atomic, meaning that it is treated as a single, indivisible unit of work. Transactions are often composed of	**7.5**	**L3**	**1**	**3**	**3.6.1**

multiple SQL statements, and atomicity ensures that either all the statements are executed successfully, or none of them are executed at all. The use of primary keys, such as a student registration number, can contribute to achieving atomicity. Here's how:

Uniqueness:

The primary key constraint ensures that each student registration number is unique within the database. This uniqueness is crucial for maintaining data integrity and preventing duplicate records.

(ii) Examine how consistency can be achieved in no of credits attributes. (2.5 Marks)

Consistency in the context of databases refers to the property that a database transitions from one valid state to another. In the case of the "number of credits" attribute, consistency can be achieved through the use of constraints and appropriate validation mechanisms. Let's examine how consistency can be maintained for the "number of credits" attribute in a database:

Data Type and Range Constraints:

Define the data type for the "number of credits" attribute to ensure it only accepts numeric values. Additionally, apply range constraints to limit the valid range of values for credits.

Example:

```
CREATE TABLE Courses (
  CourseID INT PRIMARY KEY,
  CourseName VARCHAR(255),
  NumberOfCredits INT CHECK
(NumberOfCredits >= 0 AND NumberOfCredits
<= 5)
);
```

In this example, the NumberOfCredits attribute is constrained to be an integer between 0 and 5.

(iii) Examine how durability can be achieved when power gets disconnected while uploading the end semester examination results. (2.5 Marks)

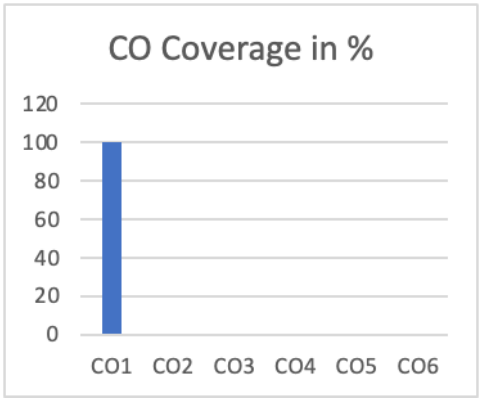
Durability in the context of databases refers to the property that ensures that once a transaction is committed, the changes made by that transaction persist even in the face of system failures such as power outages. Achieving durability during the process of uploading end semester examination results despite power disconnections involves several strategies:

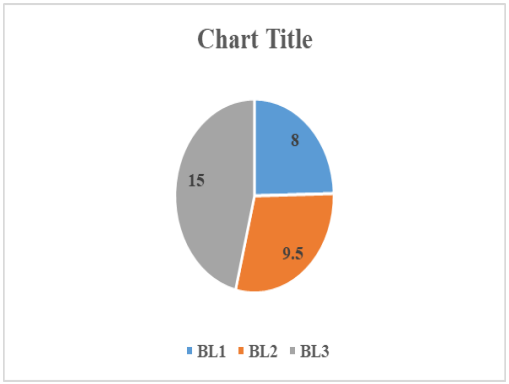
	Transaction Management: Ensure that the process of uploading end semester examination results is encapsulated within a transaction. This transaction should include all the necessary steps to update the database with the examination results. Example: BEGIN TRANSACTION; -- Steps to upload examination results (e.g., INSERT or UPDATE statements) COMMIT; By using transactions, the database management system can ensure that either all the steps in the process are completed successfully and committed, or none of them are applied at all, ensuring atomicity. **Transaction Logging:** Implement transaction logging, where the details of changes made by each transaction are recorded in a log file before they are applied to the database. In the event of a power outage or system failure during the upload process, the database management system can use the transaction log to recover and reapply any changes that were not completed before the failure occurred. The transaction log should be stored on persistent storage that is not affected by power outages, such as a hard disk drive or solid-state drive. **Write-Ahead Logging (WAL):** Use a write-ahead logging mechanism, where changes made by transactions are first written to the log file before they are written to the database itself. This ensures that the transaction log is updated before the corresponding data pages in the database, providing a consistent record of changes. In the event of a power outage, the database management system can use the transaction log to recover any changes that were not yet applied to the database. **Redundant Power Supply:**					

		Implement redundant power supply systems such as uninterruptible power supplies (UPS) or backup generators to minimize the risk of power outages affecting the database server. Redundant power supplies can provide temporary power during a power outage, allowing the database server to shut down gracefully or continue operation until power is restored. **Regular Database Backups:** Perform regular database backups to create copies of the database at specific points in time. In the event of a catastrophic failure, such as complete data loss due to a power outage, database backups can be used to restore the database to a previous consistent state. By employing these strategies, durability can be achieved even in scenarios where power gets disconnected during the process of uploading end semester examination results. These measures ensure that changes made to the database persist and are recoverable despite system failures.					

***Program Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Approved by the Audit Professor/Course Coordinator