**LAB MANUAL**

**of**

**DBMS**

**B. TECH (CSE) 3rd SEMESTER**

**SUBJECT CODE - CSDC 231**



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| SUBMITTED BY: | SUBMITTED TO: |
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**DEPARTMENT OFCOMPUTER SCIENCE AND ENGINEERING**

**DR. B.R. AMBEDKAR NATIONAL INSTITUTE OF TECHNOLOGY**

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**DEPARTMENT: COMPUTER SCIENCE AND ENGINEERING**

**COURSE CODE: CSDC-231**

**COURSE TITLE: DATA STRUCTURES AND ALGORITHM LABORATORY**

**LAB PRACTICALS (JULY-DEC, 2024)**

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| **S.**  **No.** | **WEEK**  **No.** | **NAME OF PRACTICAL** | **Date** | **Signature** |
| **1.** | **WEEK 1** |  |  |  |
| **2.** | **WEEK 2** |  |  |  |
| **3.** | **WEEK 3** |  |  |  |
| **4.** | **WEEK 4** |  |  |  |
| **5.** | **WEEK 5** |  |  |  |
| **6.** | **WEEK 6** |  |  |  |
| **7.** | **WEEK 7** |  |  |  |
| **8.** | **WEEK 8** |  |  |  |
| **9.** | **WEEK 9** |  |  |  |
| **10.** | **WEEK**  **10** |  |  |  |
| **11.** | **WEEK 11** |  |  |  |
| **12.** | **WEEK**  **12** |  |  |  |
| **13.** | **WEEK**  **13** |  |  |  |
| **14.** | **WEEK**  **14** |  |  |  |

**Lab-01**

**Introduction to DBMS (Database Management System)**

A Database Management System (DBMS) is software that allows users to create, manage, and manipulate databases. It serves as an interface between users and databases, ensuring that data is organized, consistent, secure, and easily accessible. DBMSs support key operations like defining, manipulating, and securing data, along with enforcing transaction controls. The system maintains ACID properties (Atomicity, Consistency, Isolation, and Durability) to ensure reliable transaction processing.

**Types of DBMS**

There are several types of DBMSs, each designed for specific use cases:

* **Relational DBMS (RDBMS):** Organizes data in tables (e.g., MySQL, PostgreSQL).
* **Object-Oriented DBMS:** Combines object-oriented programming and database capabilities.
* **Network DBMS:** Uses a network structure to represent data relationships.
* **Hierarchical DBMS:** Organizes data in a tree-like structure.

**File System vs DBMS**

Both file systems and DBMSs manage and organize data, but their approaches differ in several important ways:

**File System**

* A file system manages the storage of files on physical mediums like hard drives or SSDs.
* Data is stored in files, typically unstructured, and organization is basic without built-in relationships.
* Users rely on external programs for accessing and manipulating the data.

**DBMS**

* A DBMS provides a structured way to store and manage data in tables with defined relationships.
* Users interact with it using high-level query languages like SQL.
* Includes features like data integrity enforcement, concurrent access control, and automated backup mechanisms.

**Key Differences**

| **Aspect** | **File System** | **DBMS** |
| --- | --- | --- |
| **Data Storage** | Stores data in files without structure | Stores data in structured tables |
| **Data Retrieval** | Requires custom programs for retrieval | SQL provides efficient querying |
| **Data Integrity** | No built-in integrity constraints | Ensures data integrity with constraints |
| **Data Security** | Limited security, at file level | Advanced security with user access control |
| **Concurrency Control** | Limited support for concurrent access | Manages concurrent data access effectively |
| **Backup and Recovery** | Manual backup procedures | Automated backup and recovery |

**SQL (Structured Query Language)**

SQL is a standard language used for managing and manipulating relational databases. It allows users to define, query, and manage data consistently across different database systems.

**SQL Command Types**

SQL commands are categorized into four main types:

1. **Data Definition Language (DDL):** Defines and modifies the structure of database objects like tables.
   * **CREATE:** Creates new objects like tables.
   * **ALTER:** Modifies existing objects.
   * **DROP:** Deletes objects.
   * **TRUNCATE:** Removes data but keeps the structure.
2. **Data Manipulation Language (DML):** Manages the data within the database.
   * **INSERT:** Adds new records.
   * **UPDATE:** Modifies existing records.
   * **DELETE:** Removes records.
3. **Data Control Language (DCL):** Manages permissions and access control.
   * **GRANT:** Provides privileges to users.
   * **REVOKE:** Removes privileges from users.
4. **Transaction Control Language (TCL):** Manages database transactions.
   * **COMMIT:** Saves changes made during a transaction.
   * **ROLLBACK:** Reverts changes made during a transaction.
   * **SAVEPOINT:** Sets a rollback point within a transaction.

**SQL Data Types**

SQL defines several data types to handle various kinds of data. These types ensure data is stored correctly and efficiently based on its characteristics:

1. **Numeric Data Types:**
   * **INT:** Stores whole numbers.
   * **FLOAT/REAL:** Stores approximate floating-point numbers.
   * **DECIMAL (NUMERIC):** Stores exact numeric values with specified precision and scale.
2. **Character String Data Types:**
   * **CHAR(n):** Fixed-length string of characters.
   * **VARCHAR(n):** Variable-length string with a maximum length.
3. **Binary Data Types:**
   * **BINARY(n):** Fixed-length binary data.
4. **Date and Time Data Types:**
   * **DATE:** Stores date values (e.g., birthdates, event dates).
   * **TIME:** Stores time values (e.g., meeting times).
   * **DATETIME/TIMESTAMP:** Stores both date and time.
5. **Boolean Data Type:**
   * **BOOLEAN:** Stores logical values (TRUE/FALSE).