Model Institute of Engineering
& Technology (Autonomous)
Lesson Plan

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Kot Bhalwal, Jammu

Lesson Plan No. 1	Course Name: Relational Database Management System Topic: Introduction to Database Systems	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Define a database and its key characteristics. b. Understand the purpose and importance of database systems. c. Learn the basic concepts of Relational Database Management Systems (RDBMS). d. Differentiate between different types of databases (e.g., relational, NoSQL).
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	  - Imagine a library, a hospital, or an e-commerce website. How do they manage their vast amounts of information?
	  - Introduce the concept of a database as an organized collection of data.
	  - Briefly discuss the challenges of managing data without a proper system.
	- **Development** (30 minutes)
	What is a Database?
	- Define a database as a structured collection of related data.
	- Discuss key characteristics of a database:
	  o Organized and structured.
	  o Persistent (data is stored for future use).
	  o Shared (accessible by multiple users).
	  o Efficient data retrieval and manipulation.
	Purpose of Database Systems:
	  - Discuss the importance of database systems:
	    o Data management and organization.
	    o Data integrity and consistency.
	    o Data security and access control.
	    o Data sharing and collaboration.
	    o Business intelligence and decision-making.
	Relational Database Management Systems (RDBMS):
	  -Introduce the concept of RDBMS as a software system that manages relational databases.
	  -Explain the core concept of relational databases: data organized in tables with rows (records) and columns (attributes).
	  -Briefly discuss the key features of RDBMS:
	    o Structured Query Language (SQL) for data manipulation.
	    o Data integrity constraints (e.g., primary keys, foreign keys).

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	o Data normalization.
	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students
	
	  - What is the primary purpose of a database system?
	  - What are the key characteristics of a relational database?
	  - What is the role of SQL in RDBMS?
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	https://www.youtube.com/watch?v=8e-wgQnsFxE&t=209s
	
	3. Reference website:
	W3Schools SQL Tutorial: https://www.w3schools.com/sql/
	Oracle Database Documentation:
	https://docs.oracle.com/en/database/oracle/oracle-database/
	4. Suggested Reading books:
	- Database System Concepts by Korth, Silberchatz.
	- Fundamentals of Database System by lmasriRame,Navathe Shamkant
	
	5. Homework
	  - What is a database system, and what are the major components of a database system?
	  - Explain the difference between a *relational database* and a *non-relational database*. Provide examples for each.
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on fundamentals of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 2	Course Name: Relational Database Management System Topic: Characteristics of the Database Approach	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the key advantages of using a database approach for managing data. b. Learn about the core characteristics of a database system: data independence, data integrity, data security, and concurrency control. c. Recognize the limitations of traditional file-based systems compared to databases.
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Briefly discuss the challenges of managing data in traditional file-based systems: data redundancy, inconsistency, difficulty in sharing data, and limited data security. - Introduce the database approach as a solution to these challenges. - Emphasize the importance of databases in modern applications and businesses. **Development** (30 minutes) **Data Independence:** - Explain the concept of data independence (logical and physical). -Discuss how databases achieve data independence through abstraction layers. - Highlight the benefits of data independence: easier data modification, improved application portability. **Data Integrity:** - Discuss the importance of data integrity (accuracy, consistency, validity). - Explain how databases enforce data integrity through constraints (e.g., primary keys, foreign keys, data type constraints). - Discuss the role of transactions in maintaining data integrity. **Data Security:** - Discuss the importance of data security in a database environment. - Explain how databases provide security mechanisms: access control (user authentication, authorization), encryption, and

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	data backups.
	 - Discuss the role of database administrators in ensuring data security.
	
	 - **Exercise** (10 minutes) –
	   - Group Discussion at the end of the session.
	   - Ask students
	
	   - What is data independence and why is it important?
	   - How do databases enforce data integrity?
	   - What are some key security mechanisms implemented in database systems?
	 Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=8e-wgQnsFxE&t=209s 3. Reference website: Characteristics of the Database Approach - GeeksforGeeks Explain the characteristics of DBMS? Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by lmasriRame,Navathe Shamkant 4. Homework - Why is the concept of centralization of data important in a database approach? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Characteristics of the Database Approach Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 3	Course Name: Relational Database Management System **Topic:** Advantages of DBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	   a. Understand the core concepts of databases and their importance.
	   b. Learn about the key advantages of using a DBMS.
	   c. Recognize how DBMS helps in data management and decision-making.

Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- the challenges of managing data without a proper system:
	- Data redundancy (duplicate data)
	- Data inconsistency (conflicting data)
	- Difficulty in data sharing and retrieval
	- Security vulnerabilities
	- Briefly introduce the concept of a DBMS as a software system that efficiently manages and organizes data.
	Development (30 minutes)
	Data Independence:
	- Explain how DBMS decouples data from the applications that use it.
	- Discuss the benefits of data independence:
	   ○ Changes to data structures can be made without affecting applications.
	   ○ Applications can be developed independently of the underlying data storage.
	Data Integrity and Consistency:
	- Explain how DBMS ensures data integrity through constraints (e.g., primary keys, foreign keys, data type constraints).
	- Discuss how DBMS maintains data consistency across multiple tables.
	Improved Data Security:
	- Explain how DBMS features like user authentication, access control, and encryption enhance data security.
	- Discuss how DBMS helps protect sensitive data from unauthorized access and modification.
	Data Backup and Recovery:
	- Explain how DBMS facilitates regular backups and provides mechanisms for data recovery in case of failures (e.g., crashes, disasters).
	- Enhanced Data Sharing and Concurrency:

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	- Discuss how DBMS allows multiple users to access and modify data concurrently without conflicts.
	- Explain how DBMS handles concurrent transactions and prevents data corruption.
	
	   - **Exercise** (10 minutes) –
	     - Group Discussion at the end of the session.
	     - Ask students
	
	     - What is the main advantage of data independence provided by DBMS?
	     - How does DBMS ensure data integrity?
	     - What is the benefit of data concurrency control in DBMS?

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=8e-wgQnsFxE&t=209s 3. Reference website: 4. Oracle: https://www.oracle.com/database/what-is-database/ Explain the advantages and disadvantages of DBMS? Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by lmasriRame,Navathe Shamkant 5. Homework - In what ways does a DBMS improve data security compared to file-based systems? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Advantages of the DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 4	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: Database Users	

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of users and their roles in a Database Management System (DBMS). b. Learn about different types of database users and their privileges. c. Understand the importance of user management and security in a database. d. Learn how to create, manage, and grant/revoke user privileges in a common DBMS (e.g., MySQL, PostgreSQL).
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	- **Introduction** (5 minutes)
	 - Ask questions.
	 - the importance of data security and access control in a database.
	 - Introduce the concept of database users as entities that interact with the database.
	 - Briefly discuss the need for different levels of access for different users (e.g., administrators, developers, end-users).
	 Development (30 minutes)
	 Types of Database Users:
	 Discuss common user roles:
	    o Database Administrator (DBA): Highest level of privileges, responsible for overall database management.
	    o Developer: Has access to create and modify database objects (tables, views, stored procedures).
	    o End-user: Limited access to read and query data, often restricted to specific tables or views.
	    o Guest User: Read-only access to limited data.
	    User Privileges:
	 - Explain different types of privileges:
	    o Data Manipulation Language (DML) privileges: SELECT, INSERT, UPDATE, DELETE.
	    o Data Definition Language (DDL) privileges: CREATE, ALTER, DROP (for tables, views, etc.).
	    o System privileges: BACKUP, RESTORE, SHUTDOWN.
	 - Discuss how privileges are granted and revoked to users using SQL commands.
	    User Management:
	 - Explain the process of creating new users in a DBMS.
	 - Discuss how to manage user accounts (passwords, authentication).

	- Emphasize the importance of regular password changes and security best practices. - **Exercise** (10 minutes) – - Group Discussion at the end of the session. - Ask students - What is the primary role of a Database Administrator (DBA)? - Which DML privilege allows a user to add new rows to a table? - Why is it important to regularly change user passwords?
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=8e-wgQnsFxE&t=209s 3. Reference website: 4. PostgreSQL Documentation: https://www.postgresql.org/docs/current/sql-createuser.html Different Types of Database Users - GeeksforGeeks Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by lmasriRame,Navathe Shamkant 5. Homework - Why is it important for a DBMS to support different types of users with varying levels of expertise? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Database Users of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 5	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: DB Languages	

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of database query languages. b. Learn the basic syntax and semantics of SQL (Structured Query Language). c. Perform basic data manipulation operations using SQL (SELECT, INSERT, UPDATE, DELETE). d. Differentiate between DDL (Data Definition Language) and DML (Data Manipulation Language).
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	- **Introduction** (5 minutes)
	 - Ask questions.
	 - Briefly introduce the concept of databases and their importance in storing and managing data.
	 - Explain the need for a standardized language to interact with databases.
	 - Highlight SQL as the most widely used database query language.
	 Development (30 minutes)
	 Basic SQL Syntax:
	 - Introduce the basic structure of an SQL query (SELECT, FROM, WHERE).
	 - Explain the use of clauses like ORDER BY, GROUP BY, HAVING.
	 - Demonstrate simple SELECT queries to retrieve data from tables.
	 Data Manipulation Language (DML):
	 - Discuss the four primary DML commands:
	     o INSERT: Adding new rows to a table.
	     o UPDATE: Modifying existing data in a table.
	     o DELETE: Removing rows from a table.
	     o SELECT: Retrieving data from a table.
	 - Provide examples of each DML command with simple syntax.
	 Data Definition Language (DDL):
	 - Explain the purpose of DDL commands for defining the structure of a database.
	 - Briefly discuss common DDL commands:
	     o CREATE TABLE: Creating a new table.
	     o ALTER TABLE: Modifying the structure of a table.
	     o DROP TABLE: Deleting a table.
	
	 - **Exercise** (10 minutes) –

	- Group Discussion at the end of the session. - Ask students - Which SQL clause is used to filter rows based on specific conditions? - What is the primary function of the INSERT command in SQL? - Which language category deals with creating and modifying database objects (tables, indexes)?
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=8e-wgQnsFxE&t=209s 3. Reference website: W3Schools SQL Tutorial: https://www.w3schools.com/sql/ Tutorialspoint SQL Tutorial: https://www.tutorialspoint.com/sql/ Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by lmasriRame,Navathe Shamkant 4. Homework - What are some common SQL commands used in DDL and DML? Provide examples of each. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Database Languages of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 6	Course Name: Relational Database Management System **Topic:** Applications of Database	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	  a. Understand the fundamental role of databases in various domains.
	  b. Recognize the diverse applications of different database types (relational, NoSQL, etc.).
	  c. Appreciate the impact of databases on modern technology and businesses.

Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Begin by explaining the core concept of a database: an organized collection of structured information.
	- Briefly discuss the evolution of databases from simple file systems to complex, high-performance systems.
	- Highlight the importance of databases in today's data-driven world.
	
	Development (30 minutes)
	Business Applications:
	- Discuss how businesses utilize databases for:
	  o Customer Relationship Management (CRM) systems
	  o Inventory management
	  o Financial transactions (banking, e-commerce)
	  o Marketing and sales analysis
	  o Data warehousing and business intelligence
	
	Scientific and Research Applications:
	- Explain how databases are used in:
	  o Genomics and bioinformatics (storing and analyzing genetic data)
	  o Scientific simulations and experiments (storing and analyzing experimental results)
	  o Astronomical data storage and analysis
	  o Climate modeling and environmental research
	
	Web Applications:
	- Discuss the role of databases in powering web applications:
	  o Storing user data (accounts, preferences)
	  o Handling e-commerce transactions
	  o Enabling social media platforms
	  o Supporting search engines and recommendation systems
	
	- **Exercise** (10 minutes) –

	- Group Discussion at the end of the session. - Ask students - Give an example of a business application that heavily relies on databases - How are databases used in scientific research? - What is the role of databases in web applications?
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=8e-wgQnsFxE&t=209s 3. Reference website: Oracle Database: https://www.oracle.com/database/ IBM DB2:https://www.ibm.com/products/db2 Microsoft SQL Server: https://www.microsoft.com/en-us/sql-server 4. Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by lmasriRame,Navathe Shamkant 5. Homework - Discuss how databases are used in sectors such as finance, retail, healthcare, and telecommunications to manage large volumes of data. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Applications of Databases Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 7	Course Name: Relational Database Management System **Topic:** Database Administrator	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the role and responsibilities of a Database Administrator (DBA). b. Learn about the key tasks and skills required for a successful DBA career. c. Explore the challenges and rewards of working as a DBA.
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	  - the importance of databases in today's digital world.
	  - Briefly discuss different types of databases (relational, NoSQL, etc.).
	- Introduce the concept of a Database Administrator as the key professional responsible for managing and maintaining databases.
	Development (30 minutes)
	Key Responsibilities:
	- Discuss the core responsibilities of a DBA:
	  o Database design and implementation
	  o Data security and integrity
	  o Performance tuning and optimization
	  o Backup and recovery procedures
	  o User administration and access control
	  o Troubleshooting database issues
	Essential Skills:
	- Highlight the technical and soft skills required for DBAs:
	  o Strong knowledge of SQL and database concepts
	  o Proficiency in scripting languages (e.g., Python, Perl)
	  o Excellent analytical and problem-solving abilities
	  o Communication and interpersonal skills
	  o Ability to work independently and as part of a team
	Career Paths and Challenges:
	- Discuss potential career paths for DBAs (e.g., Database Analyst, Data Architect).
	- Explore the challenges faced by DBAs:
	  o Managing large and complex datasets
	  o Ensuring data security in a constantly evolving threat landscape
	  o Keeping up with the latest database technologies

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	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students
	
	  - What is the primary responsibility of a Database Administrator?
	  - Name two essential technical skills for a DBA.
	  - What are some common challenges faced by DBAs?

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	https://www.youtube.com/watch?v=8e-wgQnsFxE&t=209s
	
	3. Reference website:
	DBA Full Form - Database Administrator - GeeksforGeeks
	Explain the role of the Database Administrator in DBMS?
	4. Suggested Reading books:
	  - Database System Concepts by Korth, Silberchatz.
	  - Fundamentals of Database System by lmasriRame,Navathe Shamkant
	5. Homework
	  - Explain the key duties of a DBA, including database design, security, performance tuning, backup, recovery, and user management.
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Database Administrator. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 10	Course Name: Relational Database Management System Topic: Three Level of Architecture in DBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the architecture of DBMS b. Learn about role of each type of architecture.
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- How many users relate to DBMS?
	- Define the term "DBMS" and its purpose.
	- Discuss the importance of understanding DBMS architecture.
	- Introduce the different levels of DBMS architecture: physical, conceptual, and external.
	- **Development** (30 minutes)
	- Definition/Introduction of Architecture of DBMS
	- Role of each layer
	  - 1- tier
	  - 2- tier
	  - 3- tier
	- Explanation through block diagram of each type.
	- Advantage & disadvantages of each
	
	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students to enlist various Models
	  - Discuss about each data model.
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s 3. Reference website: https://www.javatpoint.com/dbms-architecture Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant

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	4. Homework - What are the three levels of DBMS architecture? Explain their purpose. - How does the client-server architecture work in a DBMS, and what are its key advantages? - How does the DBMS ensure data security and integrity at each level of its architecture? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on architecture of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 11	Course Name: Relational Database Management System Topic: Three Level of Architecture in DBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	   a. Understand the conceptual, logical, and physical levels of database architecture.
	   b. Differentiate between the three levels and their significance.
	   c. Explain how data is represented and manipulated at each level.
	   d. Gain a basic understanding of the relationships between these levels.

Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- introducing the concept of a Relational Database Management System (RDBMS).
	- Highlight the importance of a well-structured database for efficient data storage and retrieval.
	- Briefly mention the three levels of database architecture and their significance in database design.
	
	Development (30 minutes)
	  Conceptual Level:
	- Focus on the "what" of the data.
	- Explain how data is viewed from a user's perspective.
	- Discuss the use of Entity-Relationship Diagrams (ERDs) to model data at this level.
	- Emphasize that this level is independent of any specific software or hardware.
	
	  Logical Level:
	- Focus on "how" the data is organized.
	- Explain how data is represented in a relational model (tables, columns, relationships).
	- Discuss the use of Data Definition Language (DDL) to define the database schema at this level.
	- Emphasize that this level is independent of any specific database software.
	
	  Physical Level:
	- Focus on "where" and "how" the data is stored.
	- Explain how data is physically stored on the disk (indexing, file organization).
	- Discuss how data is accessed and retrieved efficiently.
	- Emphasize that this level is specific to the chosen database software and hardware.

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	- **Exercise** (10 minutes) – - Group Discussion at the end of the session. - Ask students - What is the primary purpose of the conceptual level in database architecture? - Which level of database architecture is independent of any specific database software? - What is the main function of the physical level? Question and Answer session in between the lesson to check the presence of mind of students.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s 3. Reference website: https://www.javatpoint.com/dbms-architecture Introduction of 3-Tier Architecture in DBMS - GeeksforGeeks Three Level Architecture of Database Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 4. Homework - What are the three levels of DBMS architecture? Explain their purpose. - How does the client-server architecture work in a DBMS, and what are its key advantages? - How does the DBMS ensure data security and integrity at each level of its architecture? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on architecture of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 12	Course Name: Relational Database Management System Topic: Client-Server Architecture in RDBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	  a. Understand the fundamental concepts of client-server architecture.
	  b. Learn how client-server architecture is applied in the context of Relational Database Management Systems (RDBMS).
	  c. Identify the roles and responsibilities of both client and server components in an RDBMS environment.
	  d. Recognize the advantages and disadvantages of client-server architecture in database systems.

Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	  - explaining the core idea of client-server architecture: a system where clients request services from a central server.
	  - Briefly discuss real-world examples of client-server systems (e.g., web browsing, email).
	  - Introduce the concept of a database and its role in modern applications.
	Development (30 minutes)
	Client-Server Architecture in RDBMS:
	  - Explain how this architecture applies to database systems.
	  - Describe the role of the client:
	    Submits requests to the server (e.g., queries, updates, inserts).
	    Receives results from the server.
	    Provides a user interface for interaction with the database.
	Describe the role of the server:
	    Manages the database (stores, retrieves, and modifies data).
	    Processes client requests.
	    Provides security and data integrity.
	Key Components of an RDBMS System:
	  - Discuss the client-side components (e.g., database client software, application programs).
	  - Discuss the server-side components (e.g., database server software, database engine).
	Advantages and Disadvantages:
	Discuss the benefits of client-server architecture in RDBMS:
	    Centralized data management.
	    Improved scalability and performance.

	Enhanced security and data integrity.
	Easier maintenance and updates.
	- **Discuss the potential drawbacks:**
	Dependence on the server.
	Single point of failure.
	Network bandwidth requirements.
	
	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students
	  - What is the primary role of the client in a client-server RDBMS architecture?
	  - List two advantages of using client-server architecture for database systems.
	  - What are some potential drawbacks of a client-server database system?
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s
	
	3. Reference website:
	  Oracle Database Documentation:
	https://docs.oracle.com/en/database/oracle/oracle-database/
	  Microsoft SQL Server Documentation:
	https://learn.microsoft.com/en-us/sql/sql-server/?view=sql-server-ver16
	  MySQL Documentation: https://dev.mysql.com/doc/
	4. Suggested Reading books:
	  - Database System Concepts by Korth, Silberchatz.
	  - Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	
	5. Homework
	  - What are the three levels of DBMS architecture? Explain their purpose.
	  - How does the client-server architecture work in a DBMS, and what are its key advantages?
	  - How does the DBMS ensure data security and integrity at each level of its architecture?
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.

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| | 2. Quiz on Client-Server Architecture of DBMS |
| | Spend 5 minutes to evaluate student assimilation of the lesson contents |

Lesson Plan No. 13	Course Name: Relational Database Management System Topic: Database Interfaces, Schemas, and Instances in RDBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of database interfaces and their role in interacting with the database. b. Learn about database schemas, including their definition and importance. c. Differentiate between database schema and database instance. d. Understand the relationship between schema and instance.
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	  - explaining that databases are not just collections of raw data. They are organized structures with specific rules and definitions.
	  - Briefly introduce the idea of interacting with a database using various tools and techniques – this is where database interfaces come into play.
	  - Emphasize the importance of understanding how data is organized within a database.
	Development (30 minutes)
	  Database Interfaces:
	    - Discuss different types of database interfaces:
	    - Command-Line Interface (CLI): Using SQL commands directly.
	    - Graphical User Interface (GUI): Tools like database management systems (DBMS) with visual interfaces.
	    - Programming Language Interfaces: Using APIs (e.g., JDBC, ODBC) to interact with the database from within applications.
	  Database Schema:
	    - Define database schema as the blueprint or structure of a database.
	      Explain that it includes:
	      Table definitions (names, columns, data types)
	      Relationships between tables (foreign keys)
	      Constraints (e.g., primary keys, unique constraints)
	      Indexes
	      Views
	    - Emphasize the importance of a well-designed schema for data integrity, efficiency, and maintainability.

	Database Instance:
	 - Define database instance as the actual data stored in the database at a particular point in time.
	 - Explain that it reflects the current state of the data based on the schema.
	 - llustrate with a simple example:
	  Schema: Defines a table "Customers" with columns "CustomerID", "Name", "Address".
	  Instance: Contains the actual rows of data for each customer in the table.
	
	 - **Exercise** (10 minutes) –
	 - Group Discussion at the end of the session.
	 - Ask students
	 - What is the main purpose of a database interface?
	 - What is the difference between a database schema and a database instance?
	 - Give an example of a type of database interface.
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s 3. Reference website: **General Database Concepts:** https://www.tutorialspoint.com/dbms/dbms_overview.htm **Database Schema Definition:** https://en.wikipedia.org/wiki/Database_schema 4. Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 5. Homework - What is a database interface? Explain its role in connecting users or applications with a database system. Define the term "schema" in the context of databases. How is it different from a database instance? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Database Interfaces, Schemas, and Instances of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 3.	Course Name: Relational Database Management System Topic: ER model to relational table	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the method of conversion of ER model to relational table b. Learn about the different rules used in conversion.
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	 - Ask questions.
	  - What do you understand by ER model?
	  - What is a relation table?
	  - Discuss what is strong and weak entity.
	
	 - **Development** (30 minutes)
	  - Definition/Introduction of rules of conversion
	  - Discussion on each rule:
	   - Strong Entity set with Simple attributes
	   - Strong Entity Set with Composite Attributes
	   - Strong Entity Set with Multi Valued Attributes
	   - Relationship Set to a Table conversion
	   - Binary relationship with cardinality
	
	 - **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students to explain all the rules used in conversion
	
	 Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=qRqzmAwmJwY 3. Reference website: https://www.gatevidyalay.com/er-diagrams-to-tables/ Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 4. Homework

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	- How do you convert a 1:1 relationship into relational tables? - How do you convert a 1:M relationship into relational tables? - How do you convert an M:N relationship into relational tables? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on rules of conversion Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 14	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: Relational System	

Objectives	At the end of the lesson the student shall be able to: a. Understand the fundamental concepts of a Relational Database Management System (RDBMS). b. Learn about the key components of a relational database: tables, rows, columns, and relationships. c. Understand the concept of a relational schema and its importance. d. Recognize the advantages of using RDBMS for data management.
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- explaining the need for organized data storage and retrieval in today's world.
	- Briefly discuss the limitations of traditional file systems.
	- Introduce the concept of a database as a structured collection of data.
	- Briefly mention that RDBMS is a popular and widely used type of database system.
	Development (30 minutes)
	Core Concepts of RDBMS:
	- Explain the concept of a relation as a two-dimensional table.
	- Define key terms:
	    Table: Represents a collection of related data.
	    Row: Represents a single record or entry in a table.
	    Column: Represents a specific attribute or characteristic of the data.
	    Primary Key: A unique identifier for each row in a table.
	    Foreign Key: A field in one table that refers to the primary key [1] in another table, establishing relationships between tables.
	Relational Schema:
	- Explain the importance of a well-defined schema in- designing a relational database.
	- Discuss how a schema defines the structure of tables, relationships between tables, and data types of columns.
	Advantages of RDBMS:
	-Data Independence: Data is logically separated from the applications that use it.
	-Data Integrity: Ensures data accuracy and consistency through constraints and rules.

	-Data Security: Provides mechanisms to control access to data and prevent unauthorized modifications.
	-Flexibility: Easily adaptable to changing business requirements.
	-Efficient Data Retrieval: SQL (Structured Query Language) allows for powerful and efficient data querying and manipulation.
	
	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students
	  - What are the four main components of a relational database?
	  - What is the purpose of a primary key in a table?
	  - What is the main advantage of data independence in an RDBMS?
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s
	
	3. Reference website:
	  Oracle Database Documentation:
	  https://docs.oracle.com/en/database/oracle/oracle-database/
	  Microsoft SQL Server Documentation:
	  https://learn.microsoft.com/en-us/sql/sql-server/?view=sql-server-ver16
	  MySQL Documentation: https://dev.mysql.com/doc/
	  4. Suggested Reading books:
	    - Database System Concepts by Korth, Silberchatz.
	    - Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	
	5. Homework
	    - What is a relational database? Explain its core components, including tables, tuples, attributes, and domains.
	    - Define the term "relation" in the context of a relational database system. How is a relation different from a table in a relational database?
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Relational system of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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| Lesson Plan No. 15 | Course Name: Relational Database Management System
Topic: Codd's Rule | Course No.: BCAMJ-401 |
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| Objectives | At the end of the lesson the student shall be able to:
a. Understand the significance of Codd's Rules in defining a true relational database.
b. Learn the key principles of Codd's Rules for relational database design.
c. Analyze database designs based on their adherence to Codd's Rules.
d. Recognize the importance of Codd's Rules for data integrity and consistency. |
|---|---|
| **Teaching Aids (if any)** | a. Power point presentation
b. Use of Whiteboard |
| **Teaching Development** | **Introduction** (5 minutes)
- Ask questions.
- Briefly introduce the concept of a Relational Database Management System (RDBMS).
- Emphasize the importance of having a well-defined and standardized approach to database design.
- Introduce Dr. Edgar F. Codd, the father of the relational model, and his seminal work on defining the characteristics of a true relational database.
Development (30 minutes)
Codd's 12 Rules:
- Briefly discuss the 12 Rules proposed by Codd.
- Focus on the most important rules:
  Information Rule: All information must be represented explicitly and only once within the database.
  Guaranteed Access Rule: Every data item can be accessed directly by using its primary key.
  Systematic Treatment of Null Values: The database must handle null values (missing data) in a systematic and consistent manner.
  View Updating Rule: Views (virtual tables) should be updatable as if they were base tables.
Significance of Codd's Rules:
- Explain how Codd's Rules ensure data integrity and consistency.
- Discuss how they promote data independence (data should be independent of the specific applications that use it).
- Highlight the impact of Codd's Rules on the development of modern database systems.
Practical Implications:
- Discuss how database designers can apply Codd's principles in their |

	work. - Briefly touch upon how database systems implement and enforce these rules. - **Exercise** (10 minutes) – - Group Discussion at the end of the session. - Ask students - What is the significance of Codd's Information Rule? - Why is the Guaranteed Access Rule important in a relational database? - How do Codd's Rules contribute to data independence? Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	 2. Suggested NPTEL video lecture
	 https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s
	
	 3. Reference website:
	   Codd's Rules in DBMS - GeeksforGeeks
	   DBMS - Codd's 12 Rules
	 4. Suggested Reading books:
	 - Database System Concepts by Korth, Silberchatz.
	 - Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	
	 5. Homework
	 - What is the significance of Codd's 12 rules in the development of relational database systems? Briefly explain the key purpose of these rules.
	 Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Codd's Rule of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 16	Course Name: Relational Database Management System Topic: Relational Model	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the fundamental concepts of the relational model in database design. b. Learn about key components of the relational model: tables, rows, columns, and relationships. c. Understand the importance of primary keys, foreign keys, and data integrity. d. Recognize the advantages of using the relational model in database systems.
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard
Teaching Development	**Introduction** (5 minutes) - Ask questions. - explaining the concept of organizing data in a structured manner. - Briefly introduce the limitations of traditional file systems for managing complex data. - Emphasize the need for a more organized and efficient approach to data storage and retrieval. **Development** (30 minutes) **Core Concepts of the Relational Model:** - Tables: Explain how data is organized into tables with rows and columns. - Rows (Tuples): Represent individual records or instances of data. - Columns (Attributes): Represent specific characteristics or properties of the data. **Key Concepts:** - Primary Key: A unique identifier for each row within a table. - Foreign Key: A field in one table that refers to the primary key in another table, establishing relationships between tables. **Data Integrity:** - Discuss the importance of maintaining data accuracy and consistency. - Explain how constraints (e.g., primary key constraints, foreign key constraints) help ensure data integrity. **Relational Algebra: (Optional, if time permits)** - Briefly introduce basic relational algebra operations (select, project, join) to demonstrate how data can be manipulated and retrieved from relational databases. - **Exercise** (10 minutes) –

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	- Group Discussion at the end of the session. - Ask students - What are the three main components of a relational database table? - What is the purpose of a primary key in a relational table? - How does a foreign key help establish relationships between tables? Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s
	
	3. Reference website:
	   Database Concepts:
	   https://www.tutorialspoint.com/dbms/dbms_overview.htm
	   Relational Model Tutorial:
	   https://www.w3schools.com/sql/sql_intro.asp
	   4. Suggested Reading books:
	   - Database System Concepts by Korth, Silberchatz.
	   - Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	
	5. Homework
	   - What is the relational model in database systems? Explain its core components, including relations, attributes, and tuples.
	   - In the context of the relational model, what is meant by a "relation"? How is it different from a "table"?
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on relational model of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 17	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: Database Optimization Techniques	

Objectives	At the end of the lesson the student shall be able to: a. Understand the importance of database optimization. b. Learn common techniques for improving database performance. c. Identify and apply appropriate optimization strategies for different scenarios.
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	**Introduction** (5 minutes)
	- Ask questions.
	  - Briefly discuss the importance of database performance in today's applications.
	  - Explain how slow database queries can impact user experience and system efficiency.
	- Introduce the concept of database optimization and its goals.
	Development (30 minutes)
	Query Optimization:
	- Explain how the database engine optimizes queries.
	- Discuss the use of indexes to speed up data retrieval.
	- Explain query rewriting techniques (e.g., using joins effectively, minimizing data scanned).
	Data Warehousing and Data Mart:
	- Discuss how data warehousing and data marts can improve query performance for analytical workloads.
	- Explain the concept of data summarization and aggregation.
	Database Tuning:
	- Discuss the importance of proper database configuration.
	- Explain how to adjust parameters like buffer cache size and log file size.
	- Briefly touch upon database partitioning for improved scalability.
	
	- **Exercise** (10 minutes) –
	- Group Discussion at the end of the session.
	- Ask students
	- What is the primary purpose of creating indexes in a database?
	- How can data warehousing improve query performance?
	- Name one way to tune a database for better performance.
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.

	2. Suggested NPTEL video lecture
	https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s
	
	3. Reference website:
	  Oracle Database Performance Tuning Guide:
	  https://docs.oracle.com/en/database/oracle/oracle-database/
	  Microsoft SQL Server Performance Tuning:
	  https://learn.microsoft.com/en-us/sql/sql-server/?view=sql-server-ver16
	  MySQL Performance Optimization:
	  https://dev.mysql.com/doc/
	  4. Suggested Reading books:
	  - Database System Concepts by Korth, Silberchatz.
	  - Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	
	5. Homework
	  - What is database optimization? Why is it important for the performance of a Database Management System (DBMS)?
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on database optimization of DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 18	Course Name: Relational Database Management System **Topic:** Entity, Types of Entity, Weak Entity Attributes, and Entity Sets in RDBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the fundamental concept of an entity in the context of a database. b. Differentiate between strong and weak entities and their characteristics. c. Learn about weak entity attributes and their relationship with identifying entities. d. Understand the concept of an entity set and its representation in a database.
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard

Teaching Development	**Introduction** (5 minutes)
	 - Ask questions.
	   - explaining the core idea of entities as real-world objects or concepts that we want to represent in a database (e.g., customers, products, orders).
	   - Briefly discuss the importance of identifying and defining entities in the database design process.
	   - Introduce the concept of entity sets as collections of entities of the same type.
	 Development (30 minutes)
	   Entities:
	   - Define an entity as a real-world object or concept that has unique characteristics.
	   - Discuss examples of entities: customers, employees, products, orders, departments.
	   Types of Entities:
	   Strong Entity:
	     o Has its own unique identifier (primary key).
	     o Exists independently.
	     o Examples: Customers, Employees, Products.
	   Weak Entity:
	     o Does not have its own unique identifier.
	     o Depends on another entity (owner entity) for its existence.
	     o Examples: Dependent of an employee, Order line item within an order.
	   - **Weak Entity Attributes:**
	   - Explain that weak entities often have attributes that are not unique within themselves.

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	- Discuss how these attributes, combined with the identifier of the owner entity, form a composite identifier for the weak entity. **Entity Sets:** Define an entity set as a collection of entities of the same type. Discuss how entity sets are represented in an Entity-Relationship Diagram (ERD). Explain the importance of entity sets in database design. - **Exercise** (10 minutes) – - Group Discussion at the end of the session. - Ask students - What is the key difference between a strong entity and a weak entity? - Give an example of a weak entity and its owner entity. - What is an entity set, and why is it important in database design? Question and Answer session in between the lesson to check the presence of mind of students.
Closure	b. Summarize the Lesson Learning Outcomes and get affirmation from students on these. c. Suggested NPTEL video lecture https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s d. Reference website: **Database Concepts:** https://www.geeksforgeeks.org/basic-database-concepts/ **Entity-Relationship Diagrams (ERDs):** https://www.lucidchart.com/pages/how-to-draw-ERD 4. Suggested Reading books: Database System Concepts by Korth, Silberchatz. Fundamentals of Database System by ElmasriRame, Navathe Shamkant 5. Homework - What is an entity in the context of a relational database system? How does it differ from an attribute? - Define an entity set. How does an entity set in an Entity-Relationship (ER) model relate to a table in a relational database? - Explain the relationship between entities and relationships in the Entity-Relationship model. How does this relationship translate to tables in a relational database? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Entity, Types of Entity, Weak Entity Attributes, and Entity Sets of DBMS

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	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 19	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: Entity – Relationship Diagrams.	

Objectives	At the end of the lesson the student shall be able to: a. Understand the fundamental concepts of Entity-Relationship modeling. b. Learn to identify and represent entities, attributes, and relationships using ER diagram symbols. c. Create basic ER diagrams to model simple real-world scenarios. d. Understand how ER diagrams are used in the design of relational databases.
Teaching Aids (if any)	a. Power point presentation b. Use of Whiteboard
Teaching Development	**Introduction** (5 minutes) - Ask questions. - explaining the need for a visual representation of data. - Introduce the concept of an Entity-Relationship Diagram as a powerful tool for modeling data structures. - Briefly discuss the importance of ER diagrams in database design. **Development** (30 minutes) **Basic Concepts of ER Diagrams:** - Define entities (e.g., Students, Courses, Departments). - Define attributes (e.g., StudentID, Name, CourseName, Credits). - Define relationships between entities (e.g., Students enroll in Courses, Departments offer Courses). **ER Diagram Symbols:** - Entities: Represented by rectangles. - Attributes: Represented by ovals or circles connected to entities. - Relationships: Represented by diamonds. - Cardinality: Represent the number of instances of one entity that can be associated with instances of another entity (e.g., one-to-one, one-to-many, many-to-many). - Optionality: Indicate whether a participation in a relationship is mandatory or optional. **Creating Simple ER Diagrams:** - Guide students through the process of creating a basic ER diagram for a simple scenario (e.g., a library system with books, members, and borrowing). - **Exercise** (10 minutes) – - Group Discussion at the end of the session. - Ask students - What are the three main components of an Entity-Relationship

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	Diagram?
	- How is a "one-to-many" relationship represented in an ER diagram?
	- What is the purpose of using cardinality in an ER diagram?
	Question and Answer session in between the lesson to check the presence of mind of students.
Closure	b. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	c. Suggested NPTEL video lecture https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s
	d. Reference website: **Database Concepts: https://www.tutorialspoint.com/dbms/dbms_overview.htm** **Entity-Relationship Diagrams (ERDs):** https://www.lucidchart.com/pages/how-to-draw-ERD
	4. Suggested Reading books: Database System Concepts by Korth, Silberchatz. Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	5. Homework
	- What is an entity in the context of a relational database system? How does it differ from an attribute?
	- Define an entity set. How does an entity set in an Entity-Relationship (ER) model relate to a table in a relational database?
	- Explain the relationship between entities and relationships in the Entity-Relationship model. How does this relationship translate to tables in a relational database?
	Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Entity-Relationship model of DBMS
	Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 31	Course Name: Relational Database Management System Topic: : Data Definition Language-Table creation management	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the role of Data Definition Language b. Analyze the significance of using DDL for accessing database c. Learn about various DDL commands
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	
	- Begin with a real-world example of a transaction (e.g., online purchase, bank transfer).
	- Definition: Introduce the concept of a transaction as a logical unit of work that is performed on a database.
	-
	- **Development** (30 minutes)
	- Definition/Introduction of DDL
	- Discussion on DDL commands:
	    - CREATE
	    - ALTER
	    - DROP
	    - TRUNCATE
	
	- **Exercise** (10 minutes) –
	- Group Discussion at the end of the session.
	- Ask students to explain the different Transaction processing
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://nptel.ac.in/courses/106/105/106105175/ 3. Reference website: https://www.javatpoint.com/dbms-transaction-processing-concept 4. Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant - The power of Oracle 9i by R. A. Parida

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	5. Homework - What do you understand by DDL and elaborate role of each command - What is the syntax for creating a table using DDL? - How can you modify an existing table using DDL? - How do you delete a table using DDL? - What is the difference between TRUNCATE and DELETE statements? - How can you rename a table using DDL? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on DDL commands Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 32	Course Name: Relational Database Management System Topic: : Data Manipulation Language	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	  a. Understand the basic concepts and functions of DML.
	  b. Learn how to insert, update, and delete data in a database using DML statements.
	  c. Explore the use of joins and subqueries in DML

Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	   - What do you understand by query?
	   - Basic understanding of database concepts and relational algebra.
	   - Familiarity with Data Definition Language (DDL) statements.
	
	- **Development** (30 minutes)
	- 1. **Introduction to DML**
	- Define DML and its role in database management.
	- Explain the difference between DDL and DML.
	- Discuss the common DML statements (INSERT, UPDATE, and DELETE).
	-
	- **2. INSERT Statements**
	- Demonstrate how to insert new rows into a table using the INSERT statement.
	- Explain the syntax and options available for INSERT statements (e.g., specifying column names, using default values).
	- Provide examples of inserting data into various data types.
	-
	- **3. UPDATE Statements**
	- Show how to modify existing rows in a table using the UPDATE statement.
	- Discuss the syntax and options for updating specific columns.
	- Demonstrate how to update multiple rows based on conditions.
	-
	- **4. DELETE Statements**
	- Explain how to delete rows from a table using the DELETE statement.
	- Discuss the syntax and options for deleting rows based on conditions.
	- Demonstrate how to delete all rows from a table.

	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students to explain the different Transaction processing
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	https://nptel.ac.in/courses/106/105/106105175/
	
	3. Reference website:
	https://www.javatpoint.com/dml-commands-in-sql
	
	4. Suggested Reading books:
	  - Database System Concepts by Korth, Silberchatz.
	  - Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	  - The power of Oracle 9i by R. A. Parida
	
	5. Homework
	
	  - What do you understand by DDL and elaborate role of each command
	  - What is the syntax for creating a table using DDL?
	  - How can you modify an existing table using DDL?
	  - How do you delete a table using DDL?
	  - What is the difference between TRUNCATE and DELETE statements?
	  - How can you rename a table using DDL?
	
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on DML commands Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 30	Course Name: Relational Database Management System Topic: : Structured Query Language	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	  a. Understand the concept of structured query language
	  b. Analyze its significance for an organization
	  c. Compare between the non-procedural and procedural query language

Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	
	    What do you understand by query language?
	    Explain the non-procedural query language
	-
	- **Development** (30 minutes)
	- Definition/Introduction of SQL
	- Discussion on:
	    - Characteristics of SQL
	    - Advantages of SQL
	    - Types of SQL commands
	
	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	    - Ask students to explain the concept of SQL and types of commands
	
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://nptel.ac.in/courses/106/105/106105175/ 3. Reference website: https://www.javatpoint.com/dbms-sql-command Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant - The power of Oracle 9i by R. A. Parida

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	4. Homework
	
	   - What is SQL and what is its primary purpose?
	   - Name the four main categories of SQL commands.
	   - What is a database table and how is it structured?
	
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on SQL commands Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 20	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: Domains and Relations	

Objectives	At the end of the lesson the student shall be able to:
	
	    a. Understand the concepts of sets, relations, and functions.
	    b. Learn different types of relations (reflexive, symmetric, transitive, equivalence).
	    c. Represent relations using different methods (sets, directed graphs, matrices).
	    d. Analyze the properties of given relations.

Teaching Aids (if any)	a. Power point presentation b. Use of WhiteBoard
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Briefly introduce the concept of sets as collections of distinct objects. - - Define a relation as a set of ordered pairs, showing a relationship between elements of two sets. - Motivate the importance of relations in various fields like mathematics, computer science (databases, graph theory), and social sciences. **Development** (30 minutes) - **Types of Relations:** - Reflexive: A relation R on a set A is reflexive if for every element $a \in A$, $(a, a) \in R$. - Symmetric: A relation R on a set A is symmetric if for every $(a, b) \in R$, $(b, a) \in R$. - Transitive: A relation R on a set A is transitive if for every $(a, b) \in R$ and $(b, c) \in R$, $(a, c) \in R$. - Equivalence Relation: A relation R on a set A is an equivalence relation if it is reflexive, symmetric, and transitive. - Provide examples and non-examples of each type of relation. **Representations of Relations:** - Set Notation: Representing a relation as a set of ordered pairs. - Directed Graphs: Visual representation using nodes (elements) and directed edges (relationships). - Matrices: Representing a relation using a matrix, where elements are 1 if the relation holds and 0 otherwise. - **Analyzing Relations:** - Given a relation, determine its properties (reflexive, symmetric, transitive, equivalence). - Analyze real-world scenarios and model them using

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	appropriate relations.

	- **Exercise** (10 minutes) –
	 - Group Discussion at the end of the session.
	    - Ask students
	
	    - What is a reflexive relation?
	    - How can you represent a relation using a graph?
	    - Is the "less than or equal to" ($\leq$) relation on the set of integers reflexive, symmetric, and/or transitive?
	 Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	 2. Suggested NPTEL video lecture
	 https://www.youtube.com/watch?v=qRqzmAwmJwY
	
	 3. Reference website:
	 Discrete Mathematics:
	 https://en.wikipedia.org/wiki/Discrete_mathematics
	 Relations in Maths - Definition, Types and Examples
	 4. Suggested Reading books:
	  - Database System Concepts by Korth, Silberchatz.
	  - Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	
	 5. Homework
	    - How do domain constraints impact the normalization process in relational database design?
	 Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Domains and Relations Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 21	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: Relations and predicates	

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of relations and their properties. b. Learn about different types of relations (reflexive, symmetric, transitive, etc.). c. Understand the concept of predicates and their use in logic. d. Learn to represent relations using matrices and directed graphs.
Teaching Aids (if any)	a. Power point presentation b. Use of WhiteBoard
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - a brief overview of sets and their importance in mathematics. - Introduce the concept of a relation as a set of ordered pairs, connecting elements from two sets. - Provide simple examples of relations in everyday life (e.g., "is a sibling of," "is taller than"). **Development** (30 minutes) - **Types of Relations:** - Reflexive: A relation R on a set A is reflexive if $(a, a) \in R$ for every element $a \in A$. - Symmetric: A relation R on a set A is symmetric if $(a, b) \in R$ implies $(b, a) \in R$ for every $a, b \in A$. - Transitive: A relation R on a set A is transitive if $(a, b) \in R$ and $(b, c) \in R$ implies $(a, c) \in R$ for every $a, b, c \in A$. - Antisymmetric: A relation R on a set A is antisymmetric if $(a, b) \in R$ and $(b, a) \in R$ implies $a = b$ for every $a, b \in A$. - Equivalence Relations: A relation that is reflexive, symmetric, and transitive. - Partial Orderings: A relation that is reflexive, antisymmetric, and transitive. - **Predicates:** - Define a predicate as a function that returns a truth value (True or False) for a given input. - Examples of predicates: "x is even," "y is greater than z," "person x likes food y." - **Quantifiers:** - Universal quantifier ($\forall$): "For all" - Existential quantifier ($\exists$): "There exists" - Explain how to use quantifiers with predicates to express

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complex statements.
- **Representing Relations:**
- Matrices: Represent a relation on a finite set using a matrix where rows and columns correspond to elements of the set, and entries indicate the presence or absence of the relation.
- Directed Graphs: Visual representation of a relation using nodes for elements and directed edges for ordered pairs.

- **Exercise** (10 minutes) –
  - Group Discussion at the end of the session.
    - Ask students

    - What is a reflexive relation?
    - What are the three properties of an equivalence relation?
    - What is the difference between a predicate and a proposition?

Question and Answer session in between the lesson to check the presence of mind of students.

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Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=qRqzmAwmJwY 3. Reference website: **Predicate in DBMS | Database Management System** slides1.pdf 4. Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 5. Homework - Explain how predicates can be used to implement business rules and constraints directly within the database, ensuring that only valid data is stored and retrieved. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Relations and Predicates Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 27	Course Name: Relational Database Management System Topic: Relational Algebra	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	   a. Understand the concept of Relational Algebra
	   b. Learn about its different operations

Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- What do you understand by unary operators?
	- Explain the meaning of Binary operator?
	
	- **Development** (30 minutes)
	- Definition/Introduction of Relational algebra
	- Discussion on each operation:
	     - Select
	     - Project
	     - Union
	     - Intersection
	     - Difference
	     - Cartesian product
	     - Rename
	
	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	    - Ask students to explain the operations used in relational algebra
	
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=qRqzmAwmJwY 3. Reference website: https://www.geeksforgeeks.org/introduction-of-relational-algebra-in-dbms/ Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe

	Shamkant
	
	4. Homework
	  - What is relational algebra?
	  - What are the basic relational algebra operators?
	  - Explain the difference between selection and projection.
	  - How does the Cartesian product work?
	
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on relational algebra Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 34	Course Name: Relational Database Management System Topic: Closure and functional dependencies (FDs).	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	  a. Understand the concept of closure in database systems.
	  b. Compute the closure of an attribute set under a given set of functional dependencies (FDs).
	  c. Apply the concept of closure to database design and normalization.

Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	
	    Prerequisites:
	   - Basic understanding of database concepts and relational algebra.
	   - Familiarity with functional dependencies
	- **Development** (30 minutes)
	   - Definition/Introduction of closure
	   - Significance of closure
	   - Characteristics of closure
	   - Few examples
	   - Steps to find closure
	
	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students to explain the significance of closure in functional dependency.
	
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	   https://www.youtube.com/watch?v=YD8dhOmuVnY
	
	3. Reference website:
	   https://www.tutorialspoint.com/explain-closure-of-attributes-in-dbms
	
	   Suggested Reading books:
	- Database System Concepts by Korth, Silberchatz.
	- Fundamentals of Database System by ElmasriRame, Navathe

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	4. Homework
	- How is the closure of an attribute set used in database design? - How can the closure be used to identify candidate keys? - What is the relationship between the closure of an attribute set and the concept of normalization? - Can you provide an example of how the closure of an attribute set is used in database design? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on closure in a database Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 35	Course Name: Database Management System Topic: Normalization	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	  a. Understand the concept of Normalization in DBMS
	  b. Articulate significance of Normalization
	  c. Learn about the different normal forms

Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- What do you understand by redundancy?
	- Begin with a real-world example of a database that is not normalized to illustrate the potential problems.
	- Introduce the concept of normalization as a process of organizing data into tables to minimize redundancy and ensure data integrity.
	
	- **Development** (30 minutes)
	- Definition/Introduction of Normalisation
	- Significance of Normalisation in Databases
	- Discussion on different normal forms
	
	- **First Normal Form (1NF)**
	  - Definition: Explain that a relation is in 1NF if all its attributes are atomic.
	  - Examples: Provide examples of relations that are and are not in 1NF.
	  - Normalization: Demonstrate how to convert a relation into 1NF by decomposing non-atomic attributes.
	
	  Second Normal Form (2NF)
	  - Definition: Explain that a relation is in 2NF if it is in 1NF and all non-key attributes are fully dependent on the primary key.
	  - Transitive Dependencies: Discuss transitive dependencies and their impact on data redundancy.
	  - Normalization: Demonstrate how to normalize a relation into 2NF by decomposing relations with transitive dependencies.
	
	  Third Normal Form (3NF)
	  - Definition: Explain that a relation is in 3NF if it is in 2NF and there are no transitive dependencies between non-key attributes.
	  - Normalization: Demonstrate how to normalize a relation into 3NF by decomposing relations with transitive dependencies between non-key attributes.

	Boyce-Codd Normal Form (BCNF)
	- Definition: Explain that a relation is in BCNF if every determinant is a superkey.
	- Comparison to 3NF: Compare BCNF to 3NF and discuss the advantages of BCNF.
	- Normalization: Demonstrate how to normalize a relation into BCNF.
	
	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students to explain the role of each Inference rule in Database
	
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=YD8dhOmuVnY 3. Reference website: https://www.javatpoint.com/dbms-normalization Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 4. Homework - What is normalization in DBMS? - Why is normalization important in database design? - What are the different normal forms? - How does normalization help to prevent data anomalies? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on normalization in DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 36	Course Name: Relational Database Management System Topic: First Normal Form (1NF) in DBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	  a. Understand the concept of normalization in database design.
	  b. Define First Normal Form (1NF) and its significance.
	  c. Identify and correct violations of 1NF in given relational tables.
	  d. Appreciate the benefits of adhering to 1NF in database design.

Teaching Aids (if any)	a. Power point presentation
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Briefly introduce the concept of databases and their importance in storing and managing data. - Discuss the challenges of working with poorly designed databases, such as data redundancy and inconsistencies. - Explain the need for normalization as a process to improve database design and eliminate these issues. **Development** (30 minutes) **What is Normalization?** - Define normalization as a systematic process of organizing data in a database to minimize redundancy and improve data integrity. - Explain that normalization involves breaking down large tables into smaller, more manageable tables. **First Normal Form (1NF):** - Define 1NF as the **first and most basic level of normalization**. - Explain the key characteristics of a table in 1NF: - **Atomic Attributes:** Each attribute (column) must be atomic, meaning it cannot be further subdivided. For example, instead of storing "Full Name" in a single column, store "FirstName" and "LastName" in separate columns. - **No Repeating Groups:** A table should not contain repeating groups of data within a single row. For example, if a table stores multiple phone numbers for a single customer, this violates 1NF. **Identifying and Correcting 1NF Violations:** - Present examples of tables that violate 1NF. - Guide students through the process of identifying and correcting these violations by decomposing the tables into 1NF. - Discuss the benefits of adhering to 1NF: - Reduced data redundancy - Improved data integrity - Easier data maintenance

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	- **Exercise** (10 minutes) – - Group Discussion at the end of the session. - Ask students - What is the primary goal of normalization in database design? - What is the key characteristic of a table that is in 1NF? - How can you correct a table that violates 1NF due to repeating groups? Question and Answer session in between the lesson to check the presence of mind of students.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=YD8dhOmuVnY 3. Reference website: **Wikipedia:**https://en.wikipedia.org/wiki/First_normal_form First Normal Form (1NF) DBMS 1NF Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 4. Homework - What is the difference between a composite attribute and a multi-valued attribute, and how do these relate to 1NF? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on First Normal Form Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 37	Course Name: Relational Database Management System Topic: Second Normal Form (2NF) in DBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	   a. Understand the concept of functional dependencies in database design.
	   b. Learn the definition and significance of Second Normal Form (2NF).
	   c. Identify and resolve partial dependencies to achieve 2NF.
	   d. Apply 2NF principles to design normalized database tables.

Teaching Aids (if any)	a. Power point presentation
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Briefly introduce the concept of database normalization. - Explain the importance of normalization in ensuring data integrity, reducing redundancy, and improving data consistency. - Discuss the limitations of First Normal Form (1NF) and the need for further normalization. **Development** (30 minutes) **Functional Dependencies:** - Define functional dependency between attributes (if A -> B, then value of A uniquely determines the value of B). - Provide examples of functional dependencies in real-world scenarios. - Explain the concept of primary key and its role in functional dependencies. **Partial Dependencies:** - Define partial dependency: a non-key attribute is functionally dependent on only a part of the primary key. - Explain why partial dependencies are undesirable and can lead to data redundancy and update anomalies. - Provide examples of tables with partial dependencies. **Achieving Second Normal Form (2NF):** - Define 2NF: A table is in 2NF if it is in 1NF and contains no partial dependencies. - Explain the process of decomposing a table into multiple tables to eliminate partial dependencies. - Provide a step-by-step example of decomposing a table to achieve 2NF. - **Exercise** (10 minutes) – - Group Discussion at the end of the session.

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	- Ask students - What is a partial dependency in the context of database design? - How can you identify if a table is in 2NF? - What is the main goal of achieving 2NF? Question and Answer session in between the lesson to check the presence of mind of students.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=YD8dhOmuVnY 3. Reference website: Wikipedia:https://en.wikipedia.org/wiki/Second_normal_form Second Normal Form (2NF) - GeeksforGeeks DBMS 2NF 4. Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 5. Homework - Explain the process of identifying and eliminating partial dependencies to move from 1NF to 2NF. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Second Normal Form Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 38	Course Name: Relational Database Management System Topic: Third Normal Form (3NF) in DBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of functional dependencies in database design. b. Learn the definition and criteria for Third Normal Form (3NF). c. Identify and resolve 3NF violations in relational tables. d. Appreciate the importance of 3NF for database efficiency and integrity.
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Briefly introduce the concept of database normalization.
	- Explain the need for normalization to eliminate data redundancy and improve data integrity.
	- Mention that 3NF is an important step in the normalization process.
	
	Development (30 minutes)
	Functional Dependencies:
	- Define functional dependencies between attributes in a relation.
	- Explain transitive dependencies as a key concept for 3NF.
	- Provide examples of functional dependencies and transitive dependencies.
	- **Third Normal Form (3NF):**
	- Define 3NF: A relation is in 3NF if it is in 2NF and every non-key attribute is non-transitively dependent on the primary key.
	- Explain how transitive dependencies violate 3NF.
	- Discuss the importance of 3NF for data integrity, update anomalies, and query performance.
	  3NF Decomposition:
	- Demonstrate the process of decomposing a relation that violates 3NF into multiple 3NF relations.
	- Explain how to identify and create new relations to remove transitive dependencies.
	- Discuss potential performance implications of excessive decomposition.
	
	- **Exercise** (10 minutes) –
	  - Group Discussion at the end of the session.
	  - Ask students
	
	  - What is a transitive dependency, and how does it relate to 3NF?

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	- What are the potential consequences of violating 3NF? - Given a relation with a set of functional dependencies, can you identify if it is in 3NF? Question and Answer session in between the lesson to check the presence of mind of students.	

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	https://www.youtube.com/watch?v=YD8dhOmuVnY
	
	3. Reference website:
	Wikipedia:https://en.wikipedia.org/wiki/Third_normal_form Third Normal Form (3NF) - GeeksforGeeks
	DBMS 3NF
	4. Suggested Reading books:
	  - Database System Concepts by Korth, Silberchatz.
	  - Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	
	5. Homework
	  - What are the steps involved in converting a table from 2NF to 3NF?
	Spend 5 minutes to wrap up and consolidate the learnings	

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Third Normal Form Spend 5 minutes to evaluate student assimilation of the lesson contents	

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Lesson Plan No. 39	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: Boyce Codd Normal Form	

Objectives	At the end of the lesson the student shall be able to:
	a. Understand the concept of functional dependencies in relational databases.
	b. Define Boyce-Codd Normal Form (BCNF) and its significance.
	c. Identify violations of BCNF in given relations.
	d. Decompose relations into BCNF.
Teaching Aids (if any)	a. Power point presentation
Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Briefly introduce the concept of database normalization.
	- Explain the importance of normalization in reducing data redundancy, improving data integrity, and enhancing query performance.
	- Introduce the concept of functional dependencies as the foundation for normalization.
	Development (30 minutes)
	Functional Dependencies:
	- Define functional dependencies (X -> Y) and explain their meaning.
	- Discuss different types of functional dependencies (trivial, non-trivial, partial, transitive).
	- Provide examples to illustrate functional dependencies in real-world scenarios.
	Boyce-Codd Normal Form (BCNF):
	- Define BCNF: A relation is in BCNF if for every non-trivial functional dependency X -> Y, X must be a superkey.
	- Explain the significance of BCNF in minimizing data redundancy and improving data integrity.
	- Discuss how BCNF helps to avoid update anomalies.
	BCNF Decomposition:
	- Demonstrate the process of decomposing a relation that violates BCNF into multiple BCNF relations.
	- Explain the lossless and dependency-preserving properties of decomposition.
	- Work through a practical example of decomposing a relation into BCNF.
	-
	- **Exercise** (10 minutes) –
	- Group Discussion at the end of the session.

	- Ask students - What is the definition of Boyce-Codd Normal Form (BCNF)? - What are the potential issues if a relation violates BCNF? - What are the key properties that a BCNF decomposition should have? Question and Answer session in between the lesson to check the presence of mind of students.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=YD8dhOmuVnY 3. Reference website: Wikipedia:https://en.wikipedia.org/wiki/Database_normalization Boyce-Codd Normal Form (BCNF) - GeeksforGeeks DBMS BCNF 4. Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 5. Homework - What is the difference between 3NF and BCNF in terms of functional dependencies and candidate keys? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Boycee Codd Normal Form Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 40	Course Name: Relational Database Management System Topic: Fourth Normal Form	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of multi-valued dependencies. b. Recognize when a relation is in 4NF. c. Learn how to decompose a relation into 4NF. d. Understand the benefits of using 4NF in database design.
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Briefly review the concept of normalization and its importance in database design.
	- Discuss the limitations of Boyce-Codd Normal Form (BCNF) and how multi-valued dependencies can still exist in BCNF relations.
	- Introduce the concept of 4NF as a higher level of normalization to address these limitations.
	Development (30 minutes)
	Multi-valued Dependencies (MVDs):
	- Define MVDs: A dependency between two sets of attributes where multiple values of one set are associated with multiple values of the other set, independent of other attributes in the relation.
	- Provide examples of MVDs in real-world scenarios (e.g., employees and their skills, students and their courses).
	- Explain how MVDs can cause data redundancy and update anomalies even when a relation is in BCNF.
	 Fourth Normal Form (4NF):
	- Define 4NF: A relation is in 4NF if for every non-trivial multi-valued dependency $X \twoheadrightarrow Y$, X is a superkey.
	- Explain the significance of 4NF: Eliminates data redundancy and update anomalies caused by MVDs.
	- Discuss how to identify MVDs in a given relation.
	Decomposition into 4NF:
	- Describe the process of decomposing a relation into 4NF:
	  o Identify all MVDs in the relation.
	  o Decompose the relation into multiple smaller relations, each containing only one of the sets of attributes involved in the MVD.
	  o Ensure that all functional dependencies are preserved in the decomposed relations.
	-

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	- **Exercise** (10 minutes) – - Group Discussion at the end of the session. - Ask students - What is a multi-valued dependency? - When is a relation said to be in 4NF? -Why is 4NF important in database design? Question and Answer session in between the lesson to check the presence of mind of students.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=YD8dhOmuVnY 3. Reference website: Wikipedia: https://en.wikipedia.org/wiki/Fourth_normal_form Database Tutorials: https://www.youtube.com/watch?v=53Vn5ZJHQbE Introduction of 4th and 5th Normal Form in DBMS - GeeksforGeeks 4. Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 5. Homework - What is the difference between a multi-valued dependency and a functional dependency, and how do they affect normalization? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Fourth Normal Form Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 41	Course Name: Relational Database Management System Topic: Fifth Normal Form	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	  a. Understand the concept of join dependencies.
	  b. Recognize when a relation is in 5NF.
	  c. Learn how to decompose a relation into 5NF.
	  d. Understand the benefits of using 5NF in database design.

Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Briefly review the concept of normalization and its importance in database design.
	- Discuss the limitations of 4NF and how join dependencies can still exist in 4NF relations.
	- Introduce the concept of 5NF as the highest level of normalization to address these limitations.
	Development (30 minutes)
	Join Dependencies:
	- Define join dependencies: A constraint that specifies that a relation can be derived by joining two or more of its proper subsets.
	- Provide examples of join dependencies in real-world scenarios (e.g., orders and order items, customers and their orders).
	- Explain how join dependencies can cause data redundancy and update anomalies even when a relation is in 4NF.
	Fifth Normal Form (5NF):
	- Define 5NF: A relation is in 5NF if for every non-trivial join dependency, the relation is already a natural join of its projections over the participating sets of attributes.
	- Explain the significance of 5NF: Eliminates data redundancy and update anomalies caused by join dependencies.
	- Discuss how to identify join dependencies in a given relation.
	Decomposition into 5NF:
	- Describe the process of decomposing a relation into 5NF:
	  o Identify all join dependencies in the relation.
	  o Decompose the relation into multiple smaller relations, each corresponding to a projection involved in the join dependency.
	  o Ensure that all functional and multi-valued dependencies are preserved in the decomposed relations.
	
	- **Exercise** (10 minutes) –
	- Group Discussion at the end of the session.

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Model Institute of Engineering
& Technology (Autonomous)
Lesson Plan

	- Ask students - What is a join dependency? - When is a relation said to be in 5NF? - Why is 5NF important in database design? Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	https://www.youtube.com/watch?v=YD8dhOmuVnY
	
	3. Reference website:
	Wikipedia:https://en.wikipedia.org/wiki/Fifth_normal_form
	Database Tutorials: https://www.youtube.com/watch?v=53Vn5ZJHQbE
	What is Fifth Normal Form (5NF) in DBMS? - GeeksforGeeks
	DBMS BCNF
	4. Suggested Reading books:
	  - Database System Concepts by Korth, Silberchatz.
	  - Fundamentals of Database System by ElmasriRame, Navathe Shamkant
	
	5. Homework
	  - Explain the concept of 5NF and how it builds on 4NF by addressing join dependencies and ensuring that relations are decomposed to avoid redundancy caused by multiple relationships.
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Fifth Normal Form Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 2.2	Course Name: Relational Database Management System Topic: Data Independence	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of Data Independence b. Learn about role of each level/schema
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	 - Ask questions.
	    - Begin by discussing the importance of data in modern organizations.
	    - Highlight the need for efficient and flexible data management.
	    - Introduce the concept of a Database Management System (DBMS)
	    - How many users are connected with DBMS?
	    - Do all the users have the same accessibility?
	
	 - **Development** (30 minutes)
	    - Definition/Introduction of Data independence
	    - Role of each level
	     - Logical
	     - Physical
	     - View
	    - Explanation through block diagram of data Independence.
	
	 - **Exercise** (10 minutes) –
	    - Group Discussion at the end of the session.
	    - Ask students to explain the concept of Data Independence
	
	 Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=AAKUqHBuzk4&t=1188s 3. Reference website: https://www.geeksforgeeks.org/what-is-data-independence-in-dbms/ Suggested Reading books: - Database System Concepts by Korth, Silberchatz.

	- Fundamentals of Database System by lmasriRame,Navathe Shamkant
	
	4. Homework
	  - Why is data independence important in DBMS? How does it benefit users and developers?
	  - Define data independence. What are its two main types?
	  - What is the difference between logical and physical data independence? Provide examples of each.
	
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on data independence Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 8	Course Name: Relational Database Management System Topic: ER model in DBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to:
	  a. Understand the concept of ER model
	  b. Learn about the significance of ER models in DBMS
	  c. Construct ER model for a given data

Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- How are the records in Database related to each other?
	- How is the relationship among data entities expressed?
	
	- **Development** (30 minutes)
	  - Definition/Introduction of ER model
	  - Discussion on important terms
	    - Entity
	    - Attributes
	    - Relationship
	  - Construction of ER diagram by taking few examples
	
	- **Exercise** (10 minutes) –
	- Group Discussion at the end of the session.
	- Discuss about ER model and its important terms.
	
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://nptel.ac.in/courses/106/106/106106093/ 3. Reference website: https://www.geeksforgeeks.org/introduction-of-er-model/ Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 4. Homework - Create an ER diagram for a library database that includes books, authors, borrowers, and loans.

	- Design an ER diagram for a university database that includes students, courses, professors, and departments. - Consider a company database. Identify the entities and relationships involved, and create an ER diagram Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on ER models in DBMS Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 1.1	Course Name: Relational Database Management System Topic: File based systems	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of File based system b. Learn about its working & its drawbacks
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	    - How do you store files on computers?
	    - Give few examples of file based systems?
	
	- **Development** (30 minutes)
	- Definition/Introduction of file based system
	- Explain with examples
	- Discuss the advantages & disadvantages of File based system
	
	- **Exercise** (10 minutes) –
	- Group Discussion at the end of the session.
	- Ask students to define File based systems & its drawbacks
	
	Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.
	
	2. Suggested NPTEL video lecture
	https://www.youtube.com/watch?v=8e-wgQnsFxE&t=209s
	
	Reference website:
	https://www.javatpoint.com/dbms-vs-files-system
	
	Suggested Reading books:
	- Database System Concepts by Korth, Silberchatz.
	- Fundamentals of Database System by lmasriRame,Navathe Shamkant
	
	3. Homework
	  • What is the role of the file system in a DBMS?.
	  • Explain the concept of File based systems
	  • Discuss its working of File Based systems with examples
	
	Spend 5 minutes to wrap up and consolidate the learnings

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Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on File based systems Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 8	Course Name: Relational Database Management System Topic: Data Models in DBMS	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Enlist the various data models in Database Management systems b. Learn about the role of each data model
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	 - Ask questions.
	 - How is the data related to each other?
	 - How is the relationship among data entities expressed?
	 - Begin by defining the term "data model." Explain how data models provide a blueprint for organizing and managing data.
	 - Discuss the importance of data models in database design and development.
	 - Introduce the three levels of data modeling: conceptual, logical, and physical
	
	 - **Development** (30 minutes)
	 - Definition/Introduction of Data models in Database Management systems
	 - Role of each model
	     - Hierarchical Data model
	     - Relational Data model
	     - Network Data model
	 - Advantage and disadvantage of each type
	
	 - **Exercise** (10 minutes) –
	    - Group Discussion at the end of the session.
	    - Ask students to enlist various Models
	    - Discuss about each data model.
	 Question and Answer session in between the lesson to check the presence of mind of students.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=sEaYXwmsLw0&t=2126s 3. Reference website: https://www.geeksforgeeks.org/data-models-in-dbms/ Suggested Reading books:

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	- Database System Concepts by Korth, Silberchatz.
	- Fundamentals of Database System by lmasriRame,Navathe Shamkant
	
	4. Homework
	   - What is a data model? How does it help in database design?
	   - What is the relational model? How does it represent data?
	   - What are the advantages and disadvantages of the ER model and the relational model?
	   - Explain the various data model in Database Management systems with schematic diagram
	
	Spend 5 minutes to wrap up and consolidate the learnings

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Models of Database Management systems Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 9	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: Data Independence	

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of data independence and its importance in database systems. b. Differentiate between physical and logical data independence. c. Explain the advantages of data independence in DBMS. d. Identify the levels of data abstraction and their relation to data independence.
Teaching Aids (if any)	a. Power point presentation b. Use of WhiteBoard

Teaching Development	- **Introduction** (5 minutes)
	 - Ask questions.
	 - discussing the challenges of maintaining and evolving database systems.
	 - Highlight the need for flexibility and adaptability in database design.
	 - Introduce the concept of data independence as a key principle in addressing these challenges.
	
	 Development (30 minutes)
	   Physical Data Independence:
	 - Define physical data independence.
	 - Explain how changes in physical storage (e.g., indexing, storage media) should not affect application programs.
	 - Discuss how DBMS shields applications from these physical changes.
	   Logical Data Independence:
	 - Define logical data independence.
	 - Explain how changes in the logical structure (e.g., adding new columns, modifying relationships) should not significantly impact application programs.
	 - Discuss how DBMS provides mechanisms to minimize the impact of such changes.
	 - **Levels of Data Abstraction and Data Independence:**
	 - Briefly discuss the three levels of data abstraction: physical, logical, and view.
	 - Explain how each level contributes to data independence.
	 - Emphasize the importance of data abstraction in achieving data independence.
	
	 - **Exercise** (10 minutes) –
	 - Group Discussion at the end of the session.

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	- Ask students - What is the significance of physical data independence in DBMS? - How does logical data independence benefit application development? - What are the three levels of data abstraction, and how do they relate to data independence? Question and Answer session in between the lesson to check the presence of mind of students.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=sEaYXwmsLw0&t=2126s 3. Reference website: https://www.geeksforgeeks.org/what-is-data-independence-in-dbms/ https://en.wikipedia.org/wiki/Data_independence https://www.tutorialspoint.com/physical-and-logical-data-independence Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by lmasriRame,Navathe Shamkant 4. Homework - What is a data model? How does it help in database design? - What is the relational model? How does it represent data? - What are the advantages and disadvantages of the ER model and the relational model? - Explain the various data model in Database Management systems with schematic diagram Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Data Independence of Database Management systems Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 4.	Course Name: Relational Database Management System Topic: : Data Integrity constraints	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of Data Integrity constraints b. Enlist various Data Integrity constraints
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	    - What do you understand by constraints?
	    - What is data integrity?
	
	- **Development** (30 minutes)
	- **1. Introduction to Data Integrity**
	
	- Explain the concept of data integrity and its importance in database management.
	- Discuss the different types of data integrity constraints (entity integrity, referential integrity, domain integrity).
	
	- **2. Entity Integrity**
	
	- Demonstrate how to enforce entity integrity using primary keys.
	- Practice creating tables with primary keys.
	- Explain the significance of unique constraints.
	
	- **3. Referential Integrity**
	-
	- Explain the concept of foreign keys and their role in maintaining referential integrity.
	- Practice creating tables with foreign keys.
	- Demonstrate how to enforce referential integrity using ON DELETE and ON UPDATE actions.
	
	- **4. Domain Integrity**
	
	- Explain how to define data types and constraints to ensure domain integrity.
	- Practice using data types like INT, VARCHAR, DATE, etc.
	- Demonstrate using constraints like NOT NULL, CHECK, and DEFAULT.
	
	- **Exercise** (10 minutes) –

	- Group Discussion at the end of the session. - Ask students to enlist the Data Integrity constraints Question and Answer session in between the lesson to check the presence of mind of students.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://nptel.ac.in/courses/106/105/106105175/ 3. Reference website: https://www.javatpoint.com/dbms-integrity-constraints Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant - The power of Oracle 9i by R. A. Parida 4. Homework - What is data integrity, and why is it important in databases? - What are the three main types of data integrity constraints? - What is the purpose of a primary key? - How does a foreign key help maintain referential integrity? - What is the difference between a NOT NULL constraint and a UNIQUE constraint? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on data integrity constraints in SQL Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 23	Course Name: Relational Database Management System Topic: : Data Integrity constraints	Course No.: BCAMJ-401

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of Data Integrity constraints b. Enlist various Data Integrity constraints
Teaching Aids (if any)	a. Power point presentation

Teaching Development	- **Introduction** (5 minutes)
	 - Ask questions.
	      - What do you understand by constraints?
	      - What is data integrity?
	
	 - **Development** (30 minutes)
	 - **1. Introduction to Data Integrity**
	
	 - Explain the concept of data integrity and its importance in database management.
	 - Discuss the different types of data integrity constraints (entity integrity, referential integrity, domain integrity).
	
	 - **2. Entity Integrity**
	
	 - Demonstrate how to enforce entity integrity using primary keys.
	 - Practice creating tables with primary keys.
	 - Explain the significance of unique constraints.
	
	 - **3. Referential Integrity**
	 -
	 - Explain the concept of foreign keys and their role in maintaining referential integrity.
	 - Practice creating tables with foreign keys.
	 - Demonstrate how to enforce referential integrity using ON DELETE and ON UPDATE actions.
	
	 - **4. Domain Integrity**
	
	 - Explain how to define data types and constraints to ensure domain integrity.
	 - Practice using data types like INT, VARCHAR, DATE, etc.
	 - Demonstrate using constraints like NOT NULL, CHECK, and DEFAULT.
	
	 - **Exercise** (10 minutes) –

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	- Group Discussion at the end of the session. - Ask students to enlist the Data Integrity constraints Question and Answer session in between the lesson to check the presence of mind of students.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://nptel.ac.in/courses/106/105/106105175/ 3. Reference website: https://www.javatpoint.com/dbms-integrity-constraints Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant - The power of Oracle 9i by R. A. Parida 4. Homework - What is data integrity, and why is it important in databases? - What are the three main types of data integrity constraints? - What is the purpose of a primary key? - How does a foreign key help maintain referential integrity? - What is the difference between a NOT NULL constraint and a UNIQUE constraint? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on data integrity constraints in SQL Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 24	Course Name: Relational Database Management System	Course No.: BCAMJ-401
	Topic: Primary Key	

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of a primary key and its significance in a database. b. Learn the characteristics and properties of a primary key. c. Identify primary keys in different database tables. d. Understand the role of primary keys in establishing relationships between tables.
Teaching Aids (if any)	a. Power point presentation b. Use of WhiteBoard
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - explaining the concept of a database and its core components (tables, rows, columns). - Emphasize the need for unique identification of each record within a table. - Introduce the primary key as the fundamental mechanism for uniquely identifying records. **Development** (30 minutes) **Definition and Characteristics:** - Define a primary key: A unique identifier for each record within a database table. - Discuss the key characteristics of a primary key: - **Uniqueness:** Each record must have a unique primary key value. - **Non-null:** A primary key cannot have null values. - **Minimality:** The primary key should contain only the minimum number of attributes necessary to uniquely identify each record. - **Types of Primary Keys:** - Discuss different types of primary keys: - **Single-column primary key:** A single attribute serves as the primary key (e.g., StudentID). - **Composite primary key:** Multiple attributes together form the primary key (e.g., OrderID and ProductID). - **Surrogate key:** An artificially generated unique identifier (e.g., CustomerID assigned automatically by the database). - **Role of Primary Keys in Relationships:** - Explain how primary keys are used to establish relationships between tables: - **Foreign keys:** A foreign key in one table references the

	primary key of another table, creating a link between them. **- One-to-one, one-to-many, and many-to-many relationships:** Illustrate how primary and foreign keys are used to represent these different types of relationships. - **Exercise** (10 minutes) – - Group Discussion at the end of the session. - Ask students - What is the primary purpose of a primary key in a database table? - Can a primary key have null values? - How are primary keys used to establish relationships between tables? Question and Answer session in between the lesson to check the presence of mind of students.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested NPTEL video lecture https://www.youtube.com/watch?v=V2iBuOtX458 3. Reference website: https://www.javatpoint.com/dbms-keys **W3Schools:** https://www.w3schools.com/sql/sql_primarykey.asp Super Key and Primary Key in DBMS | Gate Vidyalay Suggested Reading books: - Database System Concepts by Korth, Silberchatz. - Fundamentals of Database System by ElmasriRame, Navathe Shamkant 4. Homework - What is a key in a database? - What are the different types of keys in a database? - What is the role of a primary key in a table? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz on Primary key in a database Spend 5 minutes to evaluate student assimilation of the lesson contents

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