Course File Contents:

I.COVER PAGE

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE
(AUTONOMOUS)

Department of Artificial Intelligence & Machine Learning

Name of the Subject : Data Base Management System

BITS CODE :**22CS413PC**
Programme :**UG**

Branch : AI & ML	Version No :
Year : **II**	Document Number :**BITS/AI&ML/**
Semester : **II**	Number of Pages :

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4. Date :	**4.** Date :

Approved by (HOD) :

1. Name :

2. Sign :

3. Date :

CSE (Artificial Intelligence & Machine Learning)

2. VISION AND MISSION OF THE DEPARTMENT

VISION

To be a global leader in Artificial Intelligence and Machine Learning research, innovation, and education, driving transformative advancements that empower industries, enhance human capabilities, and contribute to a smarter, more sustainable world.

MISSION

M1:Innovative Research& Quality Education – To Conduct research on cutting-edge Technologies to address complex real-world problems across diverse domains and provide world-class education and training to equip students with technical expertise, ethical responsibility, and problem-solving skills.

M2: Industry Collaboration & Ethical AI Development –To Foster strong partnerships with industries, academia, and government organizations to develop impactful AI solutions and promote responsible and ethical AI practices that align with societal values and global sustainability.

M3: Entrepreneurship & Innovation – Encourage entrepreneurship and the development of AI-driven start-ups and products that contribute to economic growth.

M4: Community Engagement – Engage with communities to spread AI awareness, inclusivity, and accessibility for societal benefit.

3. PEOs, POs and PSOs

Program Educational Objectives

PEO1: Graduates shall apply the analytical, decision making and prediction skills in AI & ML to formulate and solve complex intelligent computing and multidisciplinary problems.

PEO2: Graduates will be able to take up higher studies, research & development by acquiring in-depth knowledge in Artificial Intelligence & Machine Learning.

PEO3: Graduates will be able to exhibit their employability skills and practice the ethics of their profession with a sense of social responsibility.

Programs Outcomes

PO1: graduate of the Artificial Intelligence & Machine Learning Program will demonstrate:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO3: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO4: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO5: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO6: Modern tool usage: Create, select, and apply appropriate techniques, resources,

and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO7: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO8: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Program Specific Outcomes (PSOs)

PSO1: Apply a set of Artificial Intelligence principles, tools, and techniques to model various real-world business problems, analyze them, and suggest a suitable solution by communicating relevant findings and effectively presenting results using appropriate techniques.

PSO2: Apply the skills of Artificial Intelligence and Machine Learning in the areas of Health Care, Education, Agriculture, e-commerce, financial sector, Smart Systems, and Multi-disciplinary areas of AI.

PSO3: Cultivate the ability to work in teams and learn by participating in Technical Events and Social Welfare Programs and develop the attitude for working productively as an individual and in cross- disciplinary teams to become better citizens in multicultural world.

4-Syllabus copy and Academic calendar

BALAJI INSTITUTE OF TECHNOLOGY AND SCIENCE (AUTONOMOUS)

22CS419PC: DATABASE MANAGEMENT SYSTEMS

B.Tech. II Year II Sem. L T P C

3 0 0 3

Prerequisites: A course on "Data Structures".

Course Objectives:

● To understand the basic concepts and the applications of database systems.
● To master the basics of SQL and construct queries using SQL.
● Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes:

● Gain knowledge of fundamentals of DBMS, database design and normal forms
● Master the basics of SQL for retrieval and management of data.
● Be acquainted with the basics of transaction processing and concurrency control.
● Familiarity with database storage structures and access techniques

UNIT - I

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalued dependencies, Fourth normal form, Fifth normal form.

UNIT - IV

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition

59

B.Tech. CSE (AI and ML) Syllabus R22-Regulations

2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, ElmasriNavrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.

B.Tech II-Year –II Semester

S.No	Description	Date		Duration
		From	To	
1	Commencement of II Semester class work	16-12-2024		
2	1st Spell of Instructions	16-12-2024	12-02-2025	9 Weeks
3	First Mid Term Examinations	13-02-2025	15-02-2025	3 days
4	2nd Spell of instructions	17-02-2025	12-04-2025	8 Weeks
5	Second Mid Term Examinations	15-04-2025	17-04-2025	3 days
6	Preparation Holidays and Practical Examination	18-04-2025	26-04-2025	8 days
7	End Semester Examinations	28-04-2025	10-05-2025	2 Weeks

PROGRAM SPECIFIC OUTCOMES(PSOs)

- **PSO1,** Apply a set of Artificial Intelligence principles, tools, and techniques to model various real-world business problems, analyze them, and suggest a suitable solution by communicating relevant findings and effectively presenting results using appropriate techniques.
- **PSO2,** Apply the skills of Artificial Intelligence and Machine Learning in the areas of Health Care, Education, Agriculture, e-commerce, financial sector, Smart Systems, and Multi-disciplinary areas of AI.
- **PSO3,** Cultivate the ability to work in teams and learn by participating in Technical Events and Social Welfare Programs and develop the attitude for working productively as an individual and in cross- disciplinary teams to become better citizens in multicultural world.

5. BRIEF NOTES ON THE IMPORTANCE OF THE COURSE
Brief Notes on DBMS

1. Definition:

A **DBMS** is a software system that facilitates the creation, management, and manipulation of databases. It allows users to store, retrieve, and manage data efficiently.

2. Types of DBMS:

- **Hierarchical DBMS**: Data is stored in a tree-like structure (e.g., IBM's IMS).
- **Network DBMS**: Data is represented as nodes connected by links, forming a graph structure (e.g., IDMS).
- **Relational DBMS (RDBMS)**: Data is stored in tables with rows and columns (e.g., MySQL, PostgreSQL, Oracle).
- **Object-oriented DBMS (OODBMS)**: Data is stored as objects, similar to object-oriented programming (e.g., ObjectDB).

3. Key Functions of DBMS:

- **Data Definition**: Defines the structure of the database (tables, relationships).
- **Data Manipulation**: Insert, update, delete, and retrieve data.
- **Data Security**: Ensures only authorized access to the database.
- **Data Integrity**: Maintains accuracy and consistency of the data.
- **Data Backup and Recovery**: Protects data from loss due to failure or errors.

4. Advantages of DBMS:

- **Data Redundancy Control**: Reduces duplicate data storage.
- **Data Consistency**: Ensures data is consistent across the system.
- **Data Security**: User access and permissions can be controlled.
- **Concurrency Control**: Multiple users can access the database simultaneously without conflicts.
- **Backup and Recovery**: Automated backup and recovery processes to prevent data loss.

5. Components of DBMS:

- **DBMS Software**: Manages and controls database operations.
- **Database Engine**: Handles data storage, retrieval, and modification.
- **Database Schema**: Defines the structure of the database.
- **Query Processor**: Interprets and executes queries (e.g., SQL).
- **Transaction Manager**: Ensures transactions are processed reliably.
- **Database Users**: Administrators, developers, and end-users who interact with the database.

6. DBMS Models:

- **Entity-Relationship Model (ER Model)**: A conceptual framework for modeling data.
- **Relational Model**: Uses tables (relations) to represent data.

7. Examples of Popular DBMS:

- **MySQL**, **PostgreSQL**: Open-source RDBMS.
- **Oracle**, **SQL Server**: Commercial RDBMS.
- **MongoDB**: NoSQL DBMS (for unstructured data).
- **SQLite**: Embedded DBMS used in mobile apps.

- Loops: for, while, do-while.

- Exception Handling: try, catch, finally, throw, throws.

- Enterprise Applications.

- Game Development (LibGDX, JavaFX).

6. PREREQUISITES

To effectively understand and work with **Database Management Systems (DBMS)**, there are certain fundamental concepts and skills you should be familiar with:

1. Basic Computer Science Knowledge:

- **Understanding of Computer Systems**: Familiarity with hardware, software, and operating systems is essential as DBMS operates on computers, managing data storage, retrieval, and manipulation.
- **Algorithms and Data Structures**: Basic knowledge of algorithms (e.g., searching, sorting) and data structures (e.g., arrays, lists, trees) is helpful in understanding how DBMS stores and organizes data.

2. Programming Skills:

- **Basic Programming**: Knowledge of at least one programming language (such as Python, C, or Java) is essential as it is required for interacting with the DBMS.
- **SQL (Structured Query Language)**: SQL is the standard language for interacting with relational databases. Understanding SQL is fundamental for querying, inserting, updating, and deleting data in a DBMS.

3. Mathematics:

- **Set Theory**: Understanding of sets, operations on sets, and relations is critical, especially for understanding relational databases and their queries.
- **Boolean Algebra**: Used in query logic, especially for building logical conditions in database queries (e.g., in WHERE clauses).
- **Discrete Mathematics**: Concepts like graphs, relations, and functions are useful for understanding database models, especially in network and hierarchical DBMS.

4. Understanding of Data Storage and File Systems:

- **File Systems**: Basic knowledge of how data is stored in files, the concept of indexing, and data retrieval is helpful since DBMS relies on file systems to store persistent data.
- **Data Representation**: Understanding of how different data types (integer, string, date) are represented in a computer system.

5. Basic Networking Concepts:

- **Client-Server Architecture**: Since many DBMS operate in a client-server environment, understanding how databases are accessed over networks is important.
- **Basic Networking**: Understanding of how network protocols (such as TCP/IP) work for remote database access.

6. Operating System Concepts:

- **Process Management**: Knowledge of processes, threads, and multitasking is important for understanding DBMS concurrency control and transaction management.
- **Memory Management**: Understanding how memory (RAM) and storage (disk) are managed by the operating system helps in optimizing DBMS performance.
- **Disk Storage & Files**: Understanding how data is physically stored on disks, which is essential for database optimization, indexing, and access methods.

7. Data Modeling:

- **Basic Data Modeling Concepts**: Understanding how to represent real-world entities and their relationships through data models like the **Entity-Relationship (ER) model** and **Relational model** is essential for designing databases effectively.

8. Understanding of Transactions and ACID Properties:

- **Transactions**: Understanding the concept of transactions in databases (e.g., a series of operations treated as a single unit) and how transactions are managed.
- **ACID Properties**: Knowledge of ACID (Atomicity, Consistency, Isolation, Durability) properties for ensuring reliable database transactions.

These prerequisites provide a solid foundation for understanding and working with DBMS. Once these concepts are clear, learning advanced DBMS topics, such as indexing, normalization, and query optimization, becomes much easier!

7. COURSE OBJECTIVES & OUTCOMES

The main objectives of the course are

To Understand the basic object-oriented programming concepts and apply them in problem solving.

- To Illustrate inheritance concepts for reusing the program.
- To Demonstrate multitasking by using multiple threads and event handling
- To Develop data-centric applications using JDBC.
- To Understand the basics of java console and GUI based programming

COURSE OUTCOMES(COs):

By the end of this course, Students should be able to:

Course Name: C213 (Database Management Systems-22CS419PC) **After Completion of the course student will be able to:**	**Year of Study: 2023-2024**
C213.1	Understand the fundamental concepts of databases, including data models, relational schemas, and the database architecture.
C213.2	Learn and apply SQL for database design, querying, and manipulation of relational databases.
C213.3	Understand and implement database normalization techniques to ensure efficient data storage and minimize redundancy.
C213.4	Explore transaction management, concurrency control, and database security principles.
C213.5	Design and develop databases, applying concepts like indexing, recovery, and backup to ensure data integrity and performance.

8. CO-PO, CO-PSO MAPPING& JUSTIFICATION

CO-PO and CO-PSO Mapping table

Course Name: C213 (Database Management Systems-22CS419PC) **After Completion of the course student will be able to:**	**Year of Study: 2023-2024**
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C213.4	Explore transaction management, concurrency control, and database security principles.
C213.5	Design and develop databases, applying concepts like indexing, recovery, and backup to ensure data integrity and performance.

WITH JUSTIFICATION FOR COURSE OUTCOMES MAPPING POs AND PSOs

Justification for Course Outcomes (COs) Mapping with POs and PSOs in Java Programming

Course Outcome 1: Understanding DBMS Concepts and Components

This outcome focuses on students gaining an understanding of the basic DBMS concepts, components, and its architecture, including relational models, schemas, and data types.

Mapping with Program Outcomes (POs):

- **PO1 (Engineering Knowledge)**: **Strong Correlation** – Students learn fundamental concepts of DBMS, such as data models, relational schema, and data types, which are foundational to software engineering.
- **PO2 (Problem Analysis)**: **Strong Correlation** – Students analyze and interpret different data structures and models, identifying how a DBMS organizes and stores data.
- **PO3 (Design & Development of Solutions)**: **Moderate Correlation** – Students develop the ability to design simple databases by understanding DBMS structure and components.
- **PO4 (Investigations of Complex Problems)**: **Moderate Correlation** – Understanding the architecture of DBMS allows students to begin exploring advanced database issues, such as scalability and optimization.
- **PSO1 (Problem-Solving Skills)**: **Strong Correlation** – The understanding of DBMS components enhances students' problem-solving skills when they work on structuring and organizing data for real-world applications.

Course Outcome 2: Designing and Implementing a Relational Database

This outcome focuses on students learning how to design and implement relational databases and apply normalization techniques to optimize database structures.

Mapping with Program Outcomes (POs):

- **PO1 (Engineering Knowledge)**: **Strong Correlation** – Students apply engineering knowledge to design relational databases and optimize their structures using normalization techniques.
- **PO2 (Problem Analysis)**: **Strong Correlation** – Students analyze database design requirements and use normalization to solve data redundancy and consistency issues.
- **PO3 (Design & Development of Solutions)**: **Strong Correlation** – Students design relational databases from scratch and implement them using proper design techniques.
- **PO4 (Investigations of Complex Problems)**: **Moderate Correlation** – Students investigate real-world problems like data integrity, efficiency, and query optimization by applying normalization to large databases.
- **PSO1 (Problem-Solving Skills)**: **Strong Correlation** – Students demonstrate problem-solving skills by implementing normalized, optimized, and efficient database designs.

Course Outcome 3: Writing SQL Queries for Data Manipulation

This outcome focuses on students learning how to use SQL for querying, manipulating, and retrieving data from relational databases.

Mapping with Program Outcomes (POs):

- **PO1 (Engineering Knowledge)**: **Strong Correlation** – Students apply fundamental SQL knowledge to retrieve and manipulate data, which is central to any database management system.
- **PO2 (Problem Analysis)**: **Strong Correlation** – Students analyze complex queries and optimize them for retrieving and modifying data efficiently in a relational database.
- **PO3 (Design & Development of Solutions)**: **Strong Correlation** – Students develop and implement SQL queries to solve real-world database problems, such as data retrieval, insertion, and updating.
- **PO4 (Investigations of Complex Problems)**: **Moderate Correlation** – Investigating the efficiency of SQL queries, such as indexing and query optimization, helps students address more complex database performance issues.
- **PSO1 (Problem-Solving Skills)**: **Strong Correlation** – Writing optimized and efficient SQL queries allows students to refine their problem-solving skills when interacting with large datasets.

Course Outcome 4: Understanding and Implementing Transaction Management and Concurrency Control

This outcome focuses on teaching students about transaction management, concurrency control, and recovery mechanisms in databases to ensure data integrity and reliability.

Mapping with Program Outcomes (POs):

- **PO1 (Engineering Knowledge)**: **Strong Correlation** – Students learn the core concepts of database transactions, concurrency control mechanisms, and recovery techniques, all of which are vital in ensuring data consistency.
- **PO2 (Problem Analysis)**: **Strong Correlation** – Students analyze issues related to database consistency, isolation, and concurrency, ensuring smooth multi-user database operations.
- **PO3 (Design & Development of Solutions)**: **Strong Correlation** – Implementing transaction management and concurrency control in a DBMS is part of the database design and development process to ensure reliable and accurate operations.
- **PO4 (Investigations of Complex Problems)**: **Strong Correlation** – Investigating performance issues, database locks, deadlocks, and recovery strategies presents complex database-related problems.

- **PSO2 (Software Development Skills)**: **Strong Correlation** – The implementation of transaction management and concurrency control significantly enhances the reliability and robustness of software applications using databases.

9.CLASS TIME TABLE & INDIVIDUAL TIME TABLE

Class: B.Tech II CSM A								w.e.f.16 .12.2024
DAY	1	2	3	4	1:00-1:40	5	6	7
	9:30 - 10:20	10:20 - 11:10	11:20 - 12:10	12:10 - 01:00	LUNCH BREAK	1:40 - 02:30	2:30 - 03:20	3:20 - 04:10
MON	DBMS	DM	IAI	ATCD		OOPS LAB		
TUE	DM	PROLOG LAB				OOPS	DBMS	COUNSELLING
WED	CRT/SDP- THEORY		IAI	OOPS		CRT / SDP - TECHNICAL LAB		
THU	ATCD	DM	OOPS	IAI		DBMS	CRT- Verbal Ability	
FRI	OOPS	DBMS	Real TimeReserarchProject			OOPS	IAI	ATCD
SAT	ATCD	DBMS LAB				ATCD	DM	LIBRARY/SPORTS

Day	P1	P2	P3	P4	P5	P6	P7
MON							
TUE						DBMS	
WED							
THU		DBMS					
FRI		DBMS					
SAT						DBMS	

10. METHOD OF TEACHING

Methods of Teaching DBMS

Teaching Java effectively depends on the learner's background, learning style, and objectives. Below are some **effective teaching methods**:

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1. Lecture-Based Teaching

- **Objective**: Provide foundational understanding of DBMS concepts in a structured manner.
- **Approach**:
  - **Explain DBMS concepts with real-world examples**: Relate database concepts like normalization, ER models, and indexing to real-world situations (e.g., library systems, banking systems).
  - **Use presentations, diagrams, and flowcharts**: Visual aids such as ER diagrams, relational schemas, and normalization steps help in understanding the structure and organization of databases.
  - **Encourage student interaction**: Students should take notes, ask questions, and engage in discussions to clarify any doubts.

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2. Hands-on Practice (Practical Approach)

- **Objective**: Enable students to work directly with databases and apply theoretical concepts.
- **Approach**:
  - **Start with simple DBMS tasks**: Introduce students to basic database operations like creating tables, inserting data, and running simple queries.
  - **Live demos**: Demonstrate how to write SQL queries, manage tables, and perform database operations using tools like MySQL, Oracle, or PostgreSQL.
  - **Encourage practice**: Students should practice SQL queries and database management tasks in real-world DBMS environments.

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3. Project-Based Learning

- **Objective**: Develop students' skills by applying DBMS concepts to real-world applications.
- **Approach**:
  - **Start with small projects**: Assign basic database-related tasks like creating a library management system, inventory management, or student information system.

- **Move to larger projects**: Gradually introduce more complex projects like building a banking system, an e-commerce platform, or a content management system (CMS) with features like data security and transaction management.
- **Real-world applications**: These projects help students understand how DBMS concepts like normalization, data integrity, and relational database design are applied in real-life scenarios.

11: Lecture Schedule

ISO 9001:2015 Certified Institution Estd.:2001
Balaji Institute of Technology & Science
Laknepally (V), Narsampet (M), Warangal District - 506 331, Telangana State, India
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DEPARTMENTOFAI&ML

LESSONPLAN&DELIVERYREPORT

Subject:DataBaseManagementSystem[CS803OE] **Class:B.TechIICSM**

Faculty:Mr.P.Rajesh **Regulation:R22**

AcademicYear:2024-25(II-Sem) **CommencementofClassWork:16.12.2024**

UNIT IDATABASE SYSTEM APPLICATIONS (No. of Lectures –11)				
Topics (as per syllabus)	**Sub Topics**	**Lect. No.**	**Scheduled Date**	**Topic Delivered Date**
	• About Subject & Guidelines • Vision, Mission, CO's of subject • Text & Reference Books	L1	16.12.24	
Introduction to Database System	• Introduction to DBMS-Definition • A Historical Perspective	L2	17.12.24	
	• File Systems versus a DBMS	L3	19.12.24	
	• The Data Model	L4	19.12.24	
	• Levels of Abstraction in a DBMS, • Data Independence	L5	20.12.24	

Structure of DBMS	• Structure of a DBMS	L6	23.12.24	
Introduction to Database Design	• Database Design and ER Diagrams	L7	24.12.24	
	• Entities	L8	27.12.24	
	• Attributes, and Entity Sets • Relationships and Relationship Sets	L9	30.12.24	
Relationships	• Additional Features of the ER Model • Conceptual Design With the ER	L10	31.12.24	
	Slip Test-1	L11	2.1.25	
Topics (as per syllabus)	**Sub Topics**	**Lect. No.**	**Scheduled Date**	**Topic Delivered Date**
UNIT II: INTRODUCTION TO THE RELATIONAL MODEL (No. of Lectures – 7)				
The Relational Model	• Integrity constraint over relations • Enforcing integrity constraints	L12	3.1.25	
	• Querying relational data • Logical data base design	L13	6.1.25	
	• Introduction to views • Destroying/altering tables and views	L14	9.1.25	
	• Relational Algebra	L15	10.1.25	
	• Tuple Relational Calculus	L16	13.1.25	
	• Domain Relational Calculus	L17	16.1.25	
	• Form Of Basic SQL Query, • UNION, INTERSECT, and EXCEPT	L18	20.1.25	
SQL: Queries	• Nested Queries	L19	21.1.25	
	• Unit test-1	L20	23.1.25	
UNIT-III				
SQL: Queries	• Aggregation Operators	L21	24.1.25	
	• NULL values, • Complex Integrity Constraints In SQL	L22	28.1.254	

	• Triggers And Active Data Bases • Problems caused by redundancy	L23	3.2.25	
Schema Refinement & Normal forms	• Decompositions • Problems Related To Decomposition	L24	4.2.25	
	• Reasoning About Functional Dependencies	L25	6.2.25	
	• FIRST, SECOND, THIRD normal forms	L26	7.2.25	
Mid I Schedule: 13.2.25 To 15.2.25				
Topics (as per syllabus)	**Sub Topics**	**Lect. No.**		**Topic Delivered Date**
Mid I Marks Distribution	• Marks Distribution • Discussion about Paper • Counsel the students(AB/got poor marks)	L27	17.2.25	
	• BCNF	L28	20.2.25	
	• Lossless Join Decomposition	L29	21.2.25	
	• Multi-Valued Dependencies • Fourth Normal Form • Fifth Normal Form	L30 L31	24.2.25	
UNIT-IV				
Transaction Management	• Transaction Concept	L32	27.2.25	
	• Transaction State	L33	3.3.25	
	• Implementation of Atomicity and Durability	L34	4.3.25	
	• Concurrent Executions	L35	6.3.25	
Serializability	• Serializability	L36	7.3.25	
	• Recoverability	L37	11.3.25	
	• Implementation Of Isolation	L38	13.3.25	

	• Testing For Serializability • Lock Based Protocols	L39	14.3.25	
	• Timestamp Based Protocols • Validation- Based Protocols	L40	17.3.25	
	• Multiple Granularity	L41	20.3.25	
Topics (as per syllabus)	**Sub Topics**	**Lect. No.**		**Topic Delivered Date**
Recovery	• Recovery and Atomicity	L42	21.3.25	
	• Log–Based Recovery	L43	24.3.254	
	• Recovery with Concurrent Transactions	L44	25.3.25	
UNIT-V				
File organization	• Data on External Storage	L45	27.3.25	
	• File Organization and Indexing	L46	1.4.25	
	• File Organization and Indexing (Continues)	L47	2.4.25	
	• Cluster Indexes • Primary and Secondary Indexes	L48	4.4.25	
	• Index data Structures	L49	7.4.25	
Indexing	• Hash Based Indexing	L50	7.4.25	
	• Hash Based Indexing (Continues)	L51	8.4.25	
	• Tree base Indexing, Comparison of File Organizations	L52	10.4.25	
	• Indexes and Performance Tuning, Intuitions for tree Indexes	L53	10.4.25	

	• Intuitions for tree Indexes	L54	11.4.25	
	• Indexed Sequential Access Methods (ISAM)	L55	12.4.25	
	• B+ Trees: A Dynamic Index Structure	L56	12.4.25	
Topics (as per syllabus)	**Sub Topics**	**Lect. No.**	**Scheduled Date**	**Topic Delivered Date**
Review of Syllabus & Planning (Mid II)	• Review of theory Questions • Review of objective Questions • Plan for Mid 1 exam • Tips to get good marks	L57	.6.24	

13. ADDITIONAL TOPICS

1. Database Design & Modeling

- **Entity-Relationship (ER) Model**: Designing a conceptual schema using entities, relationships, and attributes.
- **Normalization**: Process of organizing data in a database to reduce redundancy and improve data integrity (1NF, 2NF, 3NF, BCNF).
- **Denormalization**: The process of combining normalized tables to improve query performance.
- **Schema Design**: Discuss how to design schemas for real-world applications like a library system or customer management system.

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2. Advanced SQL Queries

- **Subqueries**: Use of nested queries (in SELECT, WHERE, and FROM clauses).
- **Joins**: Deep dive into INNER JOIN, LEFT JOIN, RIGHT JOIN, and FULL OUTER JOIN.
- **Aggregate Functions**: Using functions like COUNT, AVG, MAX, MIN, and SUM for data summarization.
- **Group By and Having Clauses**: Grouping data and filtering results based on aggregate functions.
- **Window Functions**: Functions like ROW_NUMBER(), RANK(), and PARTITION BY for advanced query operations.

---

3. Transaction Management & ACID Properties

- **Transactions**: A set of operations executed as a single unit (e.g., transferring money from one account to another).
- **ACID Properties**: Understanding the four properties of transactions: Atomicity, Consistency, Isolation, Durability.
- **Concurrency Control**: Techniques to manage simultaneous database access, such as locking mechanisms and isolation levels.
- **Deadlock**: Handling and preventing deadlocks in transaction processing.
- **Rollback and Commit**: Techniques to undo or apply transactions.

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4. Indexing & Query Optimization

- **Index Types**: Primary, unique, composite, and bitmap indexes.
- **B-Tree Indexing**: The most common indexing method used in DBMS.
- **Hashing**: Technique for faster retrieval of data.
- **Query Optimization**: Techniques to improve the speed and efficiency of SQL queries, including choosing the right indexes.
- **Execution Plans**: Understanding how the DBMS processes queries and how to interpret the execution plan.

---

5. Database Security & Integrity

- **Data Security**: Protecting sensitive data through encryption, access controls, and auditing.
- **User Authentication & Authorization**: Controlling access to the database via roles and permissions.
- **Integrity Constraints**: Enforcing data correctness with constraints like PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, CHECK.
- **Backup & Recovery**: Techniques to ensure database resilience, including full and incremental backups, and recovery strategies.

14.Mid exam question Papers- Theory and quiz

Set-1

S. No	Question	Blooms Level	CO's
1	What is ER model? Explain about relationships and Relationship sets?	Understand	2
2	Explain about DDL and DML operations with suitable examples?	Understand	1
3	Write in detail about different types of constraints that can be specified on a relation?	Apply	2
4	what is view? Explain different types of views with an Example?	Apply	2
5	Discuss about data Models in detail?	Remember	2
6	Explain about Structure of DBMS in detail	Remember	3

Set-2

S. No	Question	Blooms Level	CO's
1	Explain the architecture of DBMS with neat diagram.?	Understand	1
2	Differences between File management System and Data Base Management System?	Apply	2
3	Explain about tuple relational calculus with suitable Example?	Understand	2
4	List out Aggregate functions and set operations supported by SQL with suitable examples?	Understand	2
5	Write about Integrity Constraints over Relationships with an Example?	Apply	2
6	Discuss about nested Queries?	Remember	3

Set-3

S. No	Question	Blooms Level	CO's
1	What is ER model? Explain about relationships and Relationship sets?	Apply	2
2	Explain about DDL and DML operations with suitable examples?	Remember	1
3	Write in detail about different types of constraints that can be specified on a relation?	Apply	2
4	what is view? Explain different types of views with an Example?	Understanding	2
5	Discuss about UNION,UNIONALL,INTERSECT,INTERSECTALL,EXCEPT with an Example?	Understand	2
6	Explain about Database applications in detail?	Understand	3

Fill in the Blanks:

Unit-1

1. The relationship isa Association between_____

A: Entities

2. ACID stands for……..

A: Atomicity, consistency, isolation, durability

3. An entity that depends on other entity is called as _____

A: Weak Entity

4. The person who has central control over the database is called as……..

A: Database Administrator

5. …….. Express the no.of entities to which another entity can be associated via a relationship set.

A: Mapping Cardinality

6. The database and database mangement system collectively called as …….

A: Database System

7. ……..Process used to extract usable **data** from a larger set of any raw **data**.

A: Data Mining

8. Syntax for creating a table ……..

A: create table tablename (col-name1 datatype ,colname2 datatype…… col-namen datatype);

9. …….. Key is a set of one or more attributes taken collectively to uniquely identify a record?

A: Superkey

10 _____ Command is used tomake the transaction permanent in the database?

A: Committ

UNIT-2

1. The relational Algebra is _____ language

A: Procedural

2. Syntax for Selection operation_____.

A: Sigma condition (relation-name)

3. _____ Relational operation will give selected columns in the resultant table.

A: Projection

4. _____ combines the two relations into one relation with a selection condition.

A: Conditional join

5. The Query expressed in the TRC is …….

A: {t|p(t)}

6. Domain relational calculus consider …….. as its variable.

A: fieds (attribute names)

7. Example for Relational Algebra expression……..

A: pi sname (sigma age>=18(student))

8. Full Outer join is denoted by……..

A: cross symbol

9. _____ Operation is used to give the new name for resultant relation in relational algebra.

A: Rename (rho symbol) operation

10. Example for Aggregate operators……..

A: Sum, Avg

UNIT-3

1. The set of all functional dependencies implied by a given set F of FD's is called _____.

A: Closure

2. The values in the domain of each attribute of relation are atomic is known as _____Normal Form.
   A: 1 normal form
3. The attribute not part of any candidate key is _____
   A: non prime attribute
4. The non-key attributes must be fully dependent on the _____.
   A: Key attribute
5. FD is termed as_____.
   A: Functional dependency

Multiple Choice Questions

UNIT-1

1. In the architecture of database system external level is the _____ level.
   A. Physical
   B. Logical
   C. Conceptual
   D. view

2. The rectangle represents in E-R model is _____

   A. Entity set
   B. Attribute
   C. relation ship
   D. entity type

3. In Relational model, data and relationships are represented as a collection of __
   A. Tables
   B. Records
   C. Trees
   D. Graphs
4. An entity set that does not have sufficient attributes to form a primary key is a _____ entity set.

   A. Strong
   B. Weak
   C. Primary
   D. Simple
5. In E-R model ellipses represents _____.
   A. entity sets
   B. attributes
   C. relationships
   D. objects
6. Which of the following is not a characteristic of relational data model?
   A. Tables
   B. Tree like structures

C. complex logical relationships
D. records

7. The SQL statement that is used to change the definition of a table is _____.
   A. Alter
   B. Update
   C. Select
   D. Create
8. Which of the following is not a type of SQL statement
   A. data Manipulation Language (DML)
   B. data Definition Language (DDL)
   C. Data Control Language (DCL)
   D. data Standard Language (DSL)

9. To modify existing rows of table…….statement is used
   A. Alter
   B. Modify
   C. Update
   D. None of these
10. Which of the following is not included in DML
   A. Insert
   B. Update
   C. Delete
   D. Create

UNIT-2

1. ____ key not allows null and duplicate values.

A. Unique key
B. foreign key
C. primary key
D. none

2. _____ key is used to represent relationship between tables.
   A. Primary
   B. Secondary
   C. Foreign
   D. Candidate
3. _____ produces the relation that has attributes of R1 and R2
   A. Cartesian product
   B. Difference
   C. Intersection
   D. Product
4. Relational calculus is ……. language

A) Procedural

B) Non-Procedural

C) Data Definition

D) Data Manipulation

5. Relational Algebra does not have……
   A. Aggregate
   B. UNION
   C. Selection
   D. Projection
6. Relational Algebra is …..
A. Data definition Language
B. Procedural query language
C. Meta language
D. None of these
7. In Relational Algebra Cartesian Product is ….. Operator
A. Unary
B. binary
C.Ternary
D.Logical
8. 'AS' is used in SQL for ……
A. Join
B. Projection
C. Selection
D. Rename
9. Which of the following is not a Set operator?
A. Union
B. Intersect
C. Except
D. Division
10. Which of the following is not an Aggregate operator?
A. Max
B. Sum
C. Join
D. Avg

UNIT-3

1. Storing the same information several times in a database is known as
   A. Redundancy
   B. Concurrency
   C. Redesign
   D. Arbitration
2. Redundancy is dangerous as it is a potential threat to data _____
   A. Integrity
   B. consistency
   C. sufficiency
   D. both a) & b)
3. Transitive dependency is_____
   A. A->B,B->C
   B. A->B,A->C,B->C
   C. A->B,B->C,A->C
   D. None

4. Normal forms is divided into ____types

A. 3 B. 4 C. 5 D.6

5. BCNF stands for…….
   A. Binary code normal form
   B. Boyce codd normal form
   C. Base Code normal form
   D. None

15.University Question papers of previous years

Code No: 154AM

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, April/May - 2023

DATABASE MANAGEMENT SYSTEMS

(Common to CSE, IT, ECM, CSBS, CSIT, ITE, CSE(AI&ML), CSE(DS))

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What are the goals of DBMS?	[2]
b)	Explain about DML language and query processor.	[3]
c)	Distinguish between super key and Candidate key.	[2]
d)	Explain Domain relational calculus.	[3]
e)	Define dependency preserving decomposition.	[2]
f)	What is the difference between 3NF and BCNF?	[3]
g)	Explain about durability of transaction.	[2]
h)	What is transaction? Explain its states.	[3]
i)	Why are tree-structure indexes are good for searches, especially range selections.	[2]
j)	What is the main difference between ISAM and B+ tree indexes?	[3]

PART – B

(50 Marks)

2.a)	Identify the main components in a DBMS and briefly explain what they do?	
b)	Explain the following: i) View of Data ii) Data Abstraction iii) Instances and Schemas.	[5+5]

OR

3.a)	What is data model? Explain Relational Model and E-R model.	
b)	Draw an ER-Diagram for Library Management system.	[5+5]
4.a)	Differentiate between a relation schema and relation instance define the term arity and degree of a relation.	
b)	Let R =(ABC) and let r1 and r2 both relations on schema R . Give an expression in the Domain relational calculus that is equivalent to each of the following:	[5+5]

OR

5.a) What is Relational Model? Explain about various domain and integrity constraints in Relational Model with examples.

b) Explain various fundamental operations in relational algebra with examples. [5+5]

6.a) What aggregate operators does SQL support ? Explain.

b) Define Functional dependencies and Multi valued dependencies. How are primary keys related to FDs? [5+5]

OR

7.a) What are the conditions are required for a relation to be in 4NF and 3NF explain with examples.

b) Explain various set operations are used in SQL with examples. [5+5]

8.a) What is locking Protocol? Describe the Strict Two Phase locking Protocol.

b) Explain multiple granularity concurrency control scheme. [5+5]

OR

9.a) Explain the ACID Properties of transactions.

b) What is log file? Explain the following log based recovery schemes.
i) Deferred data base modification
ii) Immediate data base modification. [5+5]

10.a) Explain about cluster index, primary and secondary indexes with examples.

b) Explain Deletion and insertion operations in ISAM with examples. [5+5]

OR

11.a) Explain what are the differences between tree based and Hash based indexes.

b) Explain deletion and insertion operation in *B+ trees*. [4+6]

16 Unit-wise quiz questions

UNIT-1

8. In the architecture of database system the highest level is _____
   E. Physical
   F. Logical
   G. view

9. in E-R model ,rectangle represents _____
   E. Entity set
   F. Attribute
   G. relation ship
   H. entity type

10. In Relational model, data and relationships are represented as a collection of __
    E. Tables
    F. Records
    G. Trees
    H. Graphs
11. An entity set that does not have sufficient attributes to form a primary key is a _____ entity set.
    E. Strong
    F. Weak
    G. Primary
    H. Simple
12. In E-R model ellipses represents _____.
    E. entity sets
    F. attributes
    G. relationships
    H. objects
13. Which of the following is not a characteristic of relational data model?
    E. Tables
    F. Tree like structures
    G. complex logical relationships
    H. records

14. The SQL statement that is used to change the definition of a table is _____.
    E. Alter
    F. Update
    G. Select
    H. Create

8. Which of the following is not a type of SQL statement
   A. data Manipulation Language (DML)
   B. data Definition Language (DDL)
   C. Data Control Language (DCL)
   D. **data Standard Language (DSL)**

9. To modify existing rows of table…….statement is used
   A. Alter
   B. Modify
   C. **Update**
   D. None of these
10. Which of the following is not included in DML
   A. Insert
   B. Update
   C. Delete
   D. **Create**

Fill in the blanks

10. The relationship isa Association between_____

A: Entities

11. ACID stands for…….

A: Atomicity, consistency, isolation, durability

12. An entity that depends on other entity is called as _____

A: Weak Entity

13. The person who has central control over the database is called as…….

A: Database Administrator

14. _____ key establish relation among different tables.

A: Foreign key

15. SQL stands for_____

A: Structured Query Language

16. Information about data is called_____

A: Meta Data

17. In a relational model, relations are termed as_____

A: Tables

18. …….. is a key attribute that identify the row

A: primary key

10 _____ Command is used tomake the transaction permanent in the database?

A: Commit

UNIT -2

5. _____ key does not allow null and duplicate values.
   E. Unique key
   F. foreign key
   G. **primary key**
   H. none

6. _____ key is used to represent relationship between tables.

E. Primary
F. Secondary
G. Foreign
H. Candidate

7. _____ is the author of prescribed DBMS book
E. Raghu ramakrishnan
F. sudarshan
G. korth
H. all the above

8. identify the correct SQL statement

A) select from * table name;

B) select * from table name;

C) select table name from *;

D) select name from table;

5. _____ is responsible for authorizing access to the data base

A. database administrator
B. Naïve users
C. Sophisticated users
D. end users.

6. Revoke command is …..
A. Data definition Language
B. Data Control Language
C. Data manipulation Language
D. None of these

7. Relationship among relationships
A. Unary
B. binary
C.Ternary
D. aggregation

8. Generalization is represented by
A. rhombus
B. elipse
C. triangle
D. Rectangle

9. for example in an employee table to include the attributes whose value should not be empty
A. NULL
B. unique
C. NOT NULL
D. DISTINCT

10. _____ are the rules to be followed while entering data into the data base
A. constraint
B. dependency
C. constant
D. relational algebra

Fill in the blanks

11. _____ is the collection of information.

A: data

12. _____is a software that allows access to data stored in a database and provides an easy effective method of defining storing and manipulating information

A. DBMS

13. _____contains the information about the structure of any data base object.

A: data dictionary

14. The biggest disadvantage of file system_____

A: Redundancy

15. In _____model data is organized in a tree like structure.

A. Hierarchy

16. _____ defines the properties of an object

A: class

17. _____model , entities are organized in the form of graph

A: Network Model

18. Lowest level of abstraction_____

A: Physical level

19. _____ is used to describe an entity

A: attribute

20. _____ is a relationship that exists between higher level entity set and one or more lower level entity sets.

A: Generalization

UNIT -3

15. If K→R Then K is said to be the_____ of R [ ]

H. Candidate key
I. Foreign key
J. Super key
K. None of these

Ans: c

16. Inst_dept (ID, name, salary, dept name, building, and budget) is decomposed into

Instructor (ID, name, dept name, salary) department (dept name, building, budget)

This comes under [ ]

a) Lossy-join decomposition
b) Lossy decomposition
c) Lossless-join decomposition
d) Both a and b

Ans: d

17. There are two functional dependencies with the same set of attributes on the left side of the arrow: [ ]

A->BC
A->B

This can be combined as

a) A->BC

b) A->B

c) B->C

d) None of the mentioned

Ans: a

18. Suppose relation R(A,B,C,D,E) has the following functional dependencies: [ ]

A -> B

B -> C

BC -> A

A -> D

E -> A

D -> E

Which of the following is not a key?

a) A

b) E

c) B, C

d) D

Ans: c

19. Suppose relation R(A,B,C,D,E) has the following functional dependencies: [ ]

A -> B

B -> C

BC -> A

A -> D

E -> A

D -> E

Which of the following is not a key?

a) A

b) E

c) B, C

d) D

Ans: c

Fill in the blanks

6. A relationship which involves three entities is called_____.

A: Ternary

7. A relationship which involves weak entity is called

A: weak relationship

8. Two or more attributes that together uniquely identifies an entity occurrence_____
   A: composite key

9. Duplication of data is called _____

UNIT-4

1. The property of transaction that persists all the crashes is [ ]

a) Lock timeout

a) Atomicity

b) Durability

c) Isolation

d) All of the mentioned

Answer: b

2. _____ states that only valid data will be written to the database. [ ]

a) Lock timeout

a) Consistency

b) Atomicity

c) Durability

d) Isolation

Answer: a

3. Transaction processing is associated with everything below except [ ]

a) Lock timeout

a) Producing detail summary or exception reports

b) Recording a business activity

c) Confirming a action or triggering a response

d) Maintaining a data

Answer: c

4. The Oracle RDBMS uses the ____ statement to declare a new transaction start and its properties. [ ]

a) Lock timeout

a) BEGIN

b) SET TRANSACTION

c) BEGIN TRANSACTION

d) COMMIT

Answer: b

5. ____ means that the data used during the execution of a transaction cannot be used by a second transaction until the first one is completed. [ ]

a) Lock timeout

a) Consistency

b) Atomicity

c) Durability

d) Isolation

Answer: d

6. When SQL statements are embedded inside 3GL, we call such a program as [ ]

a) Lock timeout

a) Nested query

b) Nested programming

c) Distinct query

d) Embedded SQL

Answer: d

7. _____ provides option for entering SQL queries as execution time, rather than at the development stage. [ ]

a) Lock timeout

a) PL/SQL

b) SQL*Plus

c) SQL

d) Dynamic SQL

Answer: d

8. For a transaction to be durable, its changes need to be written to _____ storage. [ ]

a) Lock timeout

a) Volatile storage

b) Non-volatile storage

c) Stable storage

d) Dynamic storage

Answer: c

9. The situation where the lock waits only for a specified amount of time for another lock to be released is [ ]

a) Lock timeout

b) Wait-wound

c) Timeout

d) Wait2

Answer: a

10. 4. Which of the following has "all-or-none" property ? [ ]

a) Lock timeout

a) Atomicity

b) Durability

c) Isolation

d) All of the mentioned

Answer: a

Fill in the blanks

21. ACID stands for _____

A: Atomicity, Consistency, Isolation, Durability

22. The intialstate of transactional model is called _____

A: Active

23. The list of actions from the set of transactions is called as _____

A: Schedule

24. _____ is primary memory which can notsurvive on system crash

A: volatile

25. The process in which the changes caused by aborted transactions are undone is called _____

A: rollback

26. _____ is the concept that helps to identify which non serial schedule and find the transaction equivalent to serial schedule

A: Serializability

27. If there is no cycle in precedence graph then the schedule S is _____

A: Conflict Serializable

28. If transaction acquires a exclusive lock , then it can perform _____ operation

A: Read and write

29. _____ occurs when one transaction reads a changed record that has not been committed to database

A: Dirty read

30. New mode lock introduced in granularity is called _____

A: intension mode lock

UNIT-5

1. A unit of storage that can store one or more records in a hash file organization is denoted as [ ]

a) Buckets

b) Disk pages

c) Blocks

d) Nodes

Answer: a

2. The file organization which allows us to read records that would satisfy the join condition by using one block read is [ ]

a) Heap file organization

b) Sequential file organization

c) Clustering file organization

d) Hash file organization

Answer: c

3. The highest level in the hierarchy of data organization is called [ ]

a) Data bank

b) Data base

c) Data file

d) Data record

Answer: b

4. Which of the following hardware component is the most important to the operation of database management system? [ ]

a) High resolution video display

b) Printer

c) High speed, large capacity disk

d) Mouse

Answer: c

5. Which of these is not a feature of Hierarchical model? [ ]

a) Organizes the data in tree-like structure

b) Parent node can have any number of child nodes

c) Root node does not have any parent

d) Child node can have any number of parent nodes

Answer: d

6. In ordered indices the file containing the records is sequentially ordered, a _____ is an index whose search key also defines the sequential order of the file. [ ]

a) Clustered index

b) Structured index

c) Unstructured index

d) No clustered index

Answer: a

7. Indices whose search key specifies an order different from the sequential order of the file are called _____ indices. [ ]

a) Nonclustered

b) Secondary

c) All of the mentioned

d) None of the mentioned

Answer: c

8. In a _____ index, an index entry appears for only some of the search-key values. [ ]

a) Dense

b) Sparse

c) Straight

d) Continuous

Answer: a

9. A search key containing more than one attribute is referred to as a _____ search key. [ ]

a) Simple

b) Composite

c) Compound

d) Secondary

Answer: b

10. In B+ tree the node which points to another node is called [ ]

a) Leaf node

b) External node

c) Final node

d) Internal node

Answer: d

Fill in the blanks

10. A_____ is a method of arranging records in a file is stored on disk
    A: file organization
11. Hard disk consist of multiple _____
    A: platters

12. An_____ is a data structure that organizes the data records on the disk to make the retrieval of data efficient.
    A: index
13. The index structure contains _____ and _____
    A: search key, block pointer
14. _____ index helps in breaking down the index into several smaller indices in order to make the outermost level so small
    A: multilevel indexing

15. in cost model _____ is the formula for insert records
    A: D (3+logF1.5B)
16. ISAM stands for _____
    A: Indexed sequential Access method
17. In_____ leaf nodes are connected using linked list
    A B+ tree
18. In Cost model F and H means_____
    A: Fan out, Hash function
19. In_____ index record are created for every search key value in a file
    A: Dense index

20. SCHEME AND SOLUTION OF INTERNALTESTS.

In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Each Mid-Term examination consists of two parts i) **Part – A** for 10 marks, ii) **Part – B** for 20 marks with a total duration of 2 hours as follows:

1. **Mid Term Examination for 30 marks:**
    a. Part - A : Objective/quiz paper for 10 marks.
    b. Part - B : Descriptive paper for 20 marks.

The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks. The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The **average of the two Mid Term Examinations** shall be taken as the final marks for Mid Term Examination (for 30 marks).

The remaining 10 marks of Continuous Internal Evaluation are distributed as:

2. **Assignment for 5 marks. (Average of 2 Assignments each for 5 marks)**
3. **Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject for 5 marks.**

While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus. Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The average of the two assignments shall be taken as the final marks for assignment (for 5 marks). Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the subject concerned for 5 marks before II Mid-Term Examination.

26. REFERENCES, JOURNALS, WEBSITES AND E-LINKS ANY

TEXT BOOKS:

1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill

REFERENCE BOOKS: 1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, ElmasriNavrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.

5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

17.TUTORIAL PROBLEMS WITH BLOOMS MAPPING

1. Remembering (Basic Recall Questions)

Objective: Recall fundamental DBMS concepts and definitions.

- **Problem**: Define and explain the different types of database models (Hierarchical, Network, Relational, Object-Oriented).
- **Problem**: What is the difference between **DBMS** and **RDBMS**?
- **Problem**: What are the different types of keys in a relational database? Define **Primary Key**, **Foreign Key**, and **Candidate Key**.
- **Problem**: List and explain the **ACID properties** of a transaction in DBMS.

---

2. Understanding (Explain and Describe)

Objective: Explain DBMS concepts in detail.

- **Problem**: Describe the concept of **Normalization**. Explain the steps involved in converting a database schema from **1NF to 3NF**.
- **Problem**: Explain **Referential Integrity** and how foreign keys are used to enforce it.
- **Problem**: Describe the difference between **SQL** and **NoSQL** databases. When should each be used?
- **Problem**: Explain the concept of **Join Operations** in SQL, and describe the differences between **INNER JOIN**, **LEFT JOIN**, and **RIGHT JOIN** with examples.

---

3. Applying (Implement DBMS Concepts)

Objective: Solve practical database-related problems using SQL and database management techniques.

- **Problem**: Write an SQL query to retrieve the **third highest salary** from the **Employee** table.
- **Problem**: Design and implement a database for a **Library Management System**. Include tables for books, members, and transactions. Write queries for checking out a book and returning it.
- **Problem**: Write a SQL query to **update** a customer's information (e.g., change address or phone number) in the **Customer** table.
- **Problem**: Create a database schema for a **Student Management System**, and write SQL queries to enroll a student in courses and check course grades.

---

4. Analyzing (Break Down and Compare)

Objective: Examine and compare DBMS structures and features.

- **Problem**: Given a schema, identify normalization issues, and explain how to convert it to **3NF**.
- **Problem**: Compare the **performance** of different **JOIN** operations (e.g., **INNER JOIN** vs **OUTER JOIN**) in a large database with multiple records.
- **Problem**: Analyze and explain the trade-off between using **Indexes** and **Views** for improving query performance.
- **Problem**: Given two queries that return the same result, analyze which one would perform better based on **execution plans**.

---

5. Evaluating (Justify Decisions and Solutions)

Objective: Assess database solutions, and justify choices or improvements.

- **Problem**: Evaluate whether the **Relational Model** is the best choice for a given application, or if a **NoSQL database** would be more appropriate. Justify your choice.
- **Problem**: Given a DB schema, evaluate its **normalization** level and suggest whether further normalization or **denormalization** is needed for performance optimization.
- **Problem**: Given a **transaction log**, evaluate and suggest improvements for handling **deadlocks** in a database system.
- **Problem**: Review the **security measures** in a database design, and suggest improvements for **data protection** and **user authorization**.

---

6. Creating (Develop New Database Solutions)

Objective: Design and build new database systems or features.

- **Problem**: Design and implement a **Banking System Database** that includes tables for accounts, transactions, and customers. Write SQL queries for deposit, withdrawal, and balance transfer.
- **Problem**: Create a **Database System** for an **Online Store** that includes tables for products, customers, orders, and payments. Write SQL queries to process customer orders.
- **Problem**: Design and create a **Data Warehouse Schema** for an **E-commerce Website**, considering the need for **OLAP** (Online Analytical Processing).
- **Problem**: Design and implement a **Database System** for an **Online Voting System**, including tables for candidates, voters, and votes. Write SQL queries to register a vote and count total votes.

Summary of Bloom's Taxonomy Mapping for DBMS Tutorial Problems:

Bloom's Level	Problem Type	Example Problem
Remembering	Basic recall of facts and concepts	Define and explain **primary key** and **foreign key**.
Understanding	Explaining DBMS concepts and principles	Explain **Normalization** and its steps.
Applying	Solving practical problems using DBMS concepts and SQL	Write SQL queries for basic operations like **retrieving the third-highest salary**.
Analyzing	Breaking down complex structures, comparing and contrasting different approaches	Analyze the difference in performance between **INNER JOIN** and **LEFT JOIN** in large datasets.
Evaluating	Assessing existing solutions, making decisions and justifying them	Evaluate **transaction logs** and suggest improvements for **deadlock management**.
Creating	Designing new solutions, systems, or projects using DBMS principles	Design and implement a **Banking System Database** with tables and queries for transactions.

17. Assignment Questions with Blooms

1. Remembering (Knowledge)

Objective: Recall fundamental concepts related to DBMS.

- **Problem**: Define **Database Management System (DBMS)** and explain its main functions.
- **Problem**: List the **types of database models** and briefly explain each.
- **Problem**: Define **ACID properties** and explain their significance in transaction management.
- **Problem**: What is **Normalization**? List and define the **normal forms** (1NF, 2NF, 3NF, and BCNF).

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2. Understanding (Comprehension)

Objective: Explain DBMS concepts and their applications.

- **Problem**: Explain the difference between **relational databases** and **non-relational databases** with examples.
- **Problem**: Describe the process of **database normalization** and explain how it reduces redundancy.
- **Problem**: Explain the concept of **foreign keys** and **referential integrity** in relational databases.
- **Problem**: Discuss the importance of **indexing** in a database and its impact on query performance.

---

3. Applying (Application)

Objective: Solve practical problems using DBMS concepts and SQL queries.

- **Problem**: Write SQL queries to:
  - Retrieve all employees who work in the "Sales" department.
  - Find the average salary of employees in each department.
  - Retrieve the names of customers who have made a purchase greater than $500.
- **Problem**: Design a **student database** that contains tables for student details, courses, and grades. Write SQL queries to:
  - Insert student records into the database.
  - Display the list of students who scored above 80% in their exams.
  - Update the grade of a student after a re-evaluation.
- **Problem**: Implement a **Banking System Database** using SQL. Write queries to:
  - Transfer money between two accounts (ensure the transaction is safe).

- View the balance of a specific account.

---

4. Analyzing (Analysis)

Objective: Examine complex DBMS structures, identify issues, and compare alternatives.

- **Problem**: Compare and contrast **Clustered Index** and **Non-clustered Index** in terms of storage and performance.
- **Problem**: Given an **ER Diagram** for a **University Database**, convert it to a **relational schema** and write SQL statements for creating the tables.
- **Problem**: Analyze the performance of a query that uses **JOIN** versus a query that uses **subquery**. Which one is more efficient in a large dataset, and why?
- **Problem**: Compare and contrast **SQL** and **NoSQL** databases. When would you prefer one over the other?

---

5. Evaluating (Evaluation)

Objective: Assess the effectiveness of different database solutions and justify choices.

- **Problem**: Evaluate the **pros and cons** of using **denormalization** in database design. Discuss situations where denormalization is beneficial.
- **Problem**: Given a database schema, evaluate whether it is properly **normalized** and suggest changes to move it to **3NF** (if applicable).
- **Problem**: Evaluate the **CAP Theorem** and discuss how it affects the design choices between consistency, availability, and partition tolerance in distributed databases.
- **Problem**: Assess the performance of a database when using **stored procedures** versus executing direct **SQL queries**. Justify which approach is more efficient in large systems.

---

6. Creating (Synthesis)

Objective: Design and build new database systems or solutions.

- **Problem**: Design a **Library Management System Database**. The system should include tables for books, patrons, and transactions. Write SQL queries to:
  - Add new books to the library.
  - Check out a book to a patron and update availability.
  - Return a book and update transaction history.
- **Problem**: Create a **Customer Relationship Management (CRM) Database** that includes tables for customer information, orders, and interactions. Write SQL queries to:
  - Insert a new customer and their order.
  - Update customer details.
  - Retrieve a list of all customers who placed an order last month.
- **Problem**: Design a **Data Warehouse Schema** for an **E-commerce Business**. Use **star schema** or **snowflake schema** for organizing the data. Provide SQL queries for generating sales reports by product, category, and region.

18.Assignment questions with blooms mapping

1. Remembering (Knowledge)

Objective: Recall fundamental concepts related to DBMS.

- **Problem**: Define **Database Management System (DBMS)** and explain its main functions.
- **Problem**: List the **types of database models** and briefly explain each.
- **Problem**: Define **ACID properties** and explain their significance in transaction management.
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---

2. Understanding (Comprehension)

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---

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    - Transfer money between two accounts (ensure the transaction is safe).
    - View the balance of a specific account.

---

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---

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---

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    - Update customer details.
    - Retrieve a list of all customers who placed an order last month.

- **Problem**: Design a **Data Warehouse Schema** for an **E-commerce Business**. Use **star schema** or **snowflake schema** for organizing the data. Provide SQL queries for generating sales reports by product, category, and region.

19-List ofstudents

S.No	Roll No.	Student Name	Student Mobile No	Parent Name	Parent Mobile No
1	23C31A6601	ADAPA RAKESH	6305119439	ADPA SAMMAIAH	7780740727
2	23C31A6602	AITHA PRAVEEN	9182794569	AITHA BHASKAR	9908337105
3	23C31A6603	AKARAPU ARPAN	-	AKARAPU SURENDAR	939834378
4	23C31A6604	AMREEN	-	MOHAMMAD THURAB ALI	9989389550
5	23C31A6605	ARURI PAVAN	7095818105	ARURI MASTHAN	8978071354
6	23C31A6606	ARUTLA AJAY	9121548941	ARUTLA SAMPATH	9550263714
7	23C31A6607	ATLA SAIKRISHNA	9676955393	RAJI REDDY	9505795393
8	23C31A6608	BAIRABOINA PREETHI	9908088356	BAIRABOINA RAJU	7075526730
9	23C31A6609	BAJJURI SANTHOSH	9989140315	BAJJURI NAGABHUSHANAM	6300201394
10	23C31A6610	BALABAKTHULA MANISHA	9704762005	BALABAKTHULA RAMESH	9392447264
11	23C31A6611	BATTHULA DEEPIKA	-	BATTHULA RAMDAS	9603350052
12	23C31A6612	BEERUM LAXMI SRINIVAS	8374334203	BEERUM YAKAIAH	7386103555
13	23C31A6613	BOINI AJAY	8790725183	BOINI YAKAMBRAM	9951518100
14	23C31A6614	BOLLENA VARSHA	9963751023	BOLLENA CHAKRAPANI	9963161023
15	23C31A6615	BOMMANAPELLY POOJITHA	7386815114	BOMMANAPELLY DEVENDER REDDY	-
16	23C31A6616	BURA SANJAY	8522058600	BURA RAJU	6305996446
17	23C31A6617	CHINNALA ARJUN	9246985170	CHINNALA VENKATESHWARLU	9959749798

18	23C31A6618	CHINNAPALLY ASHWITHA	9393060222	CHINNAPALLY RAJANIKANTH	8099685222
19	23C31A6619	CHINTHIREDDY PRAVEEN	7985675132	CHINTHIREDDY MAHENDAR	9618415361
20	23C31A6620	DARAVATH JASHWANTH	6305259592	DARAVATH VIDYAKUMAR	-
21	23C31A6621	DASARI LAHARI SRI	6301690988	DASARI SUDHARSHAN	7780403963
22	23C31A6622	DASARI SRINIVAS	7702268896	DASARI UPENDER	8886368434
23	23C31A6623	DASU SAIPRIYA	8712383020	DASU RAMAKRISHNA	6301277950
24	23C31A6624	DOLI ARCHANA	7075416841	DOLI SAMBAIAH	9010776889
25	23C31A6625	DUDDE NITHISH	9121499092	DUDDE SRINIVAS	9573198430
26	23C31A6626	DUPPATI PRANEETH	7989990314	DUPPATI REMESH	9100082927
27	23C31A6627	EGA SHIVANI	9392787484	EGA PRAVEEN KUMAR	9989054517
28	23C31A6628	ELDI KARTHIK	6281109689	ELDI SRINIVAS	7013167951
29	23C31A6629	ENUGALA BHAVANI	9393803478	ENUGALA RAJAN BABU	9110389458
30	23C31A6630	GAJJALA VARUN	9550603956	GAJJALA RAMULU	8125823956
31	23C31A6631	GANDHAM KARTHIK	8374148824	GANDHAM RAMBABU	7206486257
32	23C31A6632	GANGINENI NAVEEN KUMAR	9346195924	GANGINENI NARESH	-
33	23C31A6633	GANJI KAVYA SHRI	-	GANJI SRIKANTH	9989487345
34	23C31A6634	GOLI LAXMI PRASANNA	9441589912	GOLI SATYANARAYANA	9912857196
35	23C31A6635	GUJJULA RAMYA	6300846231	GUJJULA RAJI REDDY	9705644780
36	23C31A6636	GUNDAMALA ARUN	8897342905	GUNDAMALA VENKATAIAH	9177552755
37	23C31A6637	GUNISHETTI GANGOTHRI	6302095450	GUNISHETTI SRINIVAS	6304592898
38	23C31A6638	INDLA SANDHYA	6300652598	INDLA RAMESH	7981040876
39	23C31A6639	INTSHAR ALAM	9354014992	MD KAMARE ALAM	7667708195
40	23C31A6640	IPPA RITHWIK	9912510250	IPPA SRINIVAS	8309497888
41	23C31A6642	KANDUKURI JAYALAXMI	9963239392	KANDUKURI SREE RANGA RAO	7386748653
42	23C31A6643	KANKALA SUSHMITHA	9908336514	KANKALA MALLIKARJUN	9010144379
43	23C31A6644	KANNAM SHIVA SAI	6301127556	KANNAM KUMARASWAMY	6301624450
44	23C31A6645	KARRA SAHITHI REDDY	9642724360	KARRA SAMPATH REDDY	9492724360
45	23C31A6646	KASANABOINA BHASKAR	9392811618	KASANABOINA DASHARATHA	-
46	23C31A6647	KATLA ARUN KUMAR	9951262638	KATLA SWAMY	8523802342
47	23C31A6648	KEESARI SRIRAM	8247094072	SAMBAIAH	7569957937
48	23C31A6649	KOLA SIDDHARTHA	8978463783	KOLA RAJINIKANTH	8247513637
49	23C31A6650	KONTAM DIVYA	9104805198	KONTAM SUDHAKAR	9099208473
50	23C31A6651	KOTHA DIVYA	9573203327	KOTHA PARASHURAMULU	9502203327
51	23C31A6652	KOTTURI CHAITHANYA	8074655548	KOTTURI SRIDHAR	9703811500
52	23C31A6653	KUCHANA SRAVANI	9701648157	KUCHANA SRINIVAS	8374505216
53	23C31A6654	LAKKA VARUN RAJ	7286885542	LAKKA NARENDER	9948810274
54	23C31A6655	LEKKALA VARAPRASAD	8008432931	LEKKALA RAJAIAH	8978344426
55	24C35A6602	JADALA SHIVA KUMAR	9652118725	JADALA RAMESH	9550505421
56	24C35A6603	KUCHANA SANDEEP	7569829376	KUCHANA BHADRAIAH	9912397087
57	24C35A6604	LAKKARSU SUNNY	9959223060	LAKKARSU KUMARASWAMY	-
58	24C35A6605	MOHAMMAD ARIF AHMED	9701529784	MOHAD BASHEER AHMED	8978549720
59	24C35A6606	NARUGULA SAI CHANDANA	8247696195	NARUGULA RAVINDER	824747606

20.Scheme and solution of internal tests.

section A: MCQs (2 × 5 = 10 Marks)

1. Which of the following is a type of database model?
   a) Hierarchical
   b) Network
   c) Relational
   d) All of the above
2. What does SQL stand for?
   a) Simple Query Language
   b) Structured Query Language
   c) Standard Query Language
   d) System Query Language
3. In normalization, the main goal is to:
   a) Increase redundancy
   b) Reduce data redundancy
   c) Make data complex
   d) Eliminate indexes

4. Which of the following is not a property of transactions?
   a) Atomicity
   b) Consistency
   c) Availability
   d) Isolation
5. The purpose of the `JOIN` clause in SQL is to:
   a) Insert new data
   b) Delete existing data
   c) Combine rows from two or more tables
   d) Update data

Section B: Short Answer Questions (5 × 2 = 10 Marks)

1. **Define Database and DBMS.**
2. **Explain the concept of Entity-Relationship (E-R) Model.**
3. **What are the ACID properties of transactions?**
4. **Differentiate between Primary Key and Foreign Key.**
5. **List and explain any two types of SQL commands.**

Section C: Long Answer Question (10 Marks)

- **Explain the process of Database Normalization with examples.**
  OR
- **Discuss the different types of SQL Joins with suitable examples.**

Solutions

Section A: MCQs

1. **d) All of the above**
2. **b) Structured Query Language**
3. **b) Reduce data redundancy**
4. **c) Availability**
5. **c) Combine rows from two or more tables**

Section B: Short Answers

1. **Database & DBMS:**
   - *Database:* A collection of related data stored in an organized manner.
   - *DBMS (Database Management System):* A software that manages databases, allowing data to be stored, retrieved, and manipulated efficiently.
2. **E-R Model:**
   - An *Entity-Relationship Model* represents data as entities (objects) and relationships (associations) between them. Example: *Student* (Entity) — *Enrolls in* (Relationship) — *Course* (Entity).
3. **ACID Properties:**

- *Atomicity:* Transactions are all or nothing.
- *Consistency:* Data remains consistent before and after the transaction.
- *Isolation:* Transactions occur independently.
- *Durability:* Changes are permanent after a transaction commits.

4. **Primary Key vs. Foreign Key:**
   - *Primary Key:* Uniquely identifies each record in a table.
   - *Foreign Key:* Refers to the primary key in another table, creating a relationship.
5. **Types of SQL Commands:**
   - *DDL (Data Definition Language):* CREATE, ALTER, DROP
   - *DML (Data Manipulation Language):* INSERT, UPDATE, DELETE

Section C: Long Answer

1. **Normalization:**
   - The process of organizing data to reduce redundancy and improve data integrity.
   - **1NF:** Eliminate repeating groups.
   - **2NF:** Remove partial dependency.
   - **3NF:** Remove transitive dependency.
   - Example: *Customer* table with duplicate addresses → Split into *Customer* and *Address* tables.
2. **Types of SQL Joins:**
   - *INNER JOIN:* Returns records with matching values in both tables.
   - *LEFT JOIN:* Returns all records from the left table and matched records from the right table.
   - *RIGHT JOIN:* Returns all records from the right table and matched records from the left table.
   - *FULL JOIN:* Returns records with matches in either left or right table.

22.Mark sheet

S.No	MID-I	Course Outcomes	Questions Aligned to Course Outcomes and Marks Obtained						Awarded Marks (Max.20)	QUIZ (MAX 10)	TOTAL (MAX 30)
			CO3	CO3	CO4	CO5	CO5	CO5			
			Q. No.1	Q. No.2	Q. No.3	Q. No.4	Q. No.5	Q. No.6			
	Roll No.	Distribution of Marks									
		Set Target Level									
1	23C31A6601	ADAPA RAKESH	3		3	3		3	12	9	21
2	23C31A6602	AITHA PRAVEEN	1		2	3		3	9	9	18

3	23C31A6603	AKARAPU ARPAN	4		3	3		2	12	5	17
4	23C31A6604	AMREEN	2			2		2	16	3	9
5	23C31A6605	ARURI PAVAN	3					2	5	7	12
6	23C31A6606	ARUTLA AJAY	5	3		1		4	13	9	22
7	23C31A6607	ATLA SAIKRISHNA	2	4				2	8	9	17
8	23C31A6608	BAIRABOINA PREETHI	5		3	5		1	14	8	22
9	23C31A6609	BAJJURI SANTHOSH	5		4	5		3	17	9	26
10	23C31A6610	BALABAKTHULA MANISHA	ABSENT								
11	23C31A6611	BATTHULA DEEPIKA	2	4	3	3			12	10	22
12	23C31A6612	BEERUM LAXMI SRINIVAS	5		4	4		3	16	9	25
13	23C31A6613	BOINI AJAY	5	3		5		4	17	9	26
14	23C31A6614	BOLLENA VARSHA	5		5	5		4	19	10	29
15	23C31A6615	BOMMANAPELLY POOJITHA			5	3		5	13	8	21
16	23C31A6616	BURA SANJAY	5	3	4				12	8	20
17	23C31A6617	CHINNALA ARJUN	4	1	2				7	7	14
18	23C31A6618	CHINNAPALLY ASHWITHA	5		4	4	4		17	8	25
19	23C31A6619	CHINTHIREDDY PRAVEEN	5		5	4		4	18	10	28
20	23C31A6620	DARAVATH JASHWANTH	2		2	3		2	13	10	23
21	23C31A6621	DASARI LAHARI SRI	5	4	4				13	10	23
22	23C31A6622	DASARI SRINIVAS	3						3	10	13
23	23C31A6623	DASU SAIPRIYA	4		3	2			9	9	18
24	23C31A6624	DOLI ARCHANA	5		5	5		4	20	9	29
25	23C31A6625	DUDDE NITHISH	4	5	4	5			18	9	27
26	23C31A6626	DUPPATI PRANEETH	3		4		1		8	7	15
27	23C31A6627	EGA SHIVANI	5		4	5		4	18	9	27

28	23C31A6628	ELDI KARTHIK	0						0	9	9
29	23C31A6629	ENUGALA BHAVANI	4		3	4			11	7	18
30	23C31A6630	GAJJALA VARUN			3	5	4	3	15	7	22
31	23C31A6631	GANDHAM KARTHIK	0						0	6	6
32	23C31A6632	GANGINENI NAVEEN KUMAR			5	4	2	3	14	8	22
33	23C31A6633	GANJI KAVYA SHRI	5		5	5		2	17	9	26
34	23C31A6634	GOLI LAXMI PRASANNA	4		4		2	2	12	9	21
35	23C31A6635	GUJJULA RAMYA		5	4	4			13	7	20
36	23C31A6636	GUNDAMALA ARUN	4		4			2	10	4	14
37	23C31A6637	GUNISHETTI GANGOTHRI	3	3				2	7	7	14
38	23C31A6638	INDLA SANDHYA	4	5	5	5			19	10	29
39	23C31A6639	INTSHAR ALAM	4	2	2				8	8	16
40	23C31A6640	IPPA RITHWIK	4	2	2	2	2		12	9	21
41	23C31A6642	KANDUKURI JAYALAXMI	5		5		4	3	17	10	27
42	23C31A6643	KANKALA SUSHMITHA	3		5	5	4		17	8	25
43	23C31A6644	KANNAM SHIVA SAI	4		3	2			9	7	16
44	23C31A6645	KARRA SAHITHI REDDY	5		5	5		4	19	10	29
45	23C31A6646	KASANABOINA BHASKAR	0						0	3	3
46	23C31A6647	KATLA ARUN KUMAR		2	2	2			6	7	13
47	23C31A6648	KEESARI SRIRAM	4	3	3	4			14	6	20
48	23C31A6649	KOLA SIDDHARTHA	3		3	4	2		13	6	18
49	23C31A6650	KONTAM DIVYA	5		4	4			13	9	22
50	23C31A6651	KOTHA DIVYA	5		4	4		2	15	9	24
51	23C31A6652	KOTTURI CHAITHANYA	3	1	4			3	12	8	20
52	23C31A6653	KUCHANA SRAVANI	5	3	3	3			14	10	24

53	23C31A6654	LAKKA VARUN RAJ	5		2	2	2		11	10	21
54	23C31A6655	LEKKALA VARAPRASAD	1		2				3	8	11
55	24C35A6602	JADALA SHIVA KUMAR		2	4	4			10	10	20
56	24C35A6603	KUCHANA SANDEEP	4		4	2	2		12	10	22
57	24C35A6604	LAKKARSU SUNNY	2		3		2	3	10	9	19
58	24C35A6605	MOHAMMAD ARIF AHMED			4	4		3	11	10	21
59	24C35A6606	NARUGULA SAI CHANDANA	3		3	4	2		12	8	20

23. Result analysis for internal Exams (tests) with respect toCOs-POs

Q.No.	Answer any two questions.	Marks	Level of Bloom Taxonomy	CO	
1	Explain the Historical Perspective of data base System. Difference Between Data base and File system	5	Understand	CO1	

2	What is key? Explain various Types of keys in Relational model? Draw the ER-Diagram for Library Management System?	5	Understand	CO1
3	What is TRC,DRC ? Explain the Levels of Abstarction with neat diagram	5	Understand	CO2

Sl. No.	H.T. No	Marks Awarded			Part - B (Theory)	Part - A (Quiz)	Part - A + B	Unit Test - 1	Assessment	Grand Total
		Q1.	Q2.	Q3						
1	23C31A6601	5		5	10	10	**20**	5	**4**	**29**
2	23C31A6602	5		4	9	10	**19**	5	**4**	**28**
3	23C31A6603	5		5	10	10	**20**	5	**4**	**29**
4	23C31A6604	5	5	5	10	9	**19**	5	**5**	**29**
5	23C31A6605	5		5	10	10	**20**	5	**4**	**29**
6	23C31A6606	3		5	8	10	**18**	5	**4**	**27**
7	23C31A6607	5		5	10	9	**19**	5	**4**	**28**
8	23C31A6608	4		4	8	9	**17**	5	**4**	**26**
9	23C31A6609	5		5	10	10	**20**	5	**4**	**29**
10	23C31A6610	4		4	8	10	**18**	5	**4**	**27**
11	23C31A6611	4		2	6	10	**16**	5	**3**	**24**
12	23C31A6612	5		5	10	10	**20**	5	**4**	**29**
13	23C31A6613	4		3	7	9	**16**	5	**3**	**24**
14	23C31A6614			4	4	10	**14**	5	**4**	**23**
15	23C31A6615	4		4	**8**	**9**	**17**	5	**3**	**25**
16	23C31A6616	1		1	2	9	**11**	5	**4**	**20**
17	23C31A6617	5		5	10	10	**20**	5	**4**	**29**
18	23C31A6618	5		4	9	9	18	5	**4**	**27**
19	23C31A6619	3	4	4	**8**	**9**	**17**	5	**4**	**26**
20	23C31A6620	2			2	10	**12**	5	**4**	**21**
21	23C31A6621	ABSENT						5	**3**	**8**
22	23C31A6622	2			2	10	**12**	5	**4**	**21**
23	23C31A6623	2	2		**4**	**10**	**14**	5	**4**	**23**
24	23C31A6624	5		5	10	10	**20**	5	**4**	**29**
25	23C31A6625	5		5	10	10	**20**	5	4	**29**
26	23C31A6626	4		5	9	10	**19**	5	4	**29**
27	23C31A6627	5		5	10	10	**20**	5	4	**29**
28	23C31A6628					9	**9**	5	3	**17**
29	23C31A6629			4	4	9	**13**	5	4	**22**
30	23C31A6630	4		4	**8**	**9**	**17**	5	4	**26**
31	23C31A6631	5		5	10	10	**20**	5	4	**29**
32	23C31A6632	1		4	5	9	**14**	5	3	**22**
33	23C31A6633	3		3	6	10	**16**	5	4	**25**
34	23C31A6634	5		5	**10**	**9**	**19**	5	5	**24**
35	23C31A6635	5		4	9	10	**19**	5	3	**26**

36	23C31A6636	5		5	10	10	**20**	5	4	**29**
37	23C31A6637	4		4	8	9	**17**	5	4	**26**
38	23C31A6638	2	2		4	10	**14**	5	4	**23**
39	23C31A6639	4		2	6	9	**15**	5	4	**24**
40	23C31A6640	4			4	9	**13**	5	3	**21**
41	23C31A6642	5			5	9	**14**	5	4	**23**
42	23C31A6643	3		3	6	10	**16**	5	3	**23**
43	23C31A6644	4		5	9	9	**18**	5	4	**27**
44	23C31A6645	5		4	9	10	**19**	5	4	**28**
45	23C31A6646	2		4	6	9	**15**	5	4	**24**
46	23C31A6647			4	4	8	**12**	5	3	**20**
47	23C31A6648	3	3		6	9	**15**	5	4	**24**
48	23C31A6649	1		2	3	9	**12**	5	4	**16**
49	23C31A6650	5		5	10	10	**20**	5	**4**	**29**
50	23C31A6651	5		5	10	10	**20**	5	**4**	**29**
51	23C31A6652	2		3	5	9	**14**	5	**4**	**23**
52	23C31A6653	5		5	10	10	20	5	**5**	**30**
53	23C31A6654	2		3	5	10	**14**	5	**4**	**24**
54	23C31A6655	4		5	9	10	**19**	5	**4**	**28**
55	24C35A6602	4		4	8	10	**18**	5	**3**	**21**
56	24C35A6603	5		5	10	10	**20**	5	**4**	**29**
57	24C35A6604	4		3	7	10	**17**	5	**4**	**26**
58	24C35A6605	5		4	9	10	**19**	5	**4**	**28**
59	24C35A6606	5		4	9	9	**18**	5	**4**	**27**
60	23C31A6601	5		5	10	9	**19**	5	**4**	**28**
61	23C31A6602	5	4		9	10	**19**	5	4	28
62	23C31A6603	5		4	9	10	**19**	5	**5**	**24**
63	23C31A6604	5		4	9	10	**19**	5	**4**	**23**
64	23C31A6605	4		4	8	10	**18**	5	**4**	**27**
65	23C31A6606	3		3	6	10	16	5	**3**	**24**
66	23C31A6607	ABSENT						0	**0**	**0**
67	23C31A6608	5		4	9	10	19	5	**4**	**28**
68	23C31A6609	3		3	8	10	18	5	**3**	**24**
69	23C31A6610	2		3	5	10	15	5	**4**	**24**

25 .CO and PO attainment sheet

ASSES 'ENT OF COs FOR THE COURSE

COs	Method	value	CO Attainment	Assignments	CO Attainment (Internal - Theory)	CO Attainment (End Exam)	Overall CO Attainment
CO1	M1 Q1	3.0	3.0	3.0	3.0	3.00	3.00
	M1 Q5	3.0					
CO2	M1 Q2	3.0	3.0				
	M1 Q6	3.0					
CO3	M1 Q3	3.0	3.0				
	M1 Q7	3.0					
	M2 Q1	3.0					
	M2 Q4	3.0					
CO4	M2 Q2	3.0	3.0				
	M2 Q5	3.0					
CO5	M2 Q3	3.0	3.0				
	M2 Q6	3.0					

26. REFERENCES, JOURNALS, WEBSITES AND E-LINKS IF ANY

1. Official Documentation and Tutorials

- **MySQL Documentation**
  - MySQL is one of the most popular relational database management systems, and its documentation provides a deep dive into database concepts, SQL syntax, and optimization techniques.
  - MySQL Documentation
- **PostgreSQL Documentation**
  - PostgreSQL is an advanced open-source relational database. The official documentation covers installation, configuration, and advanced features like indexing and optimization.
  - PostgreSQL Documentation
- **Oracle Database Documentation**
  - Oracle is one of the leading DBMS providers. This documentation offers a deep dive into database management, SQL, PL/SQL, and various Oracle database tools.
  - Oracle Database Documentation

2. Journals and Publications

- **ACM Transactions on Database Systems (TODS)**
  - A highly respected journal that publishes research on database theory, systems, and applications.
  - ACM TODS
- **IEEE Transactions on Knowledge and Data Engineering (TKDE)**
  - An academic journal covering data engineering, database systems, data mining, and other related topics.
  - IEEE TKDE
- **Journal of Database Management (JDM)**
  - A peer-reviewed journal that provides valuable articles on database theory, management, and applications.
  - Journal of Database Management

3. Websites and Online Resources

- **TutorialsPoint DBMS Tutorials**
  - Provides tutorials on database concepts, SQL, normalization, transactions, and more.
  - TutorialsPoint DBMS
- **GeeksforGeeks DBMS**
  - A platform for well-organized tutorials on DBMS concepts like ER modeling, normalization, and SQL queries.
  - GeeksforGeeks DBMS
- **W3Schools SQL Tutorial**
  - A popular resource for learning SQL with simple, interactive tutorials.
  - W3Schools SQL Tutorial
- **Stack Overflow**
  - A community-driven platform for troubleshooting DBMS-related issues and getting answers to questions on SQL, normalization, and database design.

- Stack Overflow DBMS Tag
- **Database Journal**
  - Offers articles, tutorials, and resources related to various DBMS technologies like SQL Server, Oracle, MySQL, and PostgreSQL.

4. E-links and Online Courses

- **Coursera - Databases and SQL for Data Science with Python**
  - A beginner-friendly course by IBM that covers the fundamentals of databases, SQL, and data science.
  - Coursera - Databases and SQL for Data Science
- **edX - Introduction to Databases (Stanford University)**
  - A high-level academic course covering database modeling, SQL, and data structures.
  - edX - Introduction to Databases
- **Udemy - The Complete SQL Bootcamp**
  - A comprehensive SQL course for learning SQL from basics to advanced topics, covering various DBMS.
  - Udemy - The Complete SQL Bootcamp

5. Books on DBMS

- **Database System Concepts (by Abraham Silberschatz, Henry F. Korth, S. Sudarshan)**
  - A classic textbook widely used in academic courses, covering fundamental database concepts, theory, and practical DBMS operations.

6. Tools and Software for DBMS Practice

- **MySQL**
  - One of the most popular open-source relational DBMS, MySQL provides powerful features for data storage and management.
  - MySQL