A. Course Handout (Version 1.1)

Institute/School Name	Chitkara University Institute of Engineering and Technology		
Department Name	Department of Computer Science & Engineering		
Programme Name	Bachelor of Engineering (B.E.), Computer Science & Engineering		
Course Name	Database Management System	Session	2024-2025
Course Code	22CS007	Semester/Batch	3rd /2023
L-T-P (Per Week)	3-0-2	Course Credits	04
Course Coordinator	Dr. Shikha		

CLO01	To provide a comprehensive foundation for designing and implementing database system by using RDBMS and analyse its need for real life applications.
CLO02	To enable the students to participate in the development process by implementing SQL commands and be able to describe relational algebraic expression from queries.
CLO03	To recognize and identify the use of normalization and functional dependency used in database design.
CLO04	To apply and relate the concept of transaction, concurrency control, security and recovery in database.
CLO05	To provide knowledge about the concepts of sequence, triggers, cursor, function, procedure, package.

1. Objectives of the Course

The course provides a wide scope of learning & understanding of the subject and the main objectives of the course are:

- To provide a comprehensive foundation for designing and implementing database system by using relational database management systems and analyze its need for real life applications.
- To enable the students to participate in the development process by implementing SQL commands and be able to describe relational algebraic expression from queries.
- To recognize and identify the use of normalization and functional dependency used in database design.
- To apply and relate the concept of transaction, concurrency control, security, and recovery in database.
- To provide knowledge about the concepts of sequence, triggers, cursor, function, procedure, package.

2. Course Learning Outcomes

After completion of the course, the student should be able to:

	Course Outcome	POs	CL	KC	Sessions
CLO01	To provide a comprehensive foundation for designing and implementing database system by using RDBMS and analyse its need for real life applications.	PO2, PO3, PO11, PO12	K2	Factual Conceptual	**16**
CLO02	To enable the students to participate in the development process by implementing SQL commands and be able to describe relational algebraic expression from queries.	PO2, PO3, PO4, PO12	K3	Procedural Conceptual	**20**

CLO03	To recognize and identify the use of normalization and functional dependency used in database design.	PO1, PO2, PO3, PO12	K3	Conceptual Procedural	**14**
CLO04	To apply and relate the concept of transaction, concurrency control, security and recovery in database.	PO3, PO5, PO12	K3	Conceptual Procedural	**14**
CLO05	To provide knowledge about the concepts of sequence, triggers, cursor, function, procedure, package.	PO1, PO2, PO3, PO10, PO11, PO12	K3	Conceptual Procedural	**16**

Revised Bloom's Taxonomy Terminology

* PO's available at (shorturl.at/cryzF)

**Cognitive Level =CL

***Knowledge Categories = KC

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**		**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CLO01		M	H									H	M
CLO02		M	H	M									M
CLO03	M	M	M										M
CLO04			H			H							H
CLO05	M	M	H								H	H	M

H=High, M=Medium, L=Low

3. ERISE Grid Mapping

Feature Enablement	**Level (1-5, 5 being highest)**
Entrepreneurship	3
Research	4
Innovation	3
Skills	5
Employability	5

4. Recommended Books:

B01: Database System Concepts', Abraham Silberschatz, Henry F. Korth, Sudharsan, McGraw-Hill, Seventh Edition.

B02: 'An Introduction to Database Systems', C.J.Date , O'Reilly Media, Eighth Edition.

B03: 'Database Systems', Ramez.Z.Elmasri, Shamkant B.Navathe, Pearson Education, Seventh Edition.

B04: DBMS: A Simplified Approach by Parteek Bhatia

B05: Efficient MySQL Performance: Best Practices and Techniques 1st Edition by Daniel Nichter (Author)

B06: Querying MySQL: Make your MySQL database analytics accessible with SQL operations, data extraction, and custom queries Paperback – 29 July 2022 by Adam Aspin (Author)

5. Other readings and relevant websites:

Serial No	Link of Journals, Magazines, websites and Research Papers
1.	https://www.javatpoint.com/dbms-tutorial
2.	https://link.springer.com/chapter/10.1007/978-1-349-11552-5_1
3.	https://nptel.ac.in/courses/106/106/106106093/
4.	https://www.w3schools.com/MySQL/default.asp
5.	https://dl.acm.org/doi/pdf/10.5555/77708

6. Recommended Tools and Platforms

MySQL Installer 8.0.38

7. Course Plan:

Lecture Number	Topics	Text Book
1-2	Overview of Database, Database Management System (DBMS), DBMS Architecture, Data Independence, Integrity Constraints	B01-Chpater-1
3-4	Data Models, ER (Entity Relationship) Diagram	B01-Chapter-6
5-6	Functional Dependencies, Introduction of Normalization and its Importance, Data Redundancy, and Update Anomalies	B01-Chapter-7 B02-Chapter-11
7-8	Normal Forms (1NF, 2NF, 3NF & BCNF), De-Normalization	B01-Chapter-7 B02-Chapter-12
9-10	Introduction to SQL, SQL Commands, Datatypes, and DDL statements (create, alter, drop, and truncate)	B01-Chapter-3 B04-Chapter-8
11-12	Implementing Constraints (primary key, foreign key, unique, not null, default, check)	B01-Chapter-2
13-14	DML Statements (insert, update, delete), Simple queries WHERE Clause, Compound WHERE Clause with multiple AND & OR Conditions Joins	B05-Chapter-5 B04-Chapter-8
15-16	Sub-queries - Simple & Correlated Using IN, EXISTS, NOT EXISTS	B05-Chapter-6 B04-Chapter-8
17-18	DCL statement Grant, Revoke, Group by clause, having clause	B05-Chapter-7 B04-Chapter-8
19-20	Views, Benefits of views, creating views, alter views and drop views	B04-Chapter-8
21-22	Joins (inner join, outer join, cross join, self-join), write complex queries using joins	B04-Chapter-8
23-24	Introduction to Stored Programs in MySQL, Advantages of Stored programs.	B04-Chapter-8
25-26	Variables, Data types in MySQL	B06-Chapter-1
27-28	Control Structure in Stored program (if-else, switch case)	B06-Chapter-4
29-30	Control Structure in Stored program (while loop, for loop)	B06-Chapter-5
31-32	Introduction to cursors, types of cursors, advantages and disadvantages of cursors in MySQL	B06-Chapter-5
33-34	Introduction to procedure, creating procedure and calling procedure, parameter modes	B06-Chapter-5
35-34	Introduction to Triggers, types of triggers, Syntax for Creating Triggers.	B06-Chapter-19
41-42	Transaction: introduction, TCL commands (commit, rollback, save point), ACID properties	B01-Chapter-17

43-44	Concurrent Transactions: Concurrency control, need for concurrency control, Locking Techniques	B01-Chapter-17 B01-Chapter-18
45-46	Database Recovery: Introduction, Need for Recovery, Types of Errors Recovery Techniques	B01-Chapter-19
47-48	Database security: introduction, threats, counter measures	B02-Chapter-17

8. Delivery/Instructional Resources

Lecture No.	Topics	Web References	Audio-Video
1-2	Overview of Database, Database Management System (DBMS), DBMS Architecture, Data Independence, Integrity Constraints	https://parteekbhatia.com/wp-content/uploads/2021/02/Chapter-1-1.pdf	https://www.youtube.com/watch?v=DTN78zxMs-I&list=PLVCEF4zOWjkhPA1jIOk1PcC_DejxQFTcL&index=1&pp=iAQB
3-4	Data Models, ER (Entity Relationship) Diagram	https://www.javatpoint.com/dbms-er-model-concept	https://www.youtube.com/watch?v=LIKeqPQNCjo&list=PLVCEF4zOWjkhPA1jIOk1PcC_DejxQFTcL&index=19&pp=iAQB
5-6	Functional Dependencies, Introduction of Normalization and its Importance, Data Redundancy, and Update Anomalies	https://www.javatpoint.com/dbms-functional-dependency	https://www.youtube.com/watch?v=7YEP0z0v508&list=PLVCEF4zOWjkhPA1jIOk1PcC_DejxQFTcL&index=38&pp=iAQB
7-8	Normal Forms (1NF, 2NF, 3NF & BCNF), De-Normalization	https://www.javatpoint.com/dbms-normalization	https://www.youtube.com/watch?v=bSUiOqf7rtM&list=PLVCEF4zOWjkhPA1jIOk1PcC_DejxQFTcL&index=36&pp=iAQB
9-10	Introduction to SQL, SQL Commands, Datatypes, and DDL statements (create, alter, drop, and truncate)	https://www.geeksforgeeks.org/sql-tutorial/	https://www.youtube.com/watch?v=H4Kwa2083m4&list=PLVCEF4zOWjkhvC5xsSRiyS_VeOvw78eCJ&index=1&pp=iAQB
11-12	Implementing Constraints (primary key, foreign key, unique, not null, default, check)	https://www.javatpoint.com/dbms-keys	https://www.youtube.com/watch?v=IKeSsa3aGuY&list=PLVCEF4zOWjkhPA1jIOk1PcC_DejxQFTcL&index=35&pp=iAQB
13-14	DML Statements (insert, update, delete), Simple queries WHERE Clause, Compound WHERE Clause with multiple AND & OR Conditions Joins,	https://www.javatpoint.com/mysql-where	https://www.youtube.com/watch?v=vs04JXcRwkY
15-16	Sub-queries - Simple & Correlated Using IN, EXISTS, NOT EXISTS	https://www.javatpoint.com/mysql-subquery	https://www.youtube.com/watch?v=JksrTuEVEPk
17-18	DCL statement Grant, Revoke, Group by clause, having clause	https://www.javatpoint.com/dcl-commands-in-sql	https://www.youtube.com/watch?v=kx6m8ABU4ZE
19-20	Views, Benefits of views, creating views, alter views and drop views	https://www.javatpoint.com/mysql-view	https://www.youtube.com/watch?v=SYGe92NgAQY

21-22	Joins (inner join, outer join, cross join, self-join), write complex queries using joins	https://www.javatpoint.com/mysql-join	https://www.youtube.com/watch?v=xUJnewKRI_g&list=PLVCEF4zOWjkhvC5xsSRiyS_VeOvw78eCJ&index=14&pp=iAQB
23-24	Introduction to Store programs in MySql, Advantages of Stored program.	https://dev.mysql.com/doc/dev/mysql-server/latest/stored_programs.html	https://www.c-sharpcorner.com/article/ plsql-for-beginners/
25-26	Variables, Data types in MySql.	https://dev.mysql.com/doc/refman/8.4/en/data-types.html	https://www.c-sharpcorner.com/article/ plsql-for-beginners/
27-28	Control Structure in Stored program (if-else, switch case)	https://dev.mysql.com/doc/refman/8.4/en/flow-control-statements.html	https://www.c-sharpcorner.com/article/ plsql-for-beginners/
29-30	Control Structure in Stored program (while loop, for loop)	https://www.geeksforgeeks.org/loops-in-mysql/	https://www.youtube.com/watch?v=trEF3DKcYB4
31-32	Introduction to cursors, types of cursors, advantages and disadvantages of cursors	https://dev.mysql.com/doc/refman/8.4/en/cursors.html	https://www.c-sharpcorner.com/article/ plsql-for-beginners/
33-34	Introduction to procedure, creating procedure and calling procedure, parameter modes	https://www.geeksforgeeks.org/different-types-of-procedures-in-mysql/	https://www.c-sharpcorner.com/article/ plsql-for-beginners/
35-40	Introduction to Triggers, types of triggers, Syntax for Creating Triggers.	https://www.geeksforgeeks.org/different-types-of-mysql-triggers-with-examples/	https://www.youtube.com/watch?v=jVbj72YO-8s
41-42	Transaction: introduction, TCL commands (commit, rollback, save point), ACID properties	https://www.javatpoint.com/dbms-transaction-processing-concept	https://www.youtube.com/watch?v=971pR8iWjPM&list=PLVCEF4zOWjkhPA1jIOk1PcCDejxQFTcL&index=47&pp=iAQB
43-44	Concurrent Transactions: Concurrency control, need for concurrency control, Locking Techniques	https://www.javatpoint.com/dbms-concurrency-control	https://onlinecourses.nptel.ac.in/noc21_cs04/previ ew
45-46	Database Recovery: Introduction, Need for Recovery, Types of Errors Recovery Techniques	https://www.javatpoint.com/dbms-log-based-recovery	https://nptel.ac.in/courses/106104135
47-48	Database security: introduction, threats, counter measures	https://www.javatpoint.com/database-security	https://www.digimat.in/nptel/courses/video/106105175/L01.html

9. Lab Plan

Sr. No.	Lab Number	Experiments	Learning Resource
1	1-2	Lab 1 (Introduction to the software)	https://www.geeksforgeeks.org/php-mysql-database-introduction/
2	3-4	Lab 2 (Installation of software for DBMS)	https://www.mysql.com/downloads/
3	5-6	Lab 3 (Creating Tables, Alter the table and drop tables)	https://www.javatpoint.com/mysql-create-table

4	7-8	Lab 4 (Appy constraints on the new or existing table)	https://www.javatpoint.com/mysql-constraints
5	9-10	Lab 5 (Perform DML operations on tables, select query to fetch records from tables)	https://www.javatpoint.com/mysql-select
6	11-12	Lab 6 (Implement Aggregate Function, Nested & Correlated Queries)	https://www.javatpoint.com/mysql-aggregate-functions
7	13-14	Lab 7 (Write queries using views)	https://www.javatpoint.com/mysql-create-table
8	15-16	Lab 8 (Write queries using joins)	https://www.javatpoint.com/mysql-join
9	17-18	Lab 9 (Write a simple Stored program program using if-else statement)	https://dev.mysql.com/doc/refman/8.4/en/flow-control-statements.html
10	19-20	Lab 10 (Write a Stored program using for and while loop)	https://www.geeksforgeeks.org/loops-in-mysql/
11	21-22	Lab 11 (Create a procedure using cursor)	https://dev.mysql.com/doc/refman/8.4/en/cursors.html
12	23-24	Lab 12 (Perform operations using triggers)	https://www.geeksforgeeks.org/different-types-of-mysql-triggers-with-examples/
13	29-30	Lab 13 (Learn Locking Techniques)	https://www.javatpoint.com/dbms-lock-based-protocol
14	31-32	Lab 14 (Learn to recover database)	https://www.studytonight.com/dbms/t cl-command.php

10. Action plan for different types of learners

Slow Learners	Average Learners	Fast Learners
• Remedial Classes on Saturdays • Encouragement for improvement using Peer Tutoring • Use of Audio and Visual Materials • Use of Real-Life Examples	• Workshops • Formative Exercises used to highlight concepts and notions • E-notes and E-exercises to read ahead of the pedagogic material.	• Engaging students to hold hands of slow learners by creating a Peer Tutoring Group • Design solutions for complex problems • Design solutions for complex problems • Presentation on topics beyond those covered in CHO

11. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment
Component 2	Sessional Test	03*	40%	Online
Component 3	End Term Examinations	01**	60%	Online
Total		**100%**		

* Students will have to appear in all Sessional Tests.
Makeup Examination will compensate for either ST-1 or ST-2 (Only for genuine cases, based on the Dean's approval).

**As per Academic Guidelines, a minimum of 75% attendance is required to become eligible for appearing in the End Semester Examination.

12. Syllabus of the Course:

S.No.	Topic (s)	No. of Sessions	Weightage %
1	**Overview of Database**, Database Management System (DBMS), DBMS Architecture, Data Independence, Integrity Constraints, **Data Models**, ER (Entity Relationship) Diagram, **Functional Dependencies**, Introduction of Normalization and its Importance, Data Redundancy, and Update Anomalies **Normal Forms** (1NF, 2NF, 3NF & BCNF), De-Normalization**, Introduction to SQL**, SQL Commands, Datatypes, and DDL statements (create, alter, drop, and truncate), **Implementing Constraints** (primary key, foreign key, unique, not null, default, check), **DML Statements** (insert, update, delete), Simple queries WHERE Clause, Compound WHERE Clause with multiple AND & OR Conditions Joins **Lab 1** (Introduction to the software) **Lab 2** (Installation of software for DBMS), **Lab 3** (Creating Tables, Alter the table and drop tables) **Lab 4** (Appy constraints on the new or existing table) **Lab 5** (Perform DML operations on tables, select query to fetch records from tables)	**24**	**30%**
Sessional Test-1			
2	**Overview of Database**, Database Management System (DBMS), DBMS Architecture, Data Independence, Integrity Constraints, **Data Models**, ER (Entity Relationship) Diagram, **Functional Dependencies**, Introduction of Normalization and its Importance, Data Redundancy, and Update Anomalies **Normal Forms** (1NF, 2NF, 3NF & BCNF), De-Normalization**, Introduction to SQL**, SQL Commands, Datatypes, and DDL statements (create, alter, drop, and truncate), **Implementing Constraints** (primary key, foreign key, unique, not null, default, check), **DML Statements** (insert, update, delete), Simple queries WHERE Clause, Compound WHERE Clause with multiple AND & OR Conditions Joins **Sub-queries** - Simple & Correlated Using IN, EXISTS, NOT EXISTS **DCL statement** Grant, Revoke, Group by clause, having clause **Views**, Benefits of views, creating views, alter views and drop views, **Joins** (inner join, outer join, cross join, self-join), write complex queries using joins, **Introduction to Store programs** in MySql, Advantages of Stored program **Variables**, Data types in MySql. Control Structure in Stored program (**if-else, switch case**), Control Structure in Stored program (**while loop, for loop**) **Lab 1** (Introduction to the software) **Lab 2** (Installation of software for DBMS), **Lab 3** (Creating Tables, Alter the table and drop tables) **Lab 4** (Appy constraints on the new or existing table) **Lab 5** (Perform DML operations on tables, select query to fetch records from tables) **Lab 6** (Implement Aggregate Function, Nested & Correlated Queries) **Lab 7** (Write queries using views) **Lab 8** (Write queries using joins) **Lab 9** (Write a simple Stored program using if-else statement)	**48**	**60%**
Sessional Test -2 (ST1 syllabus also included)			
3	**Overview of Database**, Database Management System (DBMS), DBMS Architecture, Data Independence, Integrity Constraints, **Data Models**, ER (Entity Relationship) Diagram, **Functional Dependencies**, Introduction of Normalization and its Importance, Data Redundancy, and Update Anomalies **Normal Forms** (1NF, 2NF, 3NF & BCNF), De-Normalization**, Introduction to SQL**, SQL Commands, Datatypes, and DDL statements (create, alter, drop, and truncate), **Implementing Constraints** (primary key, foreign key, unique, not null,	**64**	**80%**

	default, check), **DML Statements** (insert, update, delete), Simple queries WHERE Clause, Compound WHERE Clause with multiple AND & OR Conditions Joins **Sub-queries** - Simple & Correlated Using IN, EXISTS, NOT EXISTS **DCL statement** Grant, Revoke, Group by clause, having clause **Views**, Benefits of views, creating views, alter views and drop views, **Joins** (inner join, outer join, cross join, self-join), write complex queries using joins, **Introduction to Store programs** in MySql, Advantages of Stored program **Variables**, Data types in MySql. Control Structure in Stored program (**if-else, switch case**), Control Structure in Stored program (**while loop, for loop**) **Introduction to cursors**, types of cursors, advantages and disadvantages of cursors, **Introduction to procedure**, creating procedure and calling procedure, parameter modes, **Introduction to Triggers**, types of triggers, Syntax for Creating Triggers. **Lab 1** (Introduction to the software) **Lab 2** (Installation of software for DBMS), **Lab 3** (Creating Tables, Alter the table and drop tables) **Lab 4** (Appy constraints on the new or existing table) **Lab 5** (Perform DML operations on tables, select query to fetch records from tables) **Lab 6** (Implement Aggregate Function, Nested & Correlated Queries) **Lab 7** (Write queries using views) **Lab 8** (Write queries using joins) **Lab 9** (Write a simple Stored program using if-else statement) **Lab 10** (Write a Stored program using for and while loop) **Lab 11** (Create a procedure using cursor) **Lab 12** (Perform operations using triggers)		
Sessional Test-3 (ST1 and ST2 syllabus also include)			
4	**Overview of Database**, Database Management System (DBMS), DBMS Architecture, Data Independence, Integrity Constraints, **Data Models**, ER (Entity Relationship) Diagram, **Functional Dependencies**, Introduction of Normalization and its Importance, Data Redundancy, and Update Anomalies **Normal Forms** (1NF, 2NF, 3NF & BCNF), De-Normalization**, Introduction to SQL**, SQL Commands, Datatypes, and DDL statements (create, alter, drop, and truncate), **Implementing Constraints** (primary key, foreign key, unique, not null, default, check), **DML Statements** (insert, update, delete), Simple queries WHERE Clause, Compound WHERE Clause with multiple AND & OR Conditions Joins **Sub-queries** - Simple & Correlated Using IN, EXISTS, NOT EXISTS **DCL statement** Grant, Revoke, Group by clause, having clause **Views**, Benefits of views, creating views, alter views and drop views, **Joins** (inner join, outer join, cross join, self-join), write complex queries using joins, **Introduction to Store programs** in MySql, Advantages of Stored program **Variables**, Data types in MySql. Control Structure in Stored program (**if-else, switch case**), Control Structure in Stored program (**while loop, for loop**) **Introduction to cursors**, types of cursors, advantages and disadvantages of cursors, **Introduction to procedure**, creating procedure and calling procedure, parameter modes, **Introduction to Triggers**, types of triggers, Syntax for Creating Triggers. **Transaction**: Introduction, TCL commands (commit, rollback, save point), ACID properties, **Concurrent Transactions**: Concurrency control, need for concurrency control, Locking Techniques. **Database Recovery**: Introduction, Need for Recovery, Types of Errors Recovery Techniques. **Database security**: introduction, threats, counter measures **Lab 1** (Introduction to the software) **Lab 2** (Installation of software for DBMS), **Lab 3** (Creating Tables, Alter the table and drop tables)	**80**	**100%**

	Lab 4 (Appy constraints on the new or existing table) **Lab 5** (Perform DML operations on tables, select query to fetch records from tables) **Lab 6** (Implement Aggregate Function, Nested & Correlated Queries) **Lab 7** (Write queries using views) **Lab 8** (Write queries using joins) **Lab 9** (Write a simple Stored program using if-else statement) **Lab 10** (Write a Stored program using for and while loop) **Lab 11** (Create a procedure using cursor) **Lab 12** (Perform operations using triggers) **Lab 13** (Learn Locking Techniques) **Lab 14** (Learn to recover database)		
End Term Examination (ETE-Complete Syllabus)			

This Document is approved by:

Designation	**Name**	**Signature**
Course Coordinator	Dr. Shikha	
Head-Academic Delivery	Dr. Mrinal Paliwal	
Dean	Dr. Rishu Chhabra	
Dean Academics	Dr. Monit Kapoor	
Date	26.06.2024	