<table>
<tr><td colspan="5">Devi Ahilya Vishwavidhyalaya, Indore, India
Institute of Engineering & Technology</td><td colspan="2">II Year B.Tech.
(Computer Science & Engineering)</td></tr>
<tr><td>Course Code & Name</td><td colspan="6">Instructions Hours per Semester and Credits</td></tr>
<tr><td rowspan="2">4RCPC3

DATABASE MANAGEMENT SYSTEMS</td><td colspan="2">Classroom Instruction (CI)</td><td>Lab Instruction (LI)</td><td>Term Work (TW) and Self Learning (SL)</td><td>Total no. of Hours Per semester</td><td>Total Credits (Total Hours/30)</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>TW+SL</td><td rowspan="2">120</td><td rowspan="2">4</td></tr>
<tr><td>30</td><td>10</td><td>20</td><td>60</td></tr>
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Course Learning Objectives:

- Provide a strong foundation in database concepts and architectures
- Enable students to design databases using ER and relational models
- Develop proficiency in SQL for database manipulation
- Apply normalization principles to achieve efficient database design
- Introduce transaction management, concurrency, and recovery concepts
- Expose students to modern database trends and applications.

Prerequisites:
Knowledge of programming fundamentals, basic data structures, and elementary discrete mathematics is required. Familiarity with file systems and introductory operating system concepts is desirable.

COURSE CONTENTS

Unit-I
Introduction to Database Systems: Database concepts and characteristics, File system vs DBMS, Data abstraction and data independence, Database users and DBA, DBMS architecture (1-tier, 2-tier, 3-tier), Data models and applications.

Unit-II
ER Modeling: Database concepts and characteristics, File system vs DBMS, Data abstraction and data independence, Database users and DBA, DBMS architecture (1-tier, 2-tier, 3-tier), Data models and applications.

Unit-III
Relational Model and SQL: Relational model concepts, Integrity constraints, Relational algebra (basic operations), SQL: DDL, DML, DCL, TCL; Joins and subqueries, Views and indexes, Stored procedures and triggers (introductory).

Unit-IV
Database Design & Normalization: Database design process, Functional dependencies, Normal forms: 1NF, 2NF, 3NF, BCNF, Lossless decomposition, Dependency preservation.

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Unit-V

Transaction Management & Advanced DBMS: Transactions and ACID properties, Concurrency control techniques, Deadlocks, Recovery techniques, Introduction to NoSQL and distributed databases, Data warehousing basics.

Course Outcomes:

CO.No.	CO
CO1	Explain concepts, architecture, and applications of database systems
CO2	Design ER diagrams and convert them into relational schemas
CO3	Write and execute SQL queries for database operations
CO4	Apply normalization techniques to design efficient databases
CO5	Analyze transaction processing, concurrency control, and recovery mechanisms and develop a database-driven application using a DBMS tool

Books Recommended:

[1] Database System Concepts by Silberschatz, Korth, and Sudarshan (7th Edition)
[2] Fundamentals of Database Systems by Elmasri and Navathe (7th Edition)
[3] Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke (3rd Edition)
[4] SQL: The Complete Reference by James R. Groff and Paul N. Weinberg
[5] An Introduction to Database Systems by C.J. Date (8th Edition)

CO-PO-PSO Relationship

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
4RCPC3.CO1	3	2	-	-	1	-	-	-	-	1	2	2	1	1
4RCPC3.CO2	2	3	3	-	2	-	-	-	1	-	1	-	-	1
4RCPC3.CO3	2	3	2	-	3	-	-	-	-	1	1	2	1	2
4RCPC3.CO4	2	3	3	2	2	-	-	-	-	-	1	1	-	-
4RCPC3.CO5	2	3	3	3	3	-	-	-	2	2	2	3	3	3

List of Laboratory Experiments

1. SQL commands (DDL & DML)
2. Constraints and joins
3. Subqueries and views
4. Stored procedures and triggers
5. ER diagram design
6. Normalization problems
7. Transaction control commands
8. Mini-project using a real-world dataset