



DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE
(AUTONOMOUS)

(Approved by AICTE & Affiliated to Anna University, Chennai)

Re-Accredited by NAAC with 'A' Grade

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PERAMBALUR-621212, TAMILNADU, INDIA.

Website: www.dsengg.ac.in



COURSE PLAN (2025 – 2026 ODD Semesters)

Name of the Faculty				
Designation/Department				
Course Code/Name	U23ITT33 /Database Management Systems			
Year/Section/Department	II /C/IT			
Credits Details	L: 3	T: 0	P: 0	C:3
Total Contact Hours Required	45			

Syllabus:

UNIT I - RELATIONAL DATABASES	No. of Periods: 9
Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL	
UNIT II - DATABASE DESIGN	No. of Periods: 9
Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form	
UNIT III - TRANSACTIONS	No. of Periods: 9
Transaction Concepts – ACID Properties – Schedules – Serializability – Transaction support in SQL – Need for Concurrency – Concurrency control –Two Phase Locking- Timestamp – Multi version – Validation and Snapshot isolation– Multiple Granularity locking – Deadlock Handling – Recovery Concepts – Recovery based on deferred and immediate update – Shadow paging	
UNIT IV - IMPLEMENTATION TECHNIQUES	No. of Periods: 9
RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for Selection, Sorting and join operations.	
UNIT V - ADVANCED TOPICS	No. of Periods: 9
Distributed Databases: Architecture, Data Storage, Transaction Processing, Query processing and optimization – NOSQL Databases: Introduction – CAP Theorem – Document Based systems – Key value Stores – Column Based Systems – Graph Databases. Database Security: Security issues – Access control based on privileges – Role Based access control.	
TOTAL: 45 PERIODS	

Objectives:

1. To learn the fundamentals of data models, relational algebra and SQL
2. To represent a database system using ER diagrams and to learn normalization techniques
3. To understand the fundamental concepts of transaction, concurrency and recovery processing
4. To understand the internal storage structures using different file and indexing techniques which will help in physical DB design
5. To have an introductory knowledge about the Distributed databases, NOSQL and database security
6. To implement important commands and SQL Queries and the usage of nested and joint queries

Text Book:

- T1:** Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Seventh Edition, McGraw Hill, 2020.
- T2:** Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Seventh Edition, Pearson Education, 2017.

Reference Book:

- R1:** C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

Website:

- W1:** https://www.geeksforgeeks.org/introduction-of-relational-algebra-in-dbms/#google_vignette
- W2:** <https://cse.poriyaan.in/topic/validation-and-snapshot-isolation-50886/>
- W3:** <https://www.javatpoint.com/indexing-in-dbms>
- W4:** <https://www.geeksforgeeks.org/sql-query-processing/>

Online Mode of Study:

- W1:** <https://archive.nptel.ac.in/courses/106/105/106105175/>
- W2:** <https://www.coursera.org/courses?query=database%20management>
- W3:** <https://www.udemy.com/topic/database-management/>
- W4:** <https://www.mygreatlearning.com/database-management-system/free-courses>
- W5:** <https://www.edx.org/learn/databases>

Course Plan:

Topic Number	Topic	Reference Detail	Page Number	Mode of teaching	Number of Periods Required	Cumulative Period
UNIT I - RELATIONAL DATABASES						
1	Purpose of Database System – Views of data	T1	5-8	BB	1	1
2	Data Models	T1	10-22	BB	1	2
3	Database System Architecture	T1	21-25	BB	1	3
4	Introduction to	T1	39-42	BB	1	4

	relational databases – Relational Model					
5	Keys	T1	43-45	BB	1	5
6	Relational Algebra	T1/W1	57-63	PPT& Video	1	6
7	SQL fundamentals	T1	63-65	BB	1	7
8	Advanced SQL features - Embedded SQL	T1	65-72	BB	1	8
9	Dynamic SQL	T1	75-78	BB	1	9
Outcome of Unit I:						
At the end of unit, Students should be able to						
<ul style="list-style-type: none"> • Explain the fundamental concepts of relational database and SQL 						
UNIT II - DATABASE DESIGN						
10	Entity-Relationship model – E-R Diagrams	T1	262-274	BB	1	10
11	Enhanced-ER Model	T1	274-283	BB	1	11
12	ER-to-Relational Mapping	T1	295-304	BB& Video	1	12
13	Functional Dependencies	T1	338-348	BB	1	13
14	Non-loss Decomposition – First, Second Normal Forms	T1	327-329	BB	1	14
15	Third Normal Forms, Dependency Preservation	R1	229-238	BB	1	15
16	Boyce/Codd Normal Form	T1	355-360	PPT	1	16
17	Multi-valued Dependencies and Fourth Normal Form	T1	355-360	BB	1	17
18	Join Dependencies and Fifth Normal Form	T1	360-365	BB	1	18
Outcome of Unit II:						
At the end of unit, Students should be able to						
<ul style="list-style-type: none"> • Build the ER model for Relational model mapping to perform database design Effectively 						
UNIT III - TRANSACTIONS						
19	Transaction Concepts – ACID Properties	T1	627-629	BB	1	19
20	Schedules – Serializability	T1	635-641	BB	1	20
21	Transaction support in SQL – Need for Concurrency	T1	641-646	BB	1	21
22	Concurrency control – Two Phase Locking	T1	661-674	BB	1	22
23	Timestamp – Multiversion	T1	620-625	BB	1	23
24	Validation and	T1/W2	679-682	BB	1	24

	Snapshot isolation					
25	Multiple Granularity locking – Deadlock Handling	T1	682-685	PPT& Video	1	25
26	Recovery Concepts – Recovery based on deferred and immediate update	T1	685-691	BB	1	26
27	Shadow paging – ARIES Algorithm	T1	941-945	BB	1	27

Outcome of Unit III:

At the end of unit, Students should be able to

- Summarize the properties of transactions and concurrency control mechanisms.

UNIT IV - IMPLEMENTATION TECHNIQUES

28	RAID	T1	441-449	BB	1	28
29	File Organization – Organization of Records in Files	T1	451-457	BB	1	29
30	Data dictionary Storage – Column Oriented Storage	T1	475-476	BB	1	30
31	Indexing and Hashing – Ordered Indices	T1/W3	485-500	BB	1	31
32	B+ tree Index Files	T1	500-506	BB	1	32
33	B tree Index Files	T2	309-318	BB	1	33
34	Static Hashing – Dynamic Hashing	T1	537-541	PPT & Video	1	34
35	Query Processing Overview.	T1	541-542	BB	1	35
36	Algorithms for Selection, Sorting and join operations	T1	545-546	BB	1	36

Outcome of Unit IV:

At the end of unit, Students should be able to

- Compare and contrast various indexing strategies in different database systems

UNIT V - ADVANCED TOPICS

37	Distributed Databases: Architecture, Data Storage	T1	825-826	BB	1	37
38	Transaction Processing	T1	826-830	PPT & Video	1	38
39	Query processing and optimization	T1/W4	946-949	BB	1	39
40	NOSQL Databases: Introduction – CAP Theorem	T1	963-964	BB	1	40
41	Document Based systems – Key value Stores	T1	964-973	BB	1	41
42	Column Based Systems – Graph Databases	T1	981-990	BB	1	42

43	Database Security: Security issues	T1	998-1008	BB	1	43
44	Access control based on privileges systems.	T1	915-927	BB	1	44
45	Role Based access control	T1	928-935	BB	1	45

Outcome of Unit V:

At the end of unit, Students should be able to

- Extend Distributed Databases
- Explain the different advanced databases.

Course Outcome:

At the end of the course the students would be able to

CO1 : Explain the fundamental concepts of relational database and SQL.

CO2 : Build the ER model for Relational model mapping to perform database design Effectively.

CO3: Summarize the properties of transactions and concurrency control mechanisms.

CO4: Compare and contrast various indexing strategies in different database systems.

CO5: Extend Distributed Databases

CO6: Explain the different advanced databases

Course Outcome Vs Program Outcome Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	1	-	-	2	1
CO 2	3	2	1	1	1	-	-	-	-	1	-	2	2	1
CO 3	2	1	-	-	-	-	-	-	-	1	-	-	2	1
CO 4	2	1	-	-	-	-	-	-	-	1	-	-	2	1
CO 5	2	1	-	-	-	-	-	-	-	1	1	-	2	1
CO 6	2	1	-	-	1	-	-	-	2	1	1	2	2	1
AVG	2	1	1	1	1	-	-	-	2	1	1	2	2	1

Topic beyond Syllabus:

- ❖ JDBC connectivity using databases.
- ❖ Creating Databases
- ❖ Trends in Information Retrieval.
- ❖ Extracting XML Documents from Relational databases.
- ❖ Recursive Relationship in ER Model.

Internal Evaluation Components:

Webportal	Assignment	Components	Topic Number with Topic / Unit Details	Relevance to CO
Webportal 1	--	Assessment – I (60)	Unit I and II	CO 1 & CO2
	1	Assignment – Handwritten (20)	1. Explain DBMS Architecture with an example (Topic No: 3) 2. Explain Relational Databases with examples (Topic No: 4) 3. Explain the different types of keys used in DBMS (Topic No: 5)	CO1
	2	Assignment – Poster Presentation / PPT (20)	1. Explain ER Model with a neat sketch for School Database (Topic No: 11) 2. Explain various functional dependencies of an ER model with an example (Topic No: 13) 3. Explain 1NF, 2NF, 3NF, BCNF, 4NF, 5NF with examples (Topic No: 14 & 15)	CO2
Webportal 2	--	Assessment – II (60)	Unit III and IV	CO3 & CO4
	3	Seminar (20)	1. Extend two phase locking in concurrency control techniques (Topic No: 22) 2. Demonstrate the ACID properties. Explain Transactions with SQL support for a banking application (Topic No: 19) 3. Explain Shadow Paging and ARIES Algorithm (Topic No: 19)	CO3
	4	Case Study Report (20)	Construct a B+ tree for the following set of key values : (2, 3, 5, 7, 11, 17, 19, 23, 29, 31) Assume that the tree is initially empty and values are added in ascending order. Construct B+ trees for the cases where the number of pointers that will fit in one node is as follows : a) Four b) Six c) Eight (Topic No: 32)	CO4

Webportal 3	--	Model Exam (75)	Unit I to V	CO1 to CO6
	5	MCQ (15)	Unit I to V	CO1 to CO6
	-	Course Attendance (10)	--	--

Submission Details:

Phase 1(Before AT 1)	Phase 2 (Before AT 2)	Phase 3(Before Model Exam)
Assignment 1	Assignment 2	Assignment 3

Google Class Code Details:

Class Name:

PLAN OF ASSESSMENT TEST -DISTRIBUTION OF MARKS:

TEST	CO- MARK WISE DISTRIBUTION						BLOOM'S LEVEL MARK WISE DISTRIBUTION					
	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
AT-1	37	23	-	-	-	-						
AT-2	-	-	37	23	-	-						
MODEL	20	20	20	20	10	10						

Prepared By

Verified By

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