DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE
(AUTONOMOUS)
(Approved by AICTE & Affiliated to Anna University, Chennai)
Re-Accredited by NAAC with 'A' Grade
Accredited by NBA for AERO, BME, CSE, ECE, EEE, IT & MECH.
PERAMBALUR-621212, TAMILNADU, INDIA.
Website: www.dsengg.ac.in

M.E COMPUTER SCIENCE AND ENGINEERING REGULATIONS – 2023

Name of the Faculty				
Designation/Department	AP/CSE			
Course Code/Name	**P23CST13 – ADVANCED DATABASE DESIGN**			
Year/Section/Department	I/A/CSE			
Credits Details	L: 3	T: 0	P: 0	C:3
Total Contact Hours Required	45			

Syllabus:

UNIT I - INTRODUCTION	**No. of Periods: 9**
Data base system Architecture – Query Optimization Techniques - Transaction Management: Transaction Processing Concepts - Concurrency Control - Recovery Techniques -Database Security	
UNIT II - PARALLEL DBMS	**No. of Periods: 9**
Architecture-Query evaluation-Query optimization-parallelizing Individual operations. Distributed DBMS: Architecture-storing data-Cataloguing-Query processing-Transactions Concurrency and Recovery.	
UNIT III - MOBILE DATABASES	**No. of Periods: 9**
Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models -Concurrency Control - Transaction Commit Protocols	
UNIT IV - OBJECT AND MULTIMEDIA DATABASE SYSTEMS	**No. of Periods: 9**
Object Databases–Advantages and disadvantages compared to Relational Databases- Abstract data types, Objects identity and reference types- Inheritance Database design for ORDBMS ODMG data model and ODL OQL.MULTIMEDIA DATABASES: Nature of Multimedia data and applications Data management issues– Components of Multimedia database management system.	
UNIT V - BIGDATA AND HADOOP	**No. of Periods: 9**
Big Data–Introduction-Technologies–Reference Architecture- Hadoop– Introduction to Hadoop Distributed File System– Design of HDFS–HDFS Concepts–Interfaces for Hadoop File System–Map Reduce–weather Dataset–Analyzing the data with Hadoop–Anatomy of Map Reduce Job Run.	

TOTAL: 45 PERIODS

Objectives:

- To give students in depth information about system implementation techniques, data storage, representing data elements, database system architecture.
- Demonstrate principles of design, development and administration relevant to Oracle database technology.
- Formulate a working definition of database development and administration.
- To understand the emerging databases like Mobile, Multimedia, Cloud and Big Data and Hadoop infrastructures.

Text Book:

T1- onald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye**,** Probability and Statistics for Engineers and Scientists, 9th Edition, Pearson Education, 2017.
T2 - Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, 5th Edition, Academic Press, 2014.
T3- Gilbert Strang, Linear Algebra and Its Applications, 4th Edition, Cengage Learning, 2006.

Reference Book:

R1.J. E. Freund, Mathematical Statistics with Applications, Pearson Education.
R2.William Feller, An Introduction to Probability Theory and Its Applications, Wiley.
R3. Douglas C. Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, Wiley.

Website:

W1: https://www.statlect.com/probability-distributions
W2: https://www.khanacademy.org/math/statistics-probability
W3: https://stattrek.org/probability/probability-rules.aspx
W4: https://www.geeksforgeeks.org/probability-in-maths//

Online Mode of Study:

W1: https://onlinecourses.nptel.ac.in/noc24_ma23/preview
W2: https://www.coursera.org/courses?query=probability%20and%20statistics
W3: https://www.khanacademy.org/math/statistics-probability
W4: https://stattrek.org/statistics/tutorials.aspx
W5: https://www.statlect.com/

Course Plan:

Topic Number	Topic	Reference Detail	Page Number	Mode of teaching	Number of Periods Required	Cumulative Period
UNIT I - INTRODUCTION						
1	Database System Architecture	T1	5-9	BB	1	1
2	Query Optimization Techniques	T1	11-15	BB	1	2
3	Transaction Processing Concepts	T1	6-21	BB	1	3

4	Transaction Management	T1	22-29	BB	1	4
5	Concurrency Control Concepts	T1	30-33	BB	1	5
6	Concurrency Control Techniques	T1	33-37	BB	1	6
7	Recovery Techniques	T1	38-42	BB	1	7
8	Database Security Concepts	T1	42-48	BB	1	8
9	Discussion, Case Study / Review	T1	49-56	BB	1	9

Outcome of Unit I:

At the end of unit, Students should be able to

- Convert the ER-model to relational tables, populate relational databases and formulate SQL queries on data.

UNIT II - PARALLEL AND DISTRIBUTED DBMS						
11	Introduction to Parallel DBMS Architecture	T1	72-78	BB	1	11
12	Query Evaluation in Parallel Databases	T1	80-84	BB	1	12
13	Query Optimization in Parallel Systems	T1	85-89	BB	1	13
14	Parallelizing Individual Operations	T1	90-94	BB	1	14
15	Distributed DBMS Architecture	T1	95-99	BB	1	15
16	Data Storage and Cataloguing	R1	100-104	BB	1	16
17	Query Processing in Distributed Databases	T1	105-109	PPT	1	17
18	Transactions in Distributed Databases	T1	110-113	BB	1	18

- **Outcome of Unit II:**

  At the end of this unit, students should be able to:
- Understand and write well-formed XML documents

UNIT-III -Mobile Databases						
20	Introduction to Mobile Databases	T1	125	BB	1	20
21	Location Management	T1	126-131	BB	1	21
22	Handoff Management	T1	132-137	BB	1	22
23	Effect of Mobility on Data Management	T1	138-140	BB	1	23
24	Location Dependent Data Distribution	T1	141-143	BB	1	24
25	Mobile Transaction Models	T1	145-149	BB	1	25
26	Concurrency Control in Mobile Databases	T1	151-159	BB	1	26

27	Transaction Commit Protocols	T1	159-161	BB	1	27
28	Review and Case Study	T1	162-163	BB	1	28

- **Outcome of Unit III:**
  At the end of this unit, students should be able to:
- Be able to apply methods and techniques for distributed query processing.

UNIT-IV- OBJECT AND MULTIMEDIA DATABASE SYSTEMS						
29	Introduction to Object Databases	T2	11-15	BB	1	29
30	Advantages and Disadvantages vs Relational Databases	T2	16-19	BB	1	30
31	Abstract Data Types	T2	20-23	BB	1	31
32	Object Identity and Reference Types	T2	25-31	BB	1	32
33	Inheritance	T2	32-36	BB	1	33
34	Database Design for ORDBMS	T2	37-41	BB	1	34
35	ODMG Data Model, ODL and OQL	T2	42-46	BB	1	35
36	Multimedia Data: Nature and Applications	T2	47-51	BB	1	36

Outcome of Unit IV:
At the end of this unit, students should be able to:
- Design and Implement secure database systems.

UNIT-V - BIG DATA AND HADOOP						
37	Introduction to Big Data	T2	74-79	BB	1	37
38	Big Data Technologies	T2	79-81	BB	1	38
39	Big Data Reference Architecture	T2	82-86	BB	1	39
40	Introduction to Hadoop	T2	87-91	BB	1	40
41	Hadoop Distributed File System (HDFS)	T2	92-105	BB	1	41
42	Design and Concepts of HDFS	T2	111-115	BB	1	42
43	Hadoop File System Interfaces	T2	120-124	BB	1	43
44	MapReduce	T2	125-133	BB	1	44
45	Weather Dataset Example from Standardized Variables	T2	136-137	BB	1	45

Outcome of Unit V:
At the end of this unit, students should be able to:
- Use the data control, definition, and manipulation languages of the NoSQL

databases
- Understand the concept of Hadoop Distributed File System.

Course Outcome:

At the end of the course, the students will be able to

CO1: Convert the ER-model to relational tables, populate relational databases and formulate SQL queries on data.

CO2: Understand and write well-formed XML documents

CO3: Be able to apply methods and techniques for distributed query processing.

CO4: Design and Implement secure database systems.

CO5: Use the data control, definition, and manipulation languages of the NoSQL databases

CO6: Understand the concept of Hadoop Distributed File System.

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**

Internal Evaluation Components:

Web portal	Assignment	Components	Topic Number with Topic / Unit Details	Relevance to CO
Web portal 1	**--**	**Assessment – I (60)**	**Unit I and II**	**CO 1 & CO2**
	1	**Assignment – Handwritten (20)**	1. Explain the architecture of a database management system with a neat diagram. 2 Describe different query optimization techniques used in DBMS.	CO1

	2	**Assignment – Poster Presentation / PPT (20)**	1.Explain the architecture of parallel database systems. 2.Explain query optimization techniques in parallel DBMS.	CO2
Web portal 2	**--**	**Assessment – II (60)**	**Unit III and IV**	**CO3 & CO4**
	3	**Seminar (20)**	1**.** Explain the concept of mobile databases and their architecture. 2. Explain the effect of mobility on data management**..**	CO3
	4	**Case Study Report (20)**	1. Describe mobile transaction models with suitable examples. 2. Explain the difference between small sample and large sample tests**.**	CO4
Web portal 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**

PLAN OF ASSESSMENT TEST –DISTRIBUTION OF MARKS:

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

Prepared By **Verified By**

Approved By