COURSE TITLE	**DATABASE MANAGEMENT SYSTEM**
COURSE CODE	**01CE0105**
COURSE CREDITS	**4**

Objective:

1 The objective of this syllabus is to provide students with a comprehensive understanding of Database Management Systems (DBMS). It covers fundamental concepts such as database architecture, data models, SQL programming, database design, transaction management, concurrency control, query processing, optimization techniques, database security, and PL/SQL programming.

Course Outcomes: After completion of this course, student will be able to:

1 Apply DBMS principles to differentiate database systems from traditional file-based systems.

2 Analyze business requirements and construct ER diagrams with entities, attributes, and relationships

3 Apply relational algebra operations and integrity constraints to formulate and solve queries

4 Evaluate relational schemas for anomalies and optimize them using normalization up to BCNF

5 Analyze distributed and parallel database concepts, architectures, and their applications in real-world systems

Pre-requisite of course: Basic understanding of programming concepts and logic operations to effectively model and manipulate database systems.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction** Introduction and applications of DBMS, File Processing System and its limitations, ANSI/SPARC Model, Data Independence, Client-Server Architecture, Users & DBA, Database Architecture	5
2	**Data Models** Hierarchical Model, Network Model, Relational Model, Object Oriented Model., E-R Diagram: Introduction to E-R Diagram, Entities, Attributes & its types, Relationships, Mapping Cardinalities, Participation Constraints, Weak Entity Sets, Specialization,, Generalization, Aggregation	8

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Contents : Unit	Topics	Contact Hours
3	**Relational Data Model: Introduction, Degree, Cardinality** Constraints & Keys: Primary Key, Foreign Key, Super Key, Candidate Key,, Not Null Constraint, Check Constraint, Relational Algebra Operations: Selection, Projection, Cross-Product, Rename, Joins (Natural & Outer Join),, Set Operators (Union, Intersection, Set Difference), Aggregate Functions.	7
4	**Relational Database Design** Functional Dependency–definition, trivial and non-trivial FD,, Armstrong's Axioms/Inference Rules,, Closure of FD, Closure of Attributes, Candidate Key, Finding a Candidate Key, Decomposition (Lossy & Lossless), Database Anomalies, Normalization – 1Nf, 2NF, 3NF & BCNF	10
5	**Parallel & Distributed Databases** Introduction, Need for Distribution, Advantages & Disadvantages, Centralized vs Distributed DBMS,, Fragmentation (Horizontal & Vertical), Replication (basic idea), Transparency in Distributed Databases (Location & Replication Transparency), Introduction, Need for Parallelism, Shared-Memory, hared-Disk, and Shared-Nothing Architectures (conceptual overview),, Distributed DB vs Parallel DB,, Real-world use cases of Distributed & Parallel Databases (Banking, Cloud, Social Media, E-Commerce)	10
Total Hours		**40**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical 1** Introduction to DBMS and its various tools	2
2	**Practical 2** Creating the tables (Total 16 Tables)	6
3	**Practical 3** Simple DML – Select Query Part – 1	2
4	**Practical 4** Simple DML – Select Query Part – 2	2
5	**Practical 5** Simple DML – Select Query Part – 3	2
6	**Practical 6** Simple DML – Select Query Part – 4	2
7	**Practical 7** Join Queries – Part – 1	2
8	**Practical 8** Join Queries – Part – 2	2
9	**Practical 9** Miscellaneous Queries	2

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
10	**Practical 10** No-SQL (MongoDB) Part – 1	2
11	**Practical 11** No-SQL (MongoDB) Part – 2	2
12	**Practical 12** No-SQL (MongoDB) Part – 3 2	2
Total Hours		**28**

Textbook :

1 Database System Concepts, ilverschatz A., Korth F. H. and Sudarshan S., Tata McGraw Hill, 2019

References:

1 Fundamentals of Database Systems, Fundamentals of Database Systems, Fundamentals of Database Systems, Fundamentals of Database Systems, Elmasri R. and Navathe, B. S., Pearson, 2016

2 SQL, PL/SQL the Programming Language of Oracle, SQL, PL/SQL the Programming Language of Oracle, SQL, PL/SQL the Programming Language of Oracle, SQL, PL/SQL the Programming Language of Oracle, Bayross I.,, BPB Publications, 2009

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
0.00	0.00	50.00	25.00	25.00	0.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

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Supplementary Resources:

1. https://apex.oracle.com/en/
2. https://onlinecourses.nptel.ac.in/noc22_cs57/preview
3. https://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/labs/index.php
4. https://www.w3schools.com/sql/
5. https://www.oracle.com/in/database/