CSE303	Database Management System	L	T	P	C
Version 1.0	Contact Hours – 45 Hours	3	0	0	3
Pre-requisite/ Exposure	Set Theory, Knowledge of programming language.				
Co-requisite	NIL				

Course Objectives:

1. To understand database concepts, applications, data models, schemas and instances.
2. To implement the relational database design and data modelling using entity-relationship (ER) model.
3. To demonstrate the use of constraints and relational algebra operationsand Normalization process
4. To learn the new emerging Technologies and Applications in database.

Course Outcomes:

On the completion of this course the student will be able to

1. **Describe** the characteristics of database and the architecture of Database system.
2. **Model** the elements used in Entity- Relationship diagram.
3. **Summarize** relational model concept and illustrate the relational constraints.
4. **Build** Structured Query Language (SQL) and apply to query a database and **Define** normalization for relational databases.
5. **Develop** some Standalone (Example)/ Mobile/ Web Application DBon real world case studies.

Course Description:

Databases form the backbone of all applications today – tightly or loosely coupled, intranet or internet based, financial, social, administrative, and so on. Database Management Systems (DBMS) based on relational and other models have long formed the basis for such databases. Consequently, Oracle, Microsoft SQL Server, Sybase etc. have emerged as leading commercial systems while MySQL, PostgreSQL etc. lead in open source and free domain. While DBMS's differ in the details, they share a common set of models, design paradigms and a Structured Query Language (SQL). In this background the course examines data structures, file organizations, concepts and principles of DBMS's, data analysis, database design, data modeling, database management, data & query optimization, and database implementation. More specifically, the course introduces relational data models; entity-relationship modeling, SQL, data normalization, and database design. Further it introduces query coding practices using MySQL (or any other open system) through various assignments. Design of simple multi-tier client / server architectures based and Webbased database applications is also introduced.

Course Content:

Unit-I	9 Lecture Hours
Overview of database management systems and the relational mode: Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object-oriented data models, integrity constraints, data manipulation operations. ER models: Entity Set, Relation Ship Set, Cardinality Properties, Type of Entities, Type of Keys, Aggregation, Specialization and Generalization.	
Unit-II	**9 Lecture Hours**
Database design: E-R diagrams, constraints, normal forms Relational algebra, Fundamental Operations, Additional Operations. Select, Project, Cartesian Product, UNION, Set difference, Rename. Types of joining operations, Division, Intersection, Aggregate. Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.	
Unit-III	**9 Lecture Hours**
SQL: data definition, data manipulation, queries, views, constraints, triggers: Relational database design: Integrity Constraint, Domain Constrain, Referential Integrity, Functional Dependencies, Closure of Set, Cover and Canonical Cover, Types of Anomalies, Armstrong's axioms, Extended Armstrong's axioms, Assertions and Demons. Data Base Decomposition: Domain and data dependency, Normal forms: 1NF, 2 NF, 3 NF, BCNF, Dependency preservation, Lossless design.	
Unit-IV	**9 Lecture Hours**
Storage and indexing: B-trees, hashing: Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms. Storage strategies: Indices, B-trees, B+-trees, hashing, File System, Disk Organization, Physical Storage, Buffer management.	
Unit-V	**9 Lecture**

	Hours
Case Studies : Standalone (Example)/ Mobile/ Web Application DB: Transaction processing: Failure, Recovery from Failure, Different States of Transaction, Transaction Isolation, ACID property, Serializability of scheduling, Multi-version and optimistic Concurrency Control schemes. Concurrency control: Locking and timestamp-based schedulers, 2-Phase Locking Protocol, Dead Lock, Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. Advanced topics: Distributed databases, Data warehousing and data mining.	

Text Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill 2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

Reference Books:

1. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
2. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	Mid Term	Class Assessment	End Term
Weightage (%)	20	30	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		Mapped Program Outcomes
CO1	**Describe** the characteristics of database and the architecture of Database system.	PO1,PO2, PSO1
CO2	**Model** the elements used in Entity- Relationship diagram.	PO2, PO3, PO4, PSO1

CO3	**Summarize** relational model concept and illustrate the relational constraints.	PO1, PO2, PO4, PSO2
CO4	**Build** Structured Query Language (SQL) and apply to query a database and **Define** normalization for relational databases.	PO2, PO3, PO4, PO5, PO6, PSO3,PO7
CO5	**Develop** some Standalone (Example)/ Mobile/ Web Application DB on real world case studies	PO3, PO5, PSO3,PO7

		Computational knowledge	Design/development of solutions	Conduct investigations of complex problems	Problem analysis	The engineer and society	Communication	Modern tool usage	Environment and sustainability	Ethics	Individual and team work	Project management and finance	Life-long learning	To engage in professional development and to pursue post graduate education in the fields of Information Technology and Computer Applications.	To provide the students about computing principles and business practices in software solutions, outsourcing services, public and private sectors.	Analyze and synthesis computing systems through quantitative and qualitative techniques.
Cours-e Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO 3
CSE 11412	Database Management System	3	3	2	2	-	-	2	-	-	-	-	2	3	2	3

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

CSE308	*Database Management System Lab*	L	T	P	C
Version 1.0	**Contact Hours -45**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Set Theory, Knowledge of programming language.**				
Co-requisites	**--**				

Course Objectives:

1. To understand the fundamentals of how data is stored in computer systems.
2. To know the fundamentals of Structured Query Language (SQL) and how it can be used to store and retrieve data from a relational database.
3. To be able to apply the principles used in class to build a web-based database application from the ground up.

Course Outcomes:

On completion of this course, the students will be able to

CO1. **Organize** the basic concepts of Database Systems and Applications.
CO2. **Construct** the basics of SQL query from relational algebra expressions.
CO3. **Define** a commercial relational database system (Oracle, MySQL) by writing SQL using thesystem.
CO4. **Apply**query optimize algorithms to Optimize the Query.

Catalog Description:

The primary goal of this class is to learn principles and practices of database management and database design. Over the course of the semester we will discuss the database relational database design, normalization, SQL queries, reports and other interfaces to database data, and documentation. Lectures will also cover writing ethical and privacy issues associated with database systems. In- class instruction and exercises will focus on the fundamentals for creating sophisticated, interactive, and secure database applications.

Course Content:

Experiment 1:
Familiarization of structured query language.
Experiment 2:
Table Creation.
Experiment 3:
Insertion, Updation, Deletion of tuples.
Experiment 4:
Executing different queries based on different functions.

Experiment 5:
Performing joining operations.

Experiment 6:
Nested Queries.

Experiment 7:
Use of aggregate functions.

Experiment 8:
Use of group functions.

Experiment 9:
Use of order by functions.

Experiment 10:
Arithmetic operations.

Experiment 11:
Trigger using SQL.

Experiment 12:
Introduction to PL/SQL.

Experiment 13:
Report generation of various queries.

Experiment 14:
Merging Data Bases with front end using ODBC connection.

Experiment 15:
SQL Injection on a non-harmful test page.

Text Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
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Reference Books:

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Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Continuous Evaluation	End Semester Examination
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Organiz**e the basic concepts of Database Systems and Applications.	PO1,PSO1,PO12, PO2, PSO3

CO2	**Construct** the basics of SQL and construct queries using SQL in database creation interaction.	**PO1, PO2,PO3, PSO1, PO4, PSO3, PSO2**
CO3	**Design** a commercial relational database system (Oracle, MySQL) by writing SQL using thesystem.	**PO1,PO2,PO4, PO3, PSO3, PO7, PSO1**
CO4	**Apply**query optimize algorithms to Optimize the Query.	**PO1, PO2,PO4,PO7, PSO2, PSO3**

		Computational knowledge	Design/development of solutions	Conduct investigations of complex problems	Problem analysis	The engineer and society	Communication	Modern tool usage	Environment and sustainability	Ethics	Individual and team work	Project management and finance	Life-long learning	To engage in professional development and pursue post graduate education in the fields of Information Technology and Computer Applications.	To provide the students about computing principles and business practices in software solutions, outsourcing services, public and private sectors.	Analyze and synthesis computing systems through quantitative and qualitative techniques.
Cours-e Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO 3
CSE 12416	Database Management System Lab	3	3	2	3	-	-	2	-	-	-	-	2	2	2	3

1=weakly mapped 2= moderately mapped 3=strongly mapped