SWE1004	Database Management Systems	L	T	P	J	C
		3	0	2	0	4
Pre-requisite	None	Syllabus version				
		v. 1.20				

Course Objectives:

1. To study the salient features of database systems and the design process at conceptual and logical level.
2. To implement the database design using relational algebra and SQL.
3. To know the supporting subsystems of DBMS

Expected Course Outcome:

1. Compare the file system and DBMS, and know DBMS architecture and classification.
2. Understand conceptual database design
3. Explain the relational model and Write Queries in relational algebra
4. Create and manipulate the database using SQL and write routines using PL/SQL
5. Evaluate the design of database.
6. Read or write made in the database by single user, multiple user and during failures.
7. Execute a query behind the scene and physical design
8. Design ER model and Implement it using SQL and PL/SQL

Student Learning Outcomes (SLO)	2, 5, 7

2. Having a clear understanding of the subject related concepts and of contemporary issues
5.Having design thinking capability
7.Having computational thinking (Ability to translate vast data in to abstract concepts and to understand database reasoning)

Module:1	Fundamental Concepts and Architecture:	4 hours

Introduction to database system, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using the DBMS Approach, Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Classification of Database Management Systems

Module:2	Conceptual Database Design	6 hours

High-Level Conceptual Data Models for Database Design, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, ER Diagrams, Naming Conventions, and Design Issues, Relationship Types of Degree Higher than Two, Enhanced ER, Specialization, Generalization

Module:3	Relational Database Design	8 hours

Relational Model, Constraints, Update Operations and Dealing with Constraint Violations, Database Design Using ER-to-Relational Mapping and EER to Relation, Relational Algebra, Unary Relational Operations, Operations from Set Theory, Binary Relational Operations, Additional Relational Operations

Module:4	Structured Query Language	8 hours

Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL, Virtual tables Inbuilt functions, Complex Queries-nested, correlated, PL/SQL block, cursor, function, procedure, trigger

Module:5	Normalization Theory	5 hours

Informal Design Guidelines for Relation Schemas, Functional Dependencies, Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Normal Forms Based on Primary Keys, Boyce-Codd Normal Form

Module:6	**Transaction, Concurrency, Recovery**	**6 hours**
Introduction to Transaction Processing, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Concurrency, Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency Control Techniques, Recovery Concepts, NO-UNDO/REDO Recovery Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging, ARIES Recovery Algorithm		
Module:7	**Query Processing and Indexing:**	**6 hours**
Query Execution plan, Basic algorithms for query execution, Heuristic Query Optimization technique, sparse and dense index, primary, secondary and clustered index, B Tree Vs Hash Index.		
Module:8	**Contemporary issues**	**2 hours**
	Total Lecture hours: # Mode: Flipped Class Room, [Lecture to be videotaped], Slides, Demonstration of using Oracle-SQL, 2 hrs lectures by industry experts, Evaluation based on Continuous Assessment Test (30%) and Assignments(20%)	**45 hours**

Text Book(s)

1.	Fundamentals of Database Systems by Ramez Elmasri and Shamkant B.Navathe Pearson Education,2013

Reference Books

1. Database Management Systems by Raghu Rama Krishnan, Tata Mcgraw Hill,2010
2. Database System Concepts by Abraham Silberschatz, Henry F.Korth and S.Sudarshan, Tata Mc Graw Hill, 2011
3. Database System Design and Implementation by Rob Cornell,cennage learning, 2011

List of Challenging Experiments (Indicative)		**SLO: 2, 5, 7**
1.	SQL -Creating tables	
2.	SQL- Inserting, deleting, updating tables, Alter table	
3.	SQL -Querying table-simple queries	
4.	SQL- Creating constraints	
5.	SQL- Altering constraints	
6	SQL- In built functions	
7	SQL – Select statements(with different clauses)	
8	SQL- Querying table-complex(nested, correlated)	
9	SQL – Top N Queries ,catalog Queries, views	

10	PLSQL- block, cursor			
11	PLSSQL- trigger			
12	PLSQL- Function, Procedure			
13	SQL-Creating and Querying-type, varray, nested table			
14	API- Creating API for retrieving data from database			
15	API- Creating API for executing procedure/function			
Total Laboratory Hours				30 hours
Recommended by Board of Studies	5-3-2016			
Approved by Academic Council	No. 40th	Date	18-3-2016	