**Title of Subject : Database Systems (SW-215)**

**Discipline :** Software Engineering (3rd Semester)

**Effective :** 18 Batch & onwards

**Pre-requisite :** Programming Fundamentals

**Assessment :** Theory**:** 20% Sessional, 80% Written Semester Examination

## (20% Mid, 60% Final)

Practical: 40% Sessional, 60% Final Examination

**Credit Hours :** 03 + 01 **Marks:** 100 +50

**Minimum Contact Hours:** 45 + 45

# Specific Objectives of course:

* To have an understanding of the foundations, the design, the maintenance, the evolution, and the use of data warehouses.

**COURSE LEARNING OUTCOMES:**

Upon successful completion of the course, the student will be able to:

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| **CLOs** | **Description** | **Taxonomy level** | **PLO** |
| 1 | Explain the fundamental concepts of database systems, functional dependencies, true essence of data integrity and normalization. | C2 | 1 |
| 2 | Understanding and using SQL statements including DDL, DCL, DML, TCL, DCL for database definition and manipulation. | C4 | 2 |
| 3 | Developing programs using procedural language extension of SQL on ORACLE. | P2 | 3 |

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the following PLOs:

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| --- | --- | --- | --- | --- | --- |
| 1 | Engineering Knowledge: | ☑ | 7 | Environment and Sustainability: | ☐ |
| 2 | Problem Analysis: | ☑ | 8 | Ethics: | ☐ |
| 3 | Design/Development of Solutions: | ☑ | 9 | Individual and Team Work: | ☐ |
| 4 | Investigation: | ☐ | 10 | Communication: | ☐ |
| 5 | Modern Tool Usage: | ☐ | 11 | Project Management: | ☐ |
| 6 | The Engineer and Society: | ☐ | 12 | Lifelong Learning: | ☐ |

**Course outline:**

* **FILES AND DATABASE CONCEPTS**

Traditional File Based System, Database Approach, Database Environment Roles, Advantages and Disadvantages of Database System, Three Level Architecture, Database Languages, Data Models and Conceptual Modeling, DBMS Functions, Multi-user DBMS Architecture, Data Dictionaries; Relational Model, Relational Integrity, Views, Codd Rule, Database Planning, Entity Relationship Modeling, Structural Constraints, ERD Model Problems, ERD Tools, Normalization, Anomalies, Functional Dependencies.

* **INTRODUCTION TO MANAGING DATA**

Characteristics of DBMS, Concept of RDMS & its characteristics, Codd’s Law for RDBMS, Introduction to ORACLE Tools

* **STRUCTURED QUERY LANGUAGE (SQL)**

Interacting SQL\*Plus, Data Manipulation in DBMS, the ORACLE Data types, Two Dimension Matrix creation, Insertion of Data into tables

* **MANAGING TABLES**

Select Statement and its supporting Clauses and with its various applications, Insertion of Data into Tables, Updating the Contents of Tables, Deletion Operations

* **MODIFYING THE STRUCTURE OF TABLE**

Adding & Modifying new and existing columns, Restrictions on the Alter tables, Removing tables, Deleting & Dropping tables

* **DATA CONSTRAINTS**

Column & Table level constraints, Primary & Foreign Key concepts, Application of other Data constraints

* **ORACLE FUNCTIONS**

Character Function, Numeric Functions, Date Functions, Single row Function, and Group functions.

* **JOINING**

Introduction to Joining, Equi-Join, Non-Equi join, self-joining, vertical joining (union, intersect and minus Clause)

* **INDICATES, VIEWS AND SEQUENCES**

Creating & mapping indexes, Application of views, creating & managing views & sequences.

* **GRANTING PERMISSIONS**

Permission on the objects, Granting permissions, Object privileges, Revoking permissions

* **PL/SQL**

Introduction to PL/SQL, PL/SQL execution environment, Block structure, ORACLE transaction

#### **ERROR HANDLING IN PL/SQL**

Introduction, Declaring Exceptions, Implicit & Explicit Exceptions, Predetermined internal PL/SQL exceptions.

### **CURSORS**

Introduction to Cursors, Explicit cursor, implicit cursor, creating & Managing Explicit / Implicit Cursors, Attributes, Explicit & Implicit cursor Attributes cursor for loops.

### **STORED PROCEDURES/TRIGGERS**

Introduction, Internal structures, Deleting procedures, Advantages of procedures, Deleting stored procedures.

* **STORED FUNCTIONS**

Introduction, Internal structures, Deleting functions, Advantages of Functions, Deleting stored functions.

# Practical Work to be carried out:

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| 1 | Installation of ORACLE. |
| 2 | Data Modeling. |
| 3 | Normalization. |
| 4 | Demoralization. |
| 5 | Database Connectivity. |
| 6 | SQL Injections and Prepared Statements. |
| 7 | Joins. |
| 8 | Sub-Queries. |
| 9 | Views and Indexes. |
| 10 | Access Control. |
| 11 | PL/SQL, control structure and data types. |
| 12 | Cursors |
| 13 | Exception Handling. |
| 14 | Stored procedures and Stored functions. |
| 15 | Project |

# Recommended Books:

1. Database Systems: A Practical Approach to Design, Implementation, and Management, Book by Carolyn E. Begg and Thomas M. Connolly Latest Edition.
2. Relational Database Management System: A Project-based Tutorial by Gerard Blokdyk, Latest Edition.
3. Oracle 11g with PL/SQL Approach by Cadcim Technologies , Sham Tickoo & Sunil Raina Latest Edition

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| **Approval:** |  | |
| **Board of Studies:** | **Resolution No. 02** | **Dated: 29-08-2019** |
| **Board of Faculty:** | **Resolution No. 01** | **Dated: 07-10-2019** |
| **Academic Council:** | **Resolution No. 96.10** | **Dated: 07-10-2019** |