Course Title	**Database Systems Lab**
Course Code	**CC-215-L**
Credit Hours	1 (0,3)
Category	Computing Core
Prerequisite	None
Co-Requisite	None
Follow-up	DI-324: Database Administration and Management
Course Introduction	The course aims to introduce the Structured Query Language (SQL). It covers the set of commands related to Data Retrieval, Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL). It will followed up by procedural flavor of SQL (PL/SQL).

Course Learning Outcomes (CLOs)	At the end of the lab, the students will be able to:	**BT**	**PLO**
	CLO1: To learn SQL and develop expertise in writing SQL queries	C3 (Apply)	3,4,5
	CLO2: To develop the fundamental knowledge of PL/SQL, stored procedures, and database triggers	C3 (Apply)	3,4,5
	CLO3: To be able to design a database system for small business organizations	C5 (Design)	3,4,5,7

| **Syllabus** | **Introduction to SQL environment:** Writing Basic SQL Statements; **SELECT Statement:** Arithmetic Expressions, Operator Precedence, Null Value, Column Alias, Concatenation Operator, **FROM Clause:** Table list, Table Alias. Restricting and Sorting Data; **WHERE Clause**: Comparison operators, Logical operators, **ORDER BY clause,** Display table Structure.

Single row functions: character functions, number functions, date functions, type conversion functions. **Multi row Functions**: Sum, Average, Standard deviation, Variance, Subgrouping of data, Group by Clause, use of Having clause. **Join:** Cross product, natural join, Equi-join, Non equi-join, left outer-join, right outer-join, self-join. **Subquery:** use of subquery, subquery syntax, Multiple Column Subqueries, pairwise comparison, Non-pair wise comparison, Null Value in a subquery, Subquery in From Clause. **Creating and Altering SQL tables**: Create table statement, Defining Constraints, Column Level and Table Level, NOT NULL Constraint, UNIQUE Key Constraint, PRIMARY Key Constraint, FOREIGN Key Constraint, CHECK Constraint, Alter table statement, drop statement, **Data Manipulation:** Insert, Update, Delete statements. **SQL Objects:** Views, Sequences, Indexes. **User Management:** Create user, user privileges, user groups, Grant, Revoke statements.

Introduction to Procedural SQL (PL/SQL), Sections of a PL/SQL block, Variable declaration and initialization, SELECT statement in PL/SQL, Arithmetic expressions, Selection, Repetition, Exception Handling, Cursors, Stored Procedures and Functions, Introduction to Database Triggers |
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Suggested Instructional/ Reading Material	1. Introduction to Oracle 9i: SQL 2. Michael McLaughlin, Oracle Database 11g PL/SQL Programming, 1st Edition, McGrawHill Education, 2008, ISBN: 0071494456. 3. Jason Price, Oracle Database 11g SQL, McGraw Hill. ISBN: 0071498508.