GANPAT UNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Computer Engineering/ Information Technology				
Semester	IV		Version	1.0.0.0	
Effective from Academic Year		2025-26	Effective for the batch Admitted in		2026-27
Course Code	1CEIT4101	Course Name	ADVANCED DATABASE MANAGEMENT SYSTEM		

I. TEACHING-LEARNING AND ASSESSMENT SCHEME

Course Type	Course code	Course Title	Teaching & Learning Scheme									Examination Scheme							
			Credit				Actual Contact Hrs/week			SLH	Total Learning Hrs/Week	TH			PR			SLA	Total
			CL	TL	LL	Total	CL	TL	LL			CE	SEE	Total	CE	SEE	Total		
SEC	1CEIT4101	ADVANCED DATABASE MANAGEMENT SYSTEM	3	-	1	4	3	0	2	2	7	40	60	100	30	20	50	20	170

Abbreviation:	**CL-** Classroom Learning	**TL**- Tutorial Learning	**LL**-Laboratory Learning
	SLH-Self Learning Hours	**SLA -** Self Learning Assessment	**CE -** Continuous Evaluation
	SEE – Semester End Examination		

II. PRE-REQUISITES

Basic understanding of relational DBMS concepts, basic SQL (DDL, DML, and queries), and the Entity–Relationship (ER) model is required.

III. INDUSTRY /EMPLOYER EXPECTED OUTCOMES

- Develop database-driven applications using PL/SQL
- Implement stored procedures, functions, and triggers
- Manage transactions and concurrency control mechanisms
- Apply database normalization techniques in real-world systems
- Use advanced SQL features for automation and data processing

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to achieve the following course learning outcomes:

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's)&CO's	Marks	Hours
Unit 1 **Advanced SQL, DCL & TCL Commands**	**TLO 1.1** Apply advanced RDBMS concepts and SQL queries. **TLO 1.2** Implement access control using DCL commands. **TLO 1.3** Manage transactions using TCL commands. **TLO 1.4** Explain the concept of database transactions. **TLO 1.5** Interpret ACID properties for transaction	**1.1** Review of RDBMS and Advanced SQL. **1.2** DCL Commands-GRANT, REVOKE **1.3** TCL Commands-COMMIT, ROLLBACK, SAVEPOINT **1.4** Concept of Transaction **1.5** ACID Properties **1.6** Use cases in banking and ecommerce systems	**12**	**8**

	reliability. **TLO 1.6** Apply transaction concepts in real-world applications.			
Unit-2 **Introduction to PL/SQL Programming**	**TLO 2.1** Describe the fundamentals of PL/SQL. **TLO 2.2** Construct a valid PL/SQL block. **TLO 2.3** Use variables and data types appropriately. **TLO 2.4** Apply operators in PL/SQL expressions. **TLO 2.5** Apply conditional statements for decision making. **TLO 2.6** Implement iterative statements for repetitive tasks. **TLO 2.7** Perform input and output operations in PL/SQL. **TLO 2.8** Develop simple PL/SQL programs.	**2.1** Introduction to PL/SQL **2.2** Structure of PL/SQL Block **2.3** Variables and Data Types **2.4** Operators **2.5** Conditional Statements. **2.6** Iterative Statements **2.7** Input and Output in PL/SQL **2.8** Simple PL/SQL Programs	**16**	**12**
Unit-3 **Cursors & Exception Handling**	**TLO 3.1** Describe the concept of cursors. **TLO 3.2** Use implicit cursors in PL/SQL programs. **TLO 3.3** Implement explicit cursors **TLO 3.4** Apply cursor FOR loops for record processing. **TLO 3.5** Implement exception handling in PL/SQL programs. **TLO 3.6** Handle predefined exceptions in PL/SQL. **TLO 3.7** Create and use user-defined exceptions.	**3.1** Concept of Cursors **3.2** Implicit Cursor **3.3** Explicit Cursor **3.4** Cursor FOR Loop **3.5** Exception Handling **3.6** Predefined Exceptions **3.7** User-Defined Exceptions	**12**	**8**
Unit-4 **Procedures, Functions & Triggers**	**TLO 4.1** Develop stored procedures in PL/SQL. **TLO 4.2** Develop stored functions in PL/SQL. **TLO 4.3** Apply parameter passing techniques in PL/SQL. **TLO 4.4** Explain the advantages of modular programming. **TLO 4.5** Explain the concept and need of triggers. **TLO 4.6** Differentiate and implement row-level and statement-level triggers.	**4.1** Stored Procedures **4.2** Stored Functions **4.3** Parameter Passing **4.4** Advantages of Modular Programming **4.5** Triggers-Concept and Need **4.6** Row-Level and Statement-Level Triggers **4.7** BEFORE and AFTER Triggers **4.8** Trigger based validation and	**12**	**9**

	TLO 4.7 Implement BEFORE and AFTER triggers. **TLO 4.8** Apply triggers in real-time business scenarios such as audit trails and validations	audit trail		
Unit-5 **Normalization, Functional Dependency & Concurrency Control**	**TLO 5.1** Explain fundamentals of Functional Dependency (FD) and apply FD rules **TLO 5.2** Compute attribute closure and analyse dependency sets **TLO 5.3** Normalize relational schemas up to 3NF **TLO 5.4** Identify and explain concurrency problems **TLO 5.5** Explain the concept of lossless decomposition and dependency preservation. **TLO 5.6** Identify insert, update, and delete anomalies in databases. **TLO 5.7** Explain concurrency problems such as lost update, dirty read, phantom read, and non-repeatable read. **TLO 5.8** Explain the basics of locking mechanisms and serializability.	**5.1** Functional Dependency (FD) - definition, notation, examples **5.2** FD Basics-determinant, dependent attributes, trivial & non-trivial FDs. **5.3** FD Rules / Inference rules . **5.4** 1NF, 2NF, 3NF step-wise normalization with examples **5.5** Lossless Decomposition and Dependency Preservation (concept) **5.6** Anomalies-Insert, Update, Delete **.** **5.7** Concurrency Problems - Lost Update, Dirty Read, Phantom Read, non-repeatable Read **5.8** Locking and Serializability-Introduction	**8**	**8**

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL			
SR. NO	**PRACTICAL/LABORATORY LEARNING OUTCOME(LLO)**	**PRACTICAL TITLES**	**RELEVANT COs**
1	**LLO 1.1** Apply advanced SQL queries on relational databases.	Execution of advanced SQL queries using joins and subqueries	CO1
2	**LLO 1.2** Implement access control using DCL commands.	User privilege management using GRANT and REVOKE	CO1
3	**LLO 1.3** Manage database transactions using TCL commands.	Perform COMMIT, ROLLBACK, SAVEPOINT operations	CO1
4	**LLO 1.4** Apply transaction concepts in real-world scenarios.	Implementation of banking-style transaction processing	CO1
5	**LLO 1.5** Verify ACID properties through transaction execution.	Validation of ACID properties through concurrent transactions	CO1
6	**LLO 2.1** Construct valid PL/SQL blocks.	Development of basic PL/SQL block using variables	CO2
7	**LLO 2.2** Use control structures in	Implementation of decision-making using	CO2

	PL/SQL programs	IF–ELSE and CASE	
8	**LLO 2.3** Implement iterative statements in PL/SQL.	Implementation of looping constructs using FOR and WHILE	CO2
9	**LLO 2.4** Perform input and output operations in PL/SQL.	Handling user input and formatted output in PL/SQL	CO2
10	**LLO 3.1** Implement implicit cursors in PL/SQL programs.	Record retrieval using implicit cursors	CO3
11	**LLO 3.2** Implement explicit cursors for record processing.	Record processing using explicit cursors (OPEN–FETCH–CLOSE)	CO3
12	**LLO 3.3** Handle predefined and user-defined exceptions.	Exception handling using predefined and user-defined exceptions	CO3
13	**LLO 4.1** Develop stored procedures for database operations.	Creation of stored procedures for data manipulation	CO4
14	**LLO 4.2** Develop stored functions with parameter passing.	Development of stored functions with parameter passing	CO4
15	**LLO 4.3** Implementation of BEFORE and AFTER triggers for audit and validation	Implementation of BEFORE and AFTER triggers for audit and validation	CO5

VII. SUGGESTED MICRO PROJECT/ASSIGNMENTS/ACTIVITIES FOR SELF LEARNING/SKILL DEVELOPMENT (SELF LEARNING)

Micro Projects (Mini Applications / Use Cases)

- Student Result Processing System
- Library Fine Management System
- Online Order Transaction System
- Attendance Management using Triggers
- Banking Transaction Rollback Simulator

Self-Learning / Skill Building Activities

1. SQL Practice on Online Platforms
   Create a free account on LeetCode / HackerRank, choose SQL / PL-SQL track and solve at least 30 Easy-level problems.
2. Transaction Control Case Study
   Implement banking transaction programs using
   COMMIT, ROLLBACK and SAVEPOINT.
3. Cursor Implementation Activity
   Write PL/SQL programs using Implicit and Explicit Cursors to display and process employee records.
4. Exception Handling Practice
   Develop PL/SQL programs using predefined and user-defined exceptions.
5. Procedure & Function Development
   Create stored procedures and stored functions such as:
   Insert student record
   Calculate total marks / bonus
6. Trigger Based Automation

Implement BEFORE INSERT / UPDATE triggers for audit trail or validation purpose.

7. Normalization Assignment
   Perform Normalization up to 3NF for real-life tables such as:
   Student, Library, Banking or Order Management System.
8. Functional Dependency & Closure Calculation
   Compute FDs, Attribute Closure and Dependency Sets for given relational schemas.
9. Concurrency Control Research
   Prepare a report on Concurrency Problems such as
   Lost Update, Dirty Read, Phantom Read with examples.
10. Mini Project Development
    Design a mini-application such as:
    Student Result Processing System
    Library Fine Management System
    Online Order Transaction System
11. Tool Exploration Activity
    Explore database tools like Oracle / MySQL / PostgreSQL, SQL Developer, DBeaver, phpMyAdmin and prepare a comparison chart.

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD	
1	Editor: Oracle Database / MySQL / PostgreSQL/SQL Developer / DBeaver / phpMyAdmin
2	Online Compilers & Simulators DB-Fiddle – https://db-fiddle.com SQL Fiddle – https://sqlfiddle.com
3	Collaboration / Documentation Tools: GitHub / Git: Version control and project collaboration Google Docs / Word: Report and assignment preparation Draw.io / Lucidchart: ER Diagrams, normalization flowcharts, schema design

IX. LIST OF REFERENCE BOOKS

Sr.No	Title	Author	Publication
1	Database System Concepts	Silberschatz & Korth	McGraw-Hill
2	Introduction to Database Systems	C.J. Date	Pearson
3	Oracle PL/SQL Programming	Steven Feuerstein	O'Reilly Media, Inc.
4	Fundamentals of Database Systems	Navathe & Elmasri	Pearson Education

X. LINK OF LEARNING WEB RESOURCE
https://www.tutorialspoint.com/plsql/index.htm
https://www.geeksforgeeks.org/dbms/
https://www.tutorialspoint.com/dbms/index.htm

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Advanced SQL, DCL & TCL	CO1	08	2	2	4	12
2	Introduction to PL/SQL	CO2	12	3	4	5	16
3	Cursors & Exception Handling	CO3	08	3	3	2	12
4	Procedures, Functions & Triggers	CO4	09	3	4	2	12
5	Normalization, Functional	CO5	08	2	3	3	8
	Grand Total		45	13	16	16	60

XII. COs AND POs AND PSOs MAPPING

Course Outcome (Cos)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2	0	1	0	3	1	1
CO2	3	3	2	2	0	1	0	3	1	2
CO3	3	3	3	3	1	2	1	3	1	2
CO4	3	3	2	3	1	2	1	3	2	2
CO5	3	3	3	3	2	2	1	3	2	3

Legends: - *3-High; 2-Moderate/Medium; 1-Slight/Low; 0-None*