Course Syllabus
Gyanmanjari Diploma Engineering College
Semester-4 (Diploma)

Subject: Advance Database Management System-DETCE14212

Type of course: Minor Stream

Prerequisite: Prior knowledge in computer science fundamentals, including programming.

Rationale:

In today's digital economy, businesses, governments, and other organizations rely heavily on databases to store and process large volumes of critical data. Advanced DBMS provides the necessary tools and techniques to handle this growing demand efficiently and effectively. By studying advanced DBMS concepts, students are equipped with the knowledge to build high-performance, scalable, secure, and reliable database systems that power modern applications. This training ensures that they are ready to meet the challenges of working with big data, distributed systems, and complex data models, making them highly competitive in the job market.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
3	0	2	4	60	30	10	20	30	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Sr. No	Course content	Hrs.	% Weightage
1	**Database Design Concepts:** Introduction, Data and Information, Metadata, Normalization - 1NF, 2NF, 3NF, BCBF, 4NF, 5NF, De -normalization, Entity-Relationship (E-R) modeling, Schema design and implementation.	07	15%

2	**SQL and Advanced Query Techniques:** Data Definition Language (DDL)- CREATE, ALTER, TRUNATE, DROP, Data Manipulation Language(DML)-INSERT, SELECT, UPDATE, DELETE, Data Control Language (DCL)- Grant and revoke, Transaction Control Language(TCL)- Commit, save point, Rollback, Database Integrity constraints- Domain constraints, Entity integrity constraints, Group by, Having and Order by Clause, Sub queries and joins, set operations, Cursor static - Implicit and Explicit, fundamental of database Triggers – creating Triggers and types of Triggers.	11	25%
3	**Transaction Management:** ACID properties (Atomicity, Consistency, Isolation, Durability),Concurrency control techniques – Lock based protocol, Granting of lock, 2PL,Deadlock detection and resolution, introduction to parallel database, parallel database system architecture, types of parallelism, parallel database implementation, introduction to distribute database, apply parallel and distributed database technique, distributed database system architecture, benefits of distributed database system, issues with distributed database system.	09	20%
4	**Database Security and Authorization:** User roles and privileges, Encryption techniques, Data masking and auditing, DAC, MAC and RBAC models, SQL Injection.	07	15%
5	**Distributed Databases:** Architecture of distributed databases, Data replication and fragmentation, Consistency models.	04	10%
6	**Database Backup and Recovery:** Backup strategies (full, incremental, differential), Recovery Model - Simple Recovery Model, Full Recovery Model, Bulk-Logged Recovery Model, Recovery Techniques - Restore Techniques, Recovery Scenarios, Backup Strategies.	07	15%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**DDL Command Exploration:** In this activity Students use an online SQL simulator (e.g., DB Fiddle or SQL Zoo) to practice the CREATE, ALTER, TRUNCATE and DROP DDL commands. They create tables, alter existing structures, truncate data, and drop tables while observing the effects in real-time. Students document their observations on how each command impacts the database schema and upload it on GMIU web portal.	10
2	**Triggers and Trigger Types:** In this activity Students create triggers (e.g., BEFORE INSERT, AFTER UPDATE) on tables in an online simulator. They simulate data modifications and examine how triggers automatically execute actions (e.g., logging changes, enforcing business	10

	rules). Students experiment with different types of triggers and reflect on their uses in automating database operations and upload it on GMIU web portal.	
3	**Recovery Model Analysis:** In this activity Students research different recovery models (e.g., full, bulk-logged, simple) and their impact on transaction logging and database performance. They configure and simulate recovery models on a database and observe the differences in transaction log size and restore behaviour and upload it on GMIU web portal.	10
	Total	30

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	**Remembrance (R)**	**Understanding (U)**	**Application (A)**	**Analyze (N)**	**Evaluate (E)**	**Create (C)**
Weightage %	25%	35%	20%	10%	05%	05%

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Design and Implement Efficient Databases.
CO2	Apply in SQL and Advanced Query Techniques.
CO3	Implement and Manage Database Security Measures.
CO4	Design and Optimize Distributed and Parallel Database Systems.
CO5	Understand of Backup and Recovery Strategies in Database Systems.

List of Practical

Sr. No	Description	Unit No	Hrs.
1	Implement DDL (CREATE, ALTER, DROP, TRUNCATE and DML (INSERT, UPDATE, DELETE) SQL commands.	2	2
2	Insert sample data into tables using INSERT command.	2	2
3	Apply all database Entity Integrity constraints (i.e. Primary key, Foreign key, NOT NULL, Unique and CHECK).	2	2
4	Apply all database Domain constraints.	2	2
5	Perform Group by, having and Order by clause.	2	2
6	Perform query for TCL(ROLLBACK, Commit and Save point) and DCL (Grant and Revoke) commands.	2	2
7	Implement query using joins(i.e. Inner Join and Outer Join)	2	2
8	Implement query using sub queries (3 layer)	2	2
9	Perform queries involving predicates LIKE, BETWEEN, IN etc.	2	2
10	Retrieve data spread across various tables or same table using various joins.	2	2
11	Implement programming using Cursor	2	2
12	Implement programming using Triggers.	2	2
13	Implement SQL Query using set operations like: Union, Union all, Minus etc.	2	2
14	Apply concept of security and privileges.	4	2
15	Implement locking protocols.	4	2
		Total	30

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory.

The internal evaluation will be done on the basis of Active Learning Assignment.

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] Database system concepts", 6th Edition by Abraham silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
[2] Database Management System by Ramakrishnan, Gehrke, Tata McGraw-Hill.
[3] SQL-PL/SQL, Ivan bayross.
[4] Database Systems: The complete book, Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom.
[5] SQL and Relational theory: How to write accurate SQL code: C.J. Date.