PGDDS 501 **Database System** **3(2+1)**

Objectives: To understand the different issues involved in the design and implementation of a database system. To learn the physical and logical database designs, database modeling, relational, hierarchical, and network models. To use data manipulation language to query, update, and manage a database. To understand essential DBMS concepts such as: database security, integrity, concurrency, storage strategies etc. The students will get the hands on practice of using SQL and PL/SQL concepts.

Unit I: Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), and Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit II: Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design

Unit III: Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, and Query optimization algorithms. Storage strategies: Indices, B-trees, hashing.

Unit IV: Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery, Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection

Unit V: SQL Concepts : Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, join, Exist, Any, All , view and its types., transaction control commands.

Unit VI: PL/SQL Concepts: Cursors, Stored Procedures, Stored Function, Database Triggers.

Reference Books

1. Database System Concepts, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
2. Fundamentals of Database Systems, 7th Edition by R. Elmasri and S. Navathe, Pearson
3. An introduction to Database Systems, C J Date, Pearson.
4. Modern Database Management, Hoffer , Ramesh, Topi, Pearson.
5. Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.