**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

**New Scheme Based On AICTE Flexible Curricula**

**CSE-Data Science, III-Semester**

**CD304 Database Management Systems**

1. Basic Concepts of Data and Information, Overview of Information Systems, File organization and access methods; Introduction to DBMS, Difference between DBMS and traditional file storage system. Characteristics of DBMS. Data Models, Schemas and Instances, DBMS architecture, Components of DBMS. Data Independence. Study of Entity Relationship Model, Type of attributes, Entity types, Relationship and Cardinalities, Participation, Roles and constraints.

2. Relational Data Model: Domains, Tuples, Attributes, Relations, keys and types of keys, Integrity Constraints, Relational Algebra: Queries using Select operation, project operation, renaming, joins, union, intersection, difference, division, and product etc. Relational Calculus, Tuple calculus. Query Language: SQL –basic SQL queries, functions, constraints, joins and nested queries, QBE (Query By Example), Indexing, and PL/SQL.

3. Normalization Theory and Database methodologies: Relation Schemas, Functional Dependencies- Definition and rules of axioms, Normal forms- 1NF, 2NF, 3NF and BCNF, Dependency preservation, properties, loss less join decomposition. Query Processing and Optimization: Various algorithms to implement select, project & join operation of relational algebra, complexity measures.

4. Transaction Processing: Introduction to Concurrency and Recovery, Read and Write Operations, Transaction properties, Transaction states, Schedules, Serializability, types of serializability and test for serializability, Concurrency Control: Types of Locks, Timestamp Based, Validation Based etc. Multiversion schemes, Recovery: Basic concepts, techniques based on deferred update and immediate update, Shadow paging, check points.

5. Storage structure: Secondary Storage Devices, RAID, Heap Files and Sorted files, Hashing techniques, Indexing techniques: Bitmap Indices, Case Study of any contemporary DBMS.

**Text Books**


1. Korth H.F. &Silberschatz A., Sudarshan, “Database Systems”, McGraw-Hill, Sixth edition, 2010.
2. Elmasri R., Navathe S.B., “Fundamentals of Database Systems”, The Benjamin/ Cummings Publishing Company. Inc., 2004.
3. Date C.J., “An Introduction to Database Systems”, Addision Wesley, 8th edition, 2003

**Reference Books**


1. Oracle 9i, The Complete Reference, Oracle Press.
2. Alexis Leon, Mathews Leon, “Database Management Systems”, Leon Press Chennai and Vikas Publishing House Private Limited, New Delhi, 2002.