

**Semester –IV****Database Management System**

<b>BTAIC402</b>	<b>Database Management System</b>	<b>PCC4</b>	<b>3L-1T-0P</b>	<b>4 Credits</b>
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<b>Teaching Scheme</b>	<b>Examination Scheme</b>
Lecture: 3 hrs./week Tutorial : 1 hr./week	Continuous Assessment : 20 Marks Mid Semester Exam:20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)

**Pre-Requisites:** None

**Course Objectives:**

After completion of the course, students will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:

1. Fundamentals of Database Management Systems and types of DBMS used in data analysis
2. Understand various ways to organize, maintain and retrieve - efficiently, and effectively – information from different DBMS
3. Design and maintenance of the database systems
4. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

**Course Outcomes:**

On completion of the course, students will be able to:

CO1	Master the basic concepts of relational DBMS and its types.
CO2	Perform various types of operations on relational databases using DDL, DML, DCL in SQL
CO3	Understand the concept of how non-relational databases differ from relational databases from a practical perspective.
CO4	Master the basic concepts of designing NoSQL database management system.
CO5	Able to Identify what type of NoSQL database to implement based on business requirements

**Course Contents:****Unit 1: Introduction to Databases****[06 Hours]**

Introduction to Data and Database, Significance of Database Management System, Various Types of DBMS- relational & non-relational, Data Independence - The Three Levels Of Architecture - The External Level - Conceptual Level - Internal Level - Client/Server Architecture- System Structure , Instance and schema

**Unit 2: Relational Database Management System****[07 Hours]**

Data Models & Types, ER to Relational Mapping, Structure Of Relational Databases, Creation and Manipulation of Database using Basic SQL(DDL, DML,DCL,TCL )

Normalization –Anomalies- Functional Dependency, Normal forms- 1NF, 2NF, 3NF, Boyce - Codd Normal Form

**Unit 3: Non-Relational Database Management System****[07 Hours]**

NOSQL Systems-Introduction to NoSQL, Disadvantages of NoSQL technology, NOSQL Systems, weakness of RDBMS, CAP theorem, Types of NoSQL Databases, Key-value database-Key values database, More elements of key values database, Properties of Key-value store, Redis implementation (Basic CRUD operation)

**Unit 4: Columnar & Document Databases****[8 Hours]**

Columnar Databases with Apache Cassandra- Characteristics of a columnar database, Concepts of columnar databases, Cassandra Introduction and its use-cases, implement a columnar database using Apache Cassandra

Introduction to Document databases, Document databases with MongoDB - Implement a document database with MongoDB

**Unit 5: Graph and Future databases****[8 Hours]**

**Graph Databases** - Graph databases, graph traversal and graph problems, graph data structures edge list, adjacency matrix, properties of graph model.

Implementation and systems - Reliable, maintainable and scalable, Different information systems, NEO4J implementation (Basic CRUD operation), Introduction to Advance Databases- PostgreSQL

**Text Books**

1. Abraham Silberchatz, Henry K.Forth, Sudharshan, “Database system Concepts” – (6th edition), McGraw Hill, 2010.
2. Guy Harrison, “Next Generation Databases”, Apress, 2015.
3. Eric Redmond, Jim R Wilson, “Seven Databases in Seven Weeks”, LLC. 2012

**Reference Books**

1. K. Pakhira, “Database Management System”, Phi Learning Pvt. Ltd., 2012
2. MongoDB: The Definitive Guide, 2nd Edition, Powerful and Scalable Data Storage, By Kristina Chodorow, Publisher: O'Reilly Media
3. MongoDB Basics - EelDavid Hows,Peter Membrey,coPlugge, Publisher Apress - Ebook(free) <https://it-ebooks.info/book/4527/>

## Database Management System Lab

### List of practical:

1. Draw E-R diagram and convert entities and relationships to relation table for a college database.
2. Perform the following:
  - a) Viewing all databases,
  - b) Creating a Database,
  - c) Viewing all Tables in a Database,
  - d) Creating Tables (With and Without Constraints),
  - e) Inserting/Updating/Deleting Records in a Table,
3. Perform the following:
  - a) Altering a Table,
  - b) Dropping/Truncating/Renaming Tables,
  - c) Backing up / restoring a Database.
4. For a given set of relation schemes, create tables and perform the following-
  - a) Simple Queries,
  - b) Simple Queries with Aggregate functions,
  - c) Queries with Aggregate functions (group by and having clause),
5. Perform queries with Date functions and String Functions
6. Perform queries with Math Functions, Join Queries- Inner Join, Outer Join and Subqueries- With IN clause, With EXISTS clause
7. Implement a columnar database using Apache Cassandra
8. Implement a document database with MongoDB
9. Design and Implement any 5 query using MongoDB
10. Write a case study for various types of NoSQL databases.

### Note:

1. Lab should be in scope of hands of experience and practice related program must
2. Add case study and Live project experience if any related contents