<table>
<tr><td colspan="3" align="center">Core 3
For the students admitted from A.Y. 2023-2024& onwards</td></tr>
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Offering Department: **Computer Application**		Offered to: **Master of Computer Application**
Semester - I		
Course Code	Course Title	Course Credit and Hours
23MCACC103	**Core 3:** Databases for Enterprise Applications	**3 Credits - 3 hrs/wk**

Course Description:
This course offers an overview of database management systems, covering both relational databases using Oracle and NoSQL databases using MongoDB. Students will learn the basics of table creation, data manipulation, and SQL query language. The course will also introduce document-oriented data modelling, querying, and data management using MongoDB. Students will gain practical experience through hands-on exercises and projects, allowing them to design and manage databases using both technologies and perform data analysis on large data sets. Upon completion, students will have a solid understanding of both relational and NoSQL databases.

Course Purpose:

The purpose of this course is to provide students with a comprehensive understanding of database management systems, with a focus on both Oracle and MongoDB. Students will learn to design, create, and manage both relational and NoSQL databases, using SQL and MongoDB query language. By the end of the course, students will be proficient in designing database schema, manipulating data, and querying large datasets using both technologies. The course aims to equip students with practical skills and knowledge necessary to pursue a career in database administration, data analysis, or related fields.

Course Outcomes: Upon completion of this course, the learners will be able to

CO No.	CO Statement	Bloom's Taxonomy Level $(K_1$ to $K_6)$
CO_1	Understand the fundamental principles of database management systems, including the differences between relational and non-relational databases.	K1,K2
CO_2	Demonstrate proficiency in creating and managing Oracle databases, including configuring database parameters, managing tablespaces, and monitoring database performance.	K2,K3
CO_3	Learn how to use MongoDB to store and retrieve data, including understanding the differences between document-oriented databases and relational databases.	K2
CO_4	Demonstrate proficiency in creating and managing MongoDB databases, including configuring data models, indexing data for efficient retrieval, and managing data replication.	K2,K3
CO_5	Analyze and troubleshoot common database issues, including query optimization, data backup and recovery, and performance tuning.	K4

Course Content	Hours
Unit-I: Basic concepts & Database system Architecture	**9 hrs**
• **Basic concepts** • Introduction to Data, Information, Data Item or Fields, database and database systems, Records, Files, Metadata, System Catalogue, Data dictionary,	

Course Content	Hours

• **Database system Architecture**
    • Schemas, Sub-schemas, Instances;
    • Advantages of three-tier Architecture;
    • Functions of DBMS.
 ▪ **Types of Data models** (Physical Data Models, Hierarchical Data Model, Network Data Model, Relation Data Model, Entity – Relationship (E-R) Data Model, Object – oriented Data Model).	

Unit-II: Data and ER Modelling with Normalization	**9 hrs**
▪ **Types of Database Systems**(Centralized Database System, Parallel Database System, Parallel Database System, Client / Server Database System, Distributed Database System. ▪ **Basic Entity – Relationship Concepts**; ▪ Entities, Relationship, Attributes, E – R Diagram symbols, Examples; ▪ Specialization and Generalization. ▪ Introduction to Normalization. ▪ Normal forms (1 NF, 2 NF, 3 NF, BCNF).	
Unit-III: SQL Statements DDL, DML, DCL, TCL	**9 hrs**

▪ **Use of DDL Statements to Create and Manage Tables**
    • Categorize the main database objects.
    • Review the table structure.
    • List the data types available for columns.
    • Create a simple table.
    • Decipher how constraints can be created at table creation.
    • Describe how schema objects work.
 ▪ **Data Manipulation Statements**
    • Describe each DML statement.
    • Insert rows into a table.
    • Change rows in a table by the UPDATE statement.
    • Delete rows from a table with the DELETE statement.
    • Save and discard changes with the COMMIT and ROLLBACK statements.
 ▪ **Retrieve Data using the SQL SELECT Statement**
    • List the capabilities of SQL SELECT statements.
    • Generate a report of data from the output of a basic SELECT statement.
    • Select All Columns.
    • Select Specific Columns.
    • Use Column Heading Defaults.
    • Use Arithmetic Operators.
    • Understand Operator Precedence.
    • Learn the DESCRIBE command to display the table structure.
 ▪ **Restricting and Sorting Data**
    • Write queries that contain a WHERE clause to limit the output retrieved.
    • List the comparison operators and logical operators that are used in a WHERE clause.
    • Describe the rules of precedence for comparison and logical operators.
    • Use character string literals in the WHERE clause.
    • Write queries that contain an ORDER BY clause to sort the output of a SELECT statement.
    • Sort output in descending and ascending order.	

Unit-IV: Joining, Grouping and Sub queries	**9 hrs**

Course Content	Hours
Aggregate Data Using the Group Functions - Use the aggregation functions to produce meaningful reports. - Divide the retrieved data in groups by using the GROUP BY clause. - Exclude groups of data by using the HAVING clause. **Display Data from Multiple Tables Using Joins** - Write SELECT statements to access data from more than one table. - View data that generally does not meet a join condition by using outer joins. - Join a table to itself by using a self-join. **Use Sub-queries to Solve Queries** - Describe the types of problem that sub-queries can solve. - Define sub-queries. - List the types of sub-queries. - Write single-row and multiple-row sub-queries. - Multiple-Column Sub queries. - Pair wise and Non-pair wise Comparison. - Scalar Sub query Expressions. - Solve problems with Correlated Sub queries. - Update and Delete Rows Using Correlated Sub queries. - The EXISTS and NOT EXISTS operators. - Invoke the WITH clause.	
Unit-V: Introduction to NoSQL & MongoDB	**9 hrs**
Introduction - What is NoSQL? - Why use NoSQL? - MongoDB: A brief history and overview. **Key concepts in NoSQL and MongoDB** - Document-oriented databases. - NoSQL data models: key-value, column-family, document, graph. - MongoDB data model and document structure. - Data consistency and ACID vs. BASE principles. **Getting started with MongoDB** - Installing and configuring MongoDB. - MongoDB shell: Basic commands and CRUD operations. - Connecting to MongoDB using a driver or an ORM. **Creating Documents in MongoDB** - Inserting documents using the insertOne() method. - Inserting multiple documents using the insertMany() method. - Handling duplicate documents. **Querying Documents in MongoDB** - Overview of the find() method. - Filtering documents using query operators. - Sorting and limiting query results. - Retrieving specific fields from documents. **Updating Documents in MongoDB** - Overview of the updateOne() and updateMany() methods. - Updating specific fields in documents using update operators. - Adding new fields to documents. - Upserting documents. **Deleting Documents in MongoDB**	

Course Content	Hours

• Overview of the deleteOne() and deleteMany() methods.
    • Deleting documents based on specific conditions.
    • Atomicity and Concurrency in MongoDB CRUD Operations.
    • Understanding atomic operations in MongoDB.
    • Handling concurrent CRUD operations.
▪ **Querying MongoDB**
    • Query language basics: filter, sort, limit, skip, projection
    • Aggregation pipeline: Group, match, project, sort, limit, skip, etc.
    • Geospatial queries and indexes.	

Text books:
- Json Price, Oracle Database 12c SQL, Master SQL, Oracle Press "Oracle Database SQL Language Reference 12c" Release 1

Reference books:
- Database Systems Concepts, design and Applications 2/e Singh, S. K., PearsonEducation, New Delhi, 2011
- An introduction to Database Systems, C J Date, Addition-Wesley.
- Silberschatz, Korth, "Data base System Concepts"., McGraw hill, 2008.
- Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2003.
- Sommerville, "Software Engineering", 8th Edition, Pearson Education
- Peter Rob and Carlos Coronel, Database System- Design, Implementation and Management (7/e), Cengage Learning, 2007.

Pedagogic tools:
- Chalk and Board
- Power point presentation
- Seminar
- Videos

Methods of Assessment & Tools:

Components of CIA: 30 marks

Sr. No.	Component	Content	Duration (if any)	Marks	Sub Total
A	Test 1	Any 2 Units	$1^{1/2}$ hours	5 (Set for 30)	20
	Test 2	Remaining 3 Units	2.5 Hours	15 (Set for 45)	
B	Assignment	-	-	5 (20 marks)	10
	Class activity	-	-	5 (20 marks)	
				Grand Total	**30**
Assignment		• Abstract and executive summary • Case study writing • Concept mapping • Student generated handbook • Presentations			
Class activity		• Quizzes • Poster Presentation • Group Discussion			