

Course Code				23AIMAP232			
Title of the Course				Document Oriented Databases Lab			
Offered to: (Programme/s)				B.Sc. Honours (Artificial Intelligence)			
L	0	T	0	P	2	C	1
Year of Introduction:		2024-25		Semester:			3
Course Category:		Major		Course Relates to:		Local, Regional, National, Global	
Year of Revision:		--		Percentage:		--	
Type of the Course:				SKILL DEVELOPMENT			
Crosscutting Issues of the Course :				Professional Ethics			
Pre-requisites, if any				Basic of Excel and Data handling			

Course Description:

This course provides a comprehensive overview of database management systems, focusing on both traditional SQL databases and modern NoSQL solutions like MongoDB. Starting with foundational concepts, it covers the roles and advantages of DBMS, data models, and SQL commands for database creation and manipulation. Students will explore entity relationships, normalization processes, and SQL constraints. The course then transitions to NoSQL databases, specifically MongoDB, addressing its features, installation, and operations such as CRUD, indexing, and sharding. The final unit emphasizes data modeling and aggregation techniques in both SQL and MongoDB, equipping students with skills to design and manage robust databases effectively.

Course Aims and Objectives:

S.N O	COURSE OBJECTIVES
1	To educate student regarding databases and how to manage databases.
2	To handle the large amount of data handling demands of business.
3	To implement a data store that provides high performance, high availability, and automatic scaling
4	To Process an immense diversity of data that needs to be stored and processed.
5	To make use of features and functionalities to work on NO SQL Data Base Mongo DB

Course Outcomes

At the end of the course, the student will be able to...

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Recap of the data handling about database. DBMS Architecture	K1	PO3 PO5	-

			PO6	
CO2	Understand databases, various features of Database, the installation procedure of Oracle.	K2	PO3 PO5 PO6	PSO2
CO3	Apply Query on Mongo DB's rich query language to support Create, Read, Update, and Delete (CRUD) operations.	K3	PO3 PO5 PO6	PSO1 PSO2
CO4	Analyze the aggregation framework to perform aggregation operations.	K4	PO3 PO5 PO6	PSO1 PSO2
CO5	Evaluate the performance of both SQL and No Sql Databases.	K5	PO3 PO5 PO6	PSO1 PSO2

For BTL: **K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create**

CO-PO MATRIX									
CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	-	-	2	-	2	2	-	-	-
CO2	-	-	2	-	3	3	-	-	1
CO3	-	-	2	-	3	3	-	2	1
CO4	-	-	2	-	3	3	-	2	1
CO5	-	-	2	-	3	3	-	2	1

Use the codes 3,2,1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Course Structure

This lab list covers the key areas of a(title of the course) course, providing hands-on practice with(technology/software)

Unit 1: [Overview of Database Management Systems] (6Hrs)

Lab 1:

- Create a student information system using SQL.
- **Dataset** (web link) / **Experiment:** Sample SQL database schema for student records.
- **Tasks:**
Design and implement a SQL-based student information system to manage student records, including enrollment, grades, and personal information.

Lab 2:

- Retrieve student information by executing SQL SELECT queries, filtering by conditions like student ID or name.
- **Dataset** (web link) / **Experiment:** SQL student database (provided schema or sample data).
- **Tasks:**

1. Query the student information system using SQL SELECT commands, filtering results by specific student attributes.

Unit 2: [Entity Types and SQL constraints]

(6Hrs)

Lab 3:

- Installing configuring running of Mongo db
- **Dataset** (web link) / **Experiment:** MongoDB Installation Guide (official MongoDB documentation).
- **Tasks:**

Install, configure, and run MongoDB on various operating systems.

Lab 4:

- Working with data base commands in mongo db
- **Dataset** (web link) / **Experiment:** MongoDB Command Reference (MongoDB official documentation).
- **Tasks:**
- Practice key database commands in MongoDB, including querying, updating, and managing collections.

Unit 3: [Data Manipulation Language]

(6Hrs)

Lab 5:

- Working with crud operations in mongo db
- **Dataset** (web link) / **Experiment:** MongoDB CRUD Operations Tutorial (official MongoDB documentation).
- **Tasks:**

Perform Create, Read, Update, and Delete operations on MongoDB collections using practical examples.

Lab 6:

- Implementing aggregation operation s in mongo db
- **Dataset** (web link) / **Experiment:** MongoDB Aggregation Pipeline Guide (official MongoDB documentation).
- **Tasks:** Use MongoDB's aggregation framework to perform complex data processing, filtering, grouping, and summarization.

Unit 4: [Mongo DB Operations]

(6Hrs)

Lab 7:

- Implementing index operations
- **Dataset** (web link) / **Experiment:** MongoDB Indexing Guide (official MongoDB documentation).

- **Tasks:** Create and manage indexes to optimize query performance, including single-field, compound, and text indexes.

Lab 8:

1. Working with replication in mongo db
2. Working with sharding in mongo db.
- **Dataset** (web link) / **Experiment:** MongoDB Replication Setup Guide (official MongoDB documentation) and MongoDB Sharding Documentation (official MongoDB guide).
- **Tasks:**
 1. Set up a MongoDB replica set to explore data replication, failover procedures, and read/write distribution.
 2. Set up sharding to horizontally scale a MongoDB database, managing data distribution and handling query routing.

Unit 5: [Data Modelling and Aggregation]

(6Hrs)

Lab 9:

- Working with multi document transactions in mongo db
- **Dataset** (web link) / **Experiment:** MongoDB Transactions Documentation (official MongoDB guide).
- **Tasks:** Implement multi-document transactions to ensure atomicity across multiple operations, maintaining data consistency.

Lab 10:

- Working with multi document transactions with conflicts in mongo db
- **Dataset** (web link) / **Experiment:** MongoDB Conflict Resolution Guide (official MongoDB documentation).
- **Tasks:** Manage and resolve conflicts in multi-document transactions, applying conflict resolution techniques to maintain consistency.

Lab Manual:

1. “Fundamentals of Database Systems” by R.Elmasri and S.Navathe, Pearson Education; Seventh edition.

References:

1. “Database System Concepts” by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill, Seventh edition
2. MongoDB Recipes: With Data Modeling and Query Building Strategies By Subhashini Chellappan, DharanitharanGanesan ,Publisher : Apress

Lab -Model Question Paper Pattern

23AIMAP232: Document Oriented Databases Lab

Offered to: B.Sc. Honours (Artificial Intelligence)

Max. Marks: 50

Max. Time: 3Hrs

Pass. Min: 20

(A) Evaluation Procedure	35 Marks
I Experiments (Exam & Execution)	30 Marks
II Viva	3 Marks
III Record	2 Marks

(B) CONTINUOUS ASSESMENT(Internal) 15 MARKS

15 marks for the continuous assessment (Day to day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the regularity/ record/viva). Laboratory teachers are mandated to ensure that every student completes 80%-90% of the lab assessments.

TOTAL: (A)+(B) = 50 MARKS