Name: **Enrolment No:**	

UPES

End Semester Examination, May 2025

Course: Database Engineering **Semester: VI**

Program: B.Tech CSE Full Stack AI **Time : 03 hrs.**

Course Code: CSFS3004 **Max. Marks: 100**

Instructions: Please attempt according to the time provided and given weightage. Make Assumptions wherever required.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Describe the BASE model in NoSQL. How is it different from ACID in RDBMS?	**4**	**CO1**
Q 2	Give an example to show how the find() method works with a filter condition in MongoDB.	**4**	**CO3**
Q 3	Explain the concept of Database Engineering and list the different types of databases.	**4**	**CO1**
Q 4	Explain the difference between $lookup and $unwind in aggregation. Can they be used together?	**4**	**CO4**
Q 5	What is the role of $exists in MongoDB? Write a query to find documents where the field email does not exist.	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Discuss the limitations of NoSQL databases. Provide examples of when these limitations may impact application design.	**10**	**CO1**
Q 7	Discuss the concept of Data Modeling in MongoDB. Explain the types of relationships with suitable MongoDB examples.	**10**	**CO5**
Q 8	Explain the difference between embedding and referencing in MongoDB. When would you choose one over the other?	**10**	**CO5**

Q 9	Consider a collection student in a database schoolDB.
	{
	"roll_no": 101,
	"name": "Anjali Verma",
	"class": "10th",
	"marks": {
	"Math": 78,
	"Science": 88,
	"English": 91
		10	**CO4**

	}
	}
	
	Write MongoDB queries to perform the following tasks:
	a) Show all documents from the students collection.
	b) Find students who scored more than 80 in Math.
	c) Update the name of a student with roll_no = 101 to "Anjali Sharma".
	d) Count the total number of student documents.
	
	OR
	
	A collection named blogPosts contains documents like:
	
	{
	"title": "MongoDB Advanced",
	"author": "John",
	"comments": [
	{ "user": "Alex", "comment": "Very helpful", "likes": 5 },
	{ "user": "Sara", "comment": "Great read", "likes": 10 }
	],
	"tags": ["MongoDB", "Database", "NoSQL"]
	}
	
	Perform the following tasks:
	a) Find all posts that contain the tag "Database"
	b) Find all posts with a comment that has more than 5 likes
	c) Add a new comment to a specific blog post
	d) Use $elemMatch to find posts with a comment by "Sara" and likes > 5		

SECTION-C **(2Qx20M=40 Marks)**			
Q 10	a) Explain the concept of indexing in MongoDB. Discuss why indexing is crucial for query performance and describe the potential impact on write operations when indexes are used. b) Write a MongoDB query to create the following index: Create a compound index on the name and age fields of the employee's collection. Then, write a query to find employees who are older than 30 and sorted by their names in ascending order using the created index.	10+10 = **20**	**CO2**

Q 11	You have a collection named sales with documents like:
	
	{
	"item": "Laptop",
	"category": "Electronics",
	"price": 60000,
	"quantity": 2,
	"region": "North"
	}
	a) Write an aggregation query to group sales by category and calculate:
	• Total quantity
	• Average price
	b) Write a MongoDB query to filter documents where category = "Electronics" before grouping.
	c) Explain how changing the order of $match and $group affects performance.
	d) What performance benefit does using $match early in the pipeline offer?
	
	OR
	
	{
	"studentId": "S001",
	"name": "Riya Sharma",
	"department": "CSE",
	"courses": [
	{ "courseCode": "DBMS101", "courseName": "Database Systems", "grade": "A" },
	{ "courseCode": "AI202", "courseName": "Introduction to AI" }
	]
	}
	
	Answer the following based on above sample data for student collection:
	a) Write a MongoDB query to update the grade of a specific course ("AI202") to "A-" for a student with studentId: "S001".
	b) Write an aggregation pipeline to list all courses with the total number of students enrolled in each.
	c) Explain how MongoDB's flexible schema supports evolving academic requirements such as adding new fields (e.g., attendance, feedback) to course objects.
	d) Define data modeling in NoSQL databases.
		(5+5+5+5)
		= 20
			CO3