

Branch Name:	Artificial Intelligence and Data Science
Program Code	ET108
Semester/Year:	Semester-VII/Fourth Year
Course Name:	NoSQL Database
Course Code:	2ET1080701T
Pre-requisite:	Basic Knowledge about DBMS

Course Objectives:

1. Introduce students to fundamental concepts and practical applications of various NoSQL databases, essential for modern data management.
2. Utilize Redis data structures and functionalities to implement efficient caching strategies, showcasing the role of Redis in enhancing data retrieval performance

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min	Max.	Mn	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	NoSQL Fundamentals Introduction to NoSQL databases, Types of NoSQL databases, CAP theorem, Consistency in NoSQL, Consistency in NoSQL, Comparisons between MongoDB, Cassandra, Neo4j and Redis, Use cases for different NoSQL databases, Factors influencing choice of database	8	15
2	Introduction to MongoDB Introducing MongoDB, MongoDB features and advantages, Installing MongoDB, Connecting to MongoDB, Basic CRUD operations, Data modeling in MongoDB, Indexing and Query Optimization, Aggregation Framework, Replica Sets, Sharding in MongoDB	10	25
3	Introduction to Cassandra Overview of Cassandra, Data model in Cassandra, CQL (Cassandra Query Language), Installing and configuring Cassandra, Basic operations and maintenance, Monitoring and troubleshooting, Cassandra architecture, Performance tuning and optimization, Compaction strategies	9	20
4	Neo4j and Graph Databases Basics of graph databases, Graph theory fundamentals, Use cases for graph databases, Installing Neo4j, Cypher Query Language, Basic graph operations, Graph algorithms and their applications, Neo4j optimization techniques, Real-world graph database scenarios	9	20

5	Redis Essentials Overview of Redis, Redis data structures, Use cases for Redis, Basic commands and operations, Advanced features of Redis, Transactions in Redis, Using Redis in real-world scenarios, Redis and caching strategies, Integrating Redis with other technologies	9	20
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List of Reference Books:

1. "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence" by Pramod J Sadalage and Martin Fowler 2012
2. "Making Sense of NoSQL: A guide for Managers and the Rest of us (Manning)" by Dan McCreary and Ann Kelly 2013
3. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1st Edition, 2019.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Explain different types of NoSQL Databases	2. Understanding
CLO2	Analyze the impact of the CAP theorem on various NoSQL databases, highlighting the trade-offs between consistency, availability, and partition tolerance in database systems.	4. Analyze 5. Evaluate
CLO3	Apply MongoDB's features and basic CRUD operations to design and manipulate data structures effectively, demonstrating proficiency in utilizing a document-oriented database.	2. Understanding 3. Applying
CLO4	Demonstrate Cassandra's data model and query language (CQL), showcasing the ability to create and manage distributed data tables efficiently.	2. Understanding 6. Creating
CLO5	Identify the significance of graph databases, illustrating their practical applications in solving complex relationship-oriented problems	2. Understanding 3. Applying 6. Creating

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1		M	M	M	M	L						M	H	M	M	
CLO2	L	H	H	M	H					L		M		H		
CLO3	L	H	M	M	H	L								M		M
CLO4	M	M	H	M	M			L					H			
CLO5	H	M	H		H				L			M	M		M	

H: High, M: Medium, L: Low