



**SARDAR VALLABHBHAI PATEL EDUCATION SOCIETY'S  
R. N. G. PATEL INSTITUTE OF TECHNOLOGY - RNgPIT**

An Autonomous Institute u/s UGC Act 1956

Approved by AICTE & affiliated to Gujarat Technological University

Bardoli - Navsari Road, At: Isroli (tarpore), Po: Afwa, Tal: Bardoli, Dist: Surat, Pin - 394620  
Phone: 95129 00457, 95129 00458 • Email: Info@rngpit.ac.in • Website: www.rngpit.ac.in

**Program Name: Integrated M.Sc. (IT)**

**Level: Post Graduate**

**Branch: Information Technology**

**Subject Code: 1BS402**

**Subject Name: Non-Relational Database Systems**

w. e. f. Academic Year:	2025
Semester:	4
Category of the Course:	Major Course

<b>Prerequisite:</b>	RDBMS
<b>Rationale:</b>	The course provides an introduction to modern data management systems engineered to efficiently process large, dynamic, and unstructured datasets beyond the capabilities of relational databases.

**Teaching and Examination Scheme:**

Teaching Scheme (in Hours)			C Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial / Practical	
					SEE (TH)	IAT	CCE	SEE (P)
2	0	4	4	70	30	20	30	150

Where SEE: Semester End Examination, IAT: Internal Assessment Test, CCE: Continuous and

## Comprehensive Evaluation

## Course Content:

Unit No.	Title and Content	No. of Hours	% of Weightage	Corresponding CO(s)
<b>Section A</b>				
1.	<b>Introduction to NoSQL</b> 1.1 Introduction NoSQL 1.2 RDBMS limitations 1.3 ACID vs BASE 1.4 SQL vs NoSQL 1.5 CAP Theorem	3	10%	CO1
2.	<b>Types of NoSQL Databases</b> 2.1 Key-Value 2.2 Document 2.3 Column-Family 2.4 Graph 2.5 Real-world examples 2.6 Choose the appropriate type	6	20%	CO2
3.	<b>Column-Oriented Databases</b> 3.1 Column-Family data model 3.2 Row vs Column storage 3.3 Cassandra data structures 3.4 Cassandra Architecture 3.5 CQL Basics	6	20%	CO3
<b>Section B</b>				
4.	<b>MongoDB Fundamentals</b> 4.1 Document Data Model 4.2 JSON and BSON 4.3 Collections, Documents and Fields 4.4 Schema flexibility 4.5 CRUD operations 4.6 Query operators	6	20%	CO4
5.	<b>MongoDB Advanced Concepts</b> 5.1 Aggregation 5.2 Aggregation Pipeline Use Cases 5.2.1 Counting, filtering, grouping 5.2.2 Analytic operations 5.3 Data Relationships	6	20%	CO5

<b>6</b>	<b>Introduction to Graph and Key-Value Databases</b> 6.1 Introduction to key-value Database 6.1.1 In-memory key-value store 6.1.2 Redis data types 6.2 Introduction to Graph Databases 6.2.1 Introduction to Neo4j 6.2.2 Nodes, Relationships, Properties 6.2.3 Graph data model	<b>3</b>	<b>10%</b>	<b>CO6</b>
	<b>Total</b>	<b>30</b>	<b>100</b>	

**Course Outcome:**

After Completion of the Course, the Student will able to:

No	Course Outcomes	Bloom's Taxonomy Alignment
01	Describe concepts and characteristics of NoSQL.	U
02	Differentiate major NoSQL database types.	R
03	Explain Cassandra's column-family data model.	U
04	Apply MongoDB document structure.	A
05	Use MongoDB aggregation and data relationship concepts.	A
06	Understand Key-Value and Graph and database systems.	U

**Suggested Specification Table with Marks (Theory):**

Distribution of Theory Marks(%)					
R Level	U Level	A Level	N Level	E Level	C Level
<b>30</b>	<b>40</b>	<b>30</b>	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

**References/Suggested Learning Resources:**
**(a) Text Books:**

1. Sriram, N., Dhanusha, C. & Kanagalakshmi, S. (2025) Mastering NoSQL with MongoDB. Coimbatore: Deep Science Publishing.
2. Paul, B. & Collins, R. (2024) NoSQL Databases: Comprehensive Introduction to Non-Relational Data Management. Khin Soe Publishing.
3. Santana, O. (2024) Java Persistence with NoSQL: Revolutionize Your Java Apps with NoSQL Integration. Berlin: De Gruyter

**(b) Reference Books:**

4. Fowler, M. & Sadalage, P. J. (2012) NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. Boston: Addison-Wesley.
5. Tiwari, S. (2011) Professional NoSQL. Indianapolis: Wrox Press, John Wiley & Sons.
6. Hussain, K. & Hussain, F. (2024) NoSQL Essentials: Navigating the World of Non-Relational

Databases. San Francisco: Sonar Publishing.

7. McCreary, D. & Kelly, A. (2013) Making Sense of NoSQL: A Guide for Managers and the Rest of Us. Shelter Island: Manning Publications.
8. Paul, B. & Collins, R. (2024) SQL & NoSQL Databases: Models, Languages, Consistency Options and Architectures for Big Data Management. Springer Nature.

**(C) Open source software and website:**

1. <https://www.mongodb.com/>
2. [https://cassandra.apache.org/\\_/index.html](https://cassandra.apache.org/_/index.html)
3. <https://www.mongodb.com/products/platform>
4. <https://www.scylladb.com/learn/nosql/>
5. <https://www.mygreatlearning.com/academy/learn-for-free/courses/introduction-to-nosql>

**Suggested Course Practical List:**

<b>Practical List</b>	
<b>1.</b>	Store product details such as name, price, category, and stock quantity in MongoDB.
<b>2.</b>	Store basic student profiles including name, roll number, department, and year in MongoDB.
<b>3.</b>	A shop sells products and wants to add new items including name, category, price, and stock quantity in MongoDB.
<b>4.</b>	A bookstore wants to find all books by a particular author in MongoDB.
<b>5.</b>	A restaurant wants to add a new menu item including name, category, price, and availability in MongoDB.
<b>6.</b>	A library keeps track of books and needs to update the number of copies available when a book is borrowed using MongoDB.
<b>7.</b>	A ride-booking app wants to change a driver’s status from “Busy” to “Available” using Cassandra.
<b>8.</b>	An e-commerce database wants to update the status of an order from “Pending” to “Shipped” using Cassandra.
<b>9.</b>	A restaurant wants to add a new menu item including name, category, price, and availability using Cassandra.
<b>10.</b>	A hospital wants to update the age of a patient in their record using Cassandra.
<b>11.</b>	A cinema ticketing system wants to update the number of available seats after a booking is made in MongoDB
<b>12.</b>	A music streaming service wants to add a new song including title, artist, album, and duration using Cassandra.
<b>13.</b>	A pharmacy wants to insert details of new medicines including name, manufacturer, price, and expiry date using Cassandra.
<b>14.</b>	A logistics company wants to update the delivery status of a shipment from “In Transit” to “Delivered” using Cassandra.
<b>15.</b>	A travel agency wants to store new tour package details including destination, duration, cost, and available slots using Cassandra.

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