

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

22CS/CA/CD553

Fifth Semester B.E. Degree Examinations, February 2025

NOSQL

(Common to CSE, CSE-AI and CSE-DS)

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
<u>Module-1</u>			
1.	a. What is NOSQL? Explain briefly about the aggregate data models with neat diagram.	10	(2 : 1 : 1.2.1)
	b. Describe the concept of "Impedance Mismatch" in relational databases and how it impacts application development. Provide examples.	05	(2 : 1 : 2.2.1)
	c. What are materialized views? Explain the two approaches with an example.	05	(2 : 1 : 1.2.1)
(OR)			
2.	a. Explain the value of relational databases of relational databases and discuss why they have been successful over the last two decades.	10	(2 : 1 : 1.2.1)
	b. Define "Aggregate Orientation" in NoSQL databases and describe its advantages and disadvantages with examples.	05	(2 : 1 : 1.2.1)
	c. What is schemaless database? Discuss the problems schemaless database with example.	05	(2 : 1 : 1.2.1)
<u>Module-2</u>			
3.	a. Explain the following types of replication in distributed model with neat diagrams: (i) Master-Slave replication (ii) Peer to Peer replication.	10	(2 : 2 : 1.2.1)
	b. How do quorum-based read and write operations ensure consistency in replicated NoSQL systems? Discuss the trade-offs involved.	10	(2 : 2 : 1.2.1)
(OR)			
4.	a. Discuss the CAP theorem and its implications for designing distributed NoSQL systems. Provide relevant examples.	10	(2 : 2 : 2.2.1)
	b. Describe the role of version stamps in ensuring consistency in distributed systems. Discuss the types of version stamps and their respective use cases.	10	(2 : 2 : 2.2.1)
<u>Module-3</u>			
5.	a. Describe the process of the "Map" and "Reduce" stages in a Map-Reduce job, using a relevant example.	10	(2 : 3 : 2.2.1)
	b. Discuss the roles of partitioning and combining in Map-Reduce operations. How do they improve efficiency?	10	(2 : 3 : 2.2.1)
(OR)			

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

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| 6. | a. | Describe the key features of key-value stores such as transactions, and scalability. | 10 | (2 :3 : 2.2.1) |
| | b. | List and explain scenarios where key-value stores are not suitable. What alternative databases could be used in these cases? | 10 | (2 :3 : 2.2.1) |

Module-4

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| 7. | a. | Explain the key features of document databases and how they differ from traditional RDBMS systems. | 10 | (1 :4 : 1.2.1) |
| | b. | Create a database named “ Store ” in MongoDB with a collection called “ Sales ” containing documents with some or all of the following fields: customerId, customerName, gender, dataOfBirth, contactNumber, address (containing fields: houseNo, street, city), orders (containing fields: orderId, orderDate, items (containing fields: itemId, itemName)). | 10 | (4 :4 : 1.2.1) |

Perform the following operations on the database:

- (i) Insert records for 3 customers and 5 items in at least 10 orders.
- (ii) Update the contact number of a particular customer.
- (iii) Display customerId, customerName, gender, contactNumber, of customers residing in “Ballari”.
- (iv) Display city-wise count of customers
- (v) Display all customers who’s gender is male

(OR)

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| 8. | a. | Describe the CAP theorem and explain how MongoDB balances consistency, availability, and partition tolerance. | 10 | (2 :4 : 2.2.1) |
| | b. | Create a student master database with a collection called “ Student ” containing documents with following fields: StudentRollNo, StudentName, Grade, Hobbies, and DOJ. | 10 | (4 :4 : 1.2.1) |

Perform the following operations on the database:

- (i) Insert 5 Records in the database.
- (ii) Retrieve only Student Name and Grade
- (iii) Add new field “Address” in Student Collection.
- (iv) Find all documents in proper format. (Without _Id field)
- (v) Find those documents where the Hobbies is set neither to ‘Chess’ nor is set to ‘Dancing’

Module-5

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| 9. | a. | Illustrate with an example how relationships are represented in a graph database. | 10 | (2 :5 : 2.3.1) |
| | b. | What are the suitable use cases for graph databases? Mention the limitations of graph databases. | 10 | (2 :5 : 1.2.1) |

(OR)

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| 10. | a. | Discuss the advantages of using graph databases over relational databases. | 10 | (2 :5 : 2.2.1) |
| | b. | Discuss the query features of a graph database. | 10 | (2 :5 : 2.2.1) |

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