

- Q.6 Attempt any two:
- Describe the core components of a search engine and their roles. How does typical search engine process user requests, from the initial search to presenting search results? **5**
 - Discuss the process of searching and indexing data stores in a search engine. What techniques and algorithms are employed to ensure efficient and relevant data retrieval? **5**
 - Describe the concept of using reverse queries in search engines. How do reverse queries enhance user experience and the accuracy of search results? **5**

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Engineering
End Sem Examination Dec-2023

CS3ET06 No SQL Databases

Programme: B.Tech.

Branch/Specialisation: CSE / All

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1
- What is the primary historical reason that led to the development of NoSQL databases? **1**
 - Performance bottlenecks in relational databases
 - Lack of data security in traditional databases
 - Inadequate support for complex transactions
 - Scalability issues in NoSQL databases
 - In the context of NoSQL databases, what does the term "scalability" refer to? **1**
 - The ability to enforce strict schema constraints
 - The ease of querying and joining tables
 - The system's ability to handle growing data volumes and user loads
 - The use of complex transactions
 - When evaluating NoSQL databases, which of the following are a key technical consideration? **1**
 - Market share of the database
 - Business revenue projections
 - Data modeling flexibility
 - Advertising budget
 - What is a fundamental aspect of keeping data safe in NoSQL databases? **1**
 - Storing all data in a single table
 - Implementing role-based access control
 - Restricting data access to a single user
 - Using SQL queries for data retrieval

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| v. | What is a fundamental characteristic of key-value databases? | 1 |
| | (a) Complex data structures | |
| | (b) Structured query language (SQL) support | |
| | (c) Flexible schema | |
| | (d) Simple key-value pairs | |
| vi. | What is the process of dividing a document database into smaller, more manageable pieces called? | 1 |
| | (a) Data partitioning | |
| | (b) Versioning | |
| | (c) Consistency | |
| | (d) Data replication | |
| vii. | What is a key feature of column family databases that makes them particularly suitable for handling large volumes of data? | 1 |
| | (a) Support for complex queries | |
| | (b) Schema flexibility | |
| | (c) Columnar storage | |
| | (d) In-memory caching | |
| viii. | What is one of the key advantages of using graph databases for data storage and retrieval? | 1 |
| | (a) High availability | |
| | (b) Schema flexibility | |
| | (c) Efficient handling of complex transactions | |
| | (d) Native support for graph and network modeling | |
| ix. | Which of the following is a common feature of search engines? | 1 |
| | (a) Data storage using tables | |
| | (b) Complex transaction support | |
| | (c) Efficient search and retrieval of information | |
| | (d) Use of Blockchain technology | |
| x. | In a search engine, what is the purpose of indexing? | 1 |
| | (a) Sorting search results | |
| | (b) Scanning for malware | |
| | (c) Storing and organizing web content for efficient retrieval | |
| | (d) Creating complex queries | |
| Q.2 | i. Provide an overview of the historical development of NoSQL databases. | 2 |
| | ii. What challenges and limitations in traditional relational databases led to the emergence of NoSQL solutions? | 3 |

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| | iii. | Explore the concept of scalability in the context of NoSQL databases. How do NoSQL databases address the challenges of handling growing data volumes and user loads? | 5 |
| OR | iv. | In the context of the CAP theorem, explain what "Consistency," "Availability," and "Partitioning" mean, and how they influence the design and behaviour of distributed databases. | 5 |
| Q.3 | i. | When performing a technical evaluation for NoSQL databases, what are the key technical factors to consider? | 2 |
| | ii. | Discuss the strategies for scaling NoSQL databases. How does horizontal scalability differ from vertical scalability? What challenges and advantages does each approach offer? | 8 |
| OR | iii. | Discuss the significance of security in NoSQL database environments. How can encryption, access controls, and auditing mechanisms be implemented to protect sensitive data and ensure compliance with security standards? | 8 |
| Q.4 | i. | Explain the fundamental concept of a key-value database. What role do keys and values play in organizing and retrieving information? | 4 |
| | ii. | Discuss the concept of data consistency in key-value databases. What strategies are typically used to maintain data consistency, especially in distributed environments? | 6 |
| OR | iii. | Define the term "sharding" in the context of document databases. How does sharding enhance database performance and scalability, especially in large-scale systems? | 6 |
| Q.5 | i. | Explain core features and architectural principles of column family databases. How do these databases differ from traditional relational databases in terms of data storage and organization? | 4 |
| | ii. | Compare column family databases with key-value and document databases. What are the key differences and similarities in data modeling, schema flexibility, and use cases among these database types? | 6 |
| OR | iii. | Describe the consistency models used in graph databases to maintain data integrity and reliability. What types of consistency models are commonly associated with graph databases? | 6 |

Marking Scheme

No SQL database-CS3ET06 (T)

Q.1	i)	A. Performance bottlenecks in relational databases	1
	ii)	C. The system's ability to handle growing data volumes and user loads	1
	iii)	C. Data modeling flexibility	1
	iv)	B. Implementing role-based access control	1
	v)	D. Simple key-value pairs	1
	vi)	A. Data partitioning	1
	vii)	C. Columnar storage	1
	viii)	D. Native support for graph and network modeling	1
	ix)	C. Efficient search and retrieval of information	1
	x)	C. Storing and organizing web content for efficient retrieval	1
Q.2	i.	Historical databases. (As per explanation)	2
	ii.	Challenges and limitations solutions (As per explanation)	3
	iii.	Explore of NoSQL databases. 3 Marks	3
		NoSQL databasesloads 2 Marks	2
OR	iv.	In the context of the CAP theorem, ... databases. (As per explanation)	5
Q.3	i.	When performing Consider (As per explanation)	2
	ii.	The strategies for scaling NoSQL databases. 2 Marks	2
		Howscalability 3 Marks	3

		Challenges and Offer	3 Marks	
OR	iii.	The significanceenvironments.	3 Marks	3
		Encryption, Standards	5 Marks	5
Q.4	i.	Fundamental concept of a key-value database.	2 Marks	2
		Keysinformation	2 Marks	2
	ii.	The concept databases.	3 Marks	3
		Strategies are typically environments	3 Marks	3
OR	iii.	The term "sharding" databases.	3 Marks	3
		Sharding enhance systems	3 Marks	
Q.5	i.	Core features databases.	2 Marks	2
		Databases differ organization	2 Marks	2
	ii.	Compare column family databases.	2 Marks	2
		The key types	4 Marks	4
OR	iii.	The consistency integrity and reliability.	3 Marks	3
		Consistency models are databases	3 Marks	3
Q.6		Attempt any two:		
	i.	The core search results (As per explanation)		5
	ii.	The process data retrieval (As per explanation)		5
	iii.	The concept reverse .. search results (As per explanation)		5

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