PAPER ID-310871

Subject Code: KDS052

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM V) THEORY EXAMINATION 2023-24
DISTRIBUTED SYSTEM

TIME: 3 HRS **M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	Marks	CO
a.	Briefly explain key characteristics of Distributed System.	2	1
b.	Provide two real-world examples of distributed systems.	2	1
c.	Differentiate between resource deadlocks and communication deadlocks.	2	2
d.	Describe the concept of centralized deadlock detection.	2	2
e.	Describe two common system models used in the context of distributed systems.	2	3
f.	Define the Byzantine Agreement Problem.	2	3
g.	Define backward recovery and forward recovery	2	4
h.	Contrast two types of commit protocols used in distributed systems.	2	4
i.	Define nested transactions.	2	5
j.	Define timestamp ordering in the context of concurrency control.	2	5

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a.	Differentiate between centralized, decentralized, and distributed architectural models. Provide an example for each, highlighting their respective advantages and disadvantages.	10	1
b.	Elaborate on the conditions that must be satisfied by a distributed mutual exclusion algorithm to adhere to the Mutual Exclusion Theorem.	10	2
c.	Discuss the role of fault tolerance in consensus algorithms. How do consensus algorithms handle failures in distributed environments?	10	3
d.	Discuss the challenges associated with voting protocols in large-scale distributed systems. How do these protocols handle communication delays and node failures?	10	4
e.	Define flat and nested distributed transactions. How do these transaction models differ from their non-distributed counterparts, and what challenges do they introduce?	10	5

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

a.	Discuss the challenges posed by the absence of a global clock in distributed systems. How does this limitation impact the synchronization of events across multiple nodes?	10	1
b.	Discuss the significance of termination detection in distributed systems. How can the detection of termination be achieved, and why is it crucial for ensuring system stability?	10	1

4. Attempt any *one* part of the following: **10 x 1 = 10**

a.	Differentiate between resource deadlocks and communication deadlocks in a distributed system. Provide examples for each type of deadlock.	10	2

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b.	Explain the principles behind path pushing algorithms and edge chasing algorithms for distributed deadlock detection. How do these algorithms contribute to identifying and resolving deadlocks in a distributed setting?	10	2

5. Attempt any *one* part of the following: 10 x 1 = 10

a.	Explain the fundamental concept of distributed shared memory. Provide an overview of an algorithm used for the implementation of distributed shared memory in a distributed system.	10	3
b.	Explain the challenges associated with achieving atomic commit in a distributed database system. How do two-phase commit protocols address these challenges?	10	3

6. Attempt any *one* part of the following: 10 x 1 = 10

a.	Define dynamic voting protocols and explain how they adapt to changes in the system, such as node additions or failures. What advantages do dynamic voting protocols offer in dynamic and evolving distributed environments?	10	4
b.	Discuss the importance of transaction recovery in distributed databases. What mechanisms are commonly used to recover from failures and ensure the atomicity and durability of transactions?	10	4

7. Attempt any *one* part of the following: 10 x 1 = 10

a.	Compare two common atomic commit protocols, Two-Phase Commit (2PC) and Three-Phase Commit (3PC). What are the key differences between these protocols, and in what scenarios is each more suitable?	10	5
b.	Explain the role of group communication in replicated systems. How does group communication facilitate coordination and consistency among replicated nodes?	10	5