Software Engineering

3rd Year 1st Semester Final Examination' June 2022 (Session: 2018-19)

Course Code: SWE 325 Credits: 2 Course Title: Distributed System

Time: 2 hrs Total Marks: 50

Group A

[Answer all the questions]

1. Answer any FIVE 5x1=5

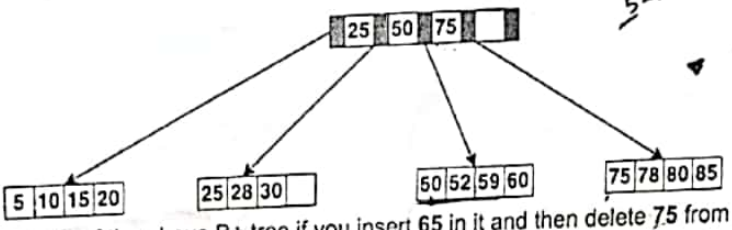
a) What is "Mobile Code"?
b) What is RPC and RMI?
c) What is a *stub* in RPC?
d) What is *MapReduce*?
e) What is *Thrashing* in DSM?
f) What do you understand by the terms Marshalling and Unmarshalling?
g) Mention two Memory Coherence Protocols used in DSM.
h) What is *Secondary* index in an Ordered indexing system?

2. Answer any FOUR 4x2.5=10

a) Name a communication paradigm that is Time and Space Uncoupled. Explain how.
b) Is the World Wide Web (WWW) itself a distributed system? Discuss.
c) What is the relationship between microservices and distributed systems? Explain in brief.
d) What are the differences between *Thread* and *Process*?
e) What is the difference between *connection oriented* communication and *message oriented* communication?
f) What is MapReduce? Briefly state how it works.

3. Answer any TWO 2x5=10

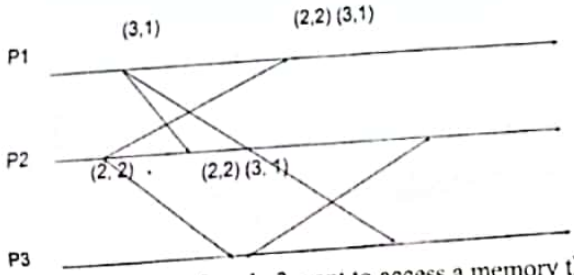
a)



Draw the state of the above B+ tree if you insert **65** in it and then delete **75** from it.

b) The Election service must ensure that a vote is recorded whenever any user thinks they have cast a vote. Discuss the effect of maybe call semantics on the Election service. Would at-least-once call semantics be acceptable for the Election service or would you recommend at-most-once call semantics?

c)



Suppose processes p1, p2 and p3 want to access a memory that is shared among them. They use messages based on Lamport's total ordering relation to vote among them. For example a message (4,3) consists of (timestamp, process-id). Now complete the diagram and determine which process will get the access to the memory first?

Group B

[Answer all the questions]

4. Answer any FIVE 5x1

a) What do you understand by the term "Heterogeneity"?
b) What is meant by Serialization?
c) What is Indexing? Give two examples of indexing mechanisms.
d) Give an example where multicast communication can be used.
e) What is Space Uncoupling in a distributed system?
f) Name 3 applications that can use the Publish-Subscribe system.
g) What is DSM?
h) What is the disadvantage of Sparse Indexing?

5. Answer any FOUR 4x2.5=10

a) Suppose you are facing performance bottlenecks while printing from your laptop. Assume that the processing power of your laptop is significantly greater than the one of the printing machine. What measures can you take to avoid this bottleneck?
b) What are the differences between Ordered Indexing and Sparse Indexing?
c) What do you understand by *Transient Asynchronous Communication* (in message oriented communication)? Explain with a diagram?
d) What advantages may you have using Sparse Indexing over Dense Indexing? Discuss in brief.
e) Which pattern does Berkeley Socket follow between connection oriented communication and message oriented communication? Explain why.
f) What is the *Conflict Equivalent Schedule*? When can we say that a schedule is *Conflict Serializable*?

6. Answer any TWO 2x5=10

a) Suppose, you have to develop a voice calling (VoIP - Voice over IP) application for a client. For streaming, you need to choose between TCP and UDP protocols. What do you think about which one you should choose? What advantage you may have from it over the other? **5**

b) Suppose you are developing a simple e-commerce website for a client.

i. What are the communication entities of that system from a programmer perspective? Explain in brief. **2.5**

ii. Write down two mechanisms you may follow to communicate with those entities you think in the answer to question *i*. **2.5**

c) Suppose you are given the following words. **5**
Dear, Bear, River, Car, Car, River, Deer, Car, Bear.
Now count the occurrences of these words using MapReduce.