Roll No. | | | | | | | | | | |

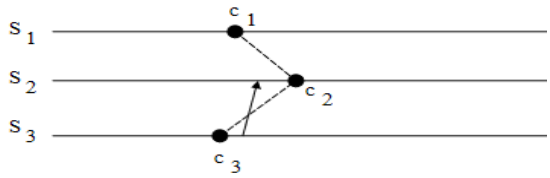
B.E. (FT) END SEMESTER EXAMINATIONS – AUGUST- 2021

Computer Science and Engineering
VI Semester
CS6303 DISTRIBUTED SYSTEMS
(Regulation 2018 - RUSA)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Mention the problems which requires synchronization.
2. Define a cut. Identify the type of cut in the given diagram.

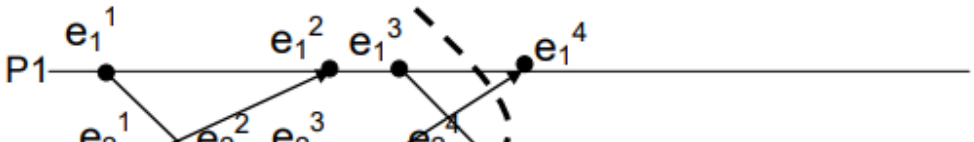


3. What is meant by Causally Ordered execution? Give example.
4. Give any two applications of a distributed snapshot.
5. What is the purpose of REPLY message in Lamport's algorithm?
6. Mention the application of Wait for Graphs (WFG) in deadlock detection.
7. Why rollback recovery is complicated in distributed systems?
8. How the agreement problem differs from consensus problem?
9. List the important characteristics of Peer-to-Peer networks.
10. Write the merits of distributed shared memory.

PART – B (8 x 8 = 64 marks)
(Answer any 8 questions)

11. Identify any four distributed applications two in each scientific and commercial application areas. Discuss its motivating factors that are necessary for building it over a distributed system.

12. Answer the following questions from the figure.



i. Is the run **<e_1^1, e_2^2, e_2^3, e_3^2, e_2^4, e_3^3>,** a linearization of events? Justify your answer.**(3 m)**

ii. Check whether the **cut X** is consistent or not?**(2 m)**

iii. As per Lamport's Happened-Before relation, identify all the events that happen before event **e_2^4**?**(3 m)**

13. Explain the differences and relationships between
    i) a synchronous execution
    ii) an asynchronous execution
    iii) an asynchronous execution that uses synchronous communication
    iv) a synchronous system

14. Consider a distributed system where every node has its physical clock and all physical clocks are synchronized. Write a simpler algorithm to record global state assuming the communication network is reliable.

15. Show that in Lamport's algorithm the critical section is accessed in increasing order of timestamps.

16. Discuss the Suzuki-Kasami's broadcast algorithm and verify its correctness.

17. Show that, in the AND model, false deadlocks can occur due to deadlock resolution in distributes systems.

18. Elaborate on any two checkpoint-based recovery techniques.

19. Assume a checkpoint algorithm in which a process takes a local checkpoint immediately after sending a message. Show that the last checkpoint at all processes will always be consistent.

20. Assume that a meeting panel consists of four members: m1, m2, m3 and m4. They were called to discuss some administrative issues in their concern and agree upon some decision. During the meeting, it was found that two of them are not authorized members. Suggest an algorithm and show that an agreement cannot always be reached among them.

21. Illustrate the distributed reassignment protocol in CAN and analyze its time complexity.

22. Compare the distributed shared memory consistency models.

PART – C (2 x 8 = 16marks)

23. Draw the Butterfly networks for n=16 inputs and outputs. And also trace the paths from P5 to M3 and P6 to M2.

24. Identify and discuss the issues in implementing a distributed shared memory software for an application of your choice.