one more process wants to enter it, it must be allowed to do so. Modify Ricart Agrawala algorithm to solve the L-exclusion problem. (CO4) [4]

Q. 6. Draw a space-time diagram for a case where causally ordered broadcast is violated. How does the protocol by Birman et. al. for causally ordered broadcast handle such a case? (CO4) [3]

Q. 7. Consider the edge-chasing algorithm (without priorities). Give examples to show that it could detect phantom deadlocks. (CO4) [4]

Department of Computer Science & Engineering

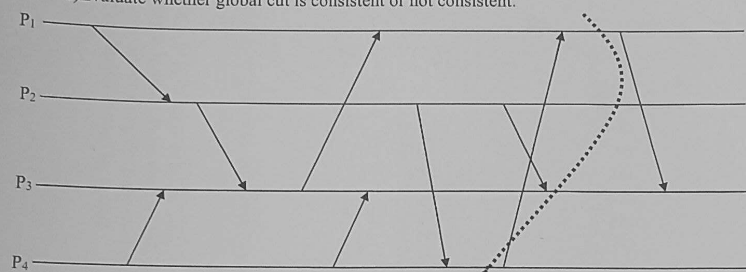
Mid Sem Examination February 2023

Branch: 4th Year B.Tech CSE
Course: CSL409 Topics in Distributed Systems (Slot C)
Duration: **1.5 Hrs**

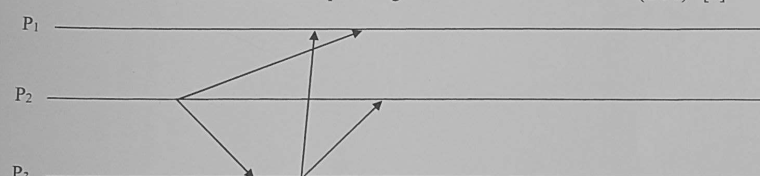
Max. Marks: **30**

Note: Attempt all questions. Credit reserved for neat comments/ to the point answers. Assume any missing data.

Q.1. a)Determine the vector timestamp of each of the events shown below. (CO1) [5]
b)Timestamp of the global cut, the dotted line, cutting across all the processes.
c)Evaluate whether global cut is consistent or not consistent.



Q.2. Assume the matrix algorithm is used for casual ordering of the messages for delivery at the receiving process. Show the matrix timestamps of the sending and receiving of the messages and also indicate if any message needs to be buffered and delivered later than what is indicated in the time space diagram. (CO1) [4]



Q. 3. Vector clocks are convenient for identifying concurrent as well as causally ordered events. However, scalability is a problem, since the size of the clock grows linearly with the number of processes n. Is it possible to detect causality (or concurrency) using vector clocks of size smaller than n? Justify your answer. (CO1) [5]

Q. 4 In the Suzuki–Kasami algorithm, prove the liveness property that any process requesting a token eventually receives the token. Also compute an upper bound on the number of messages exchanged in the system before the token is received. (CO1) [5]

Q. 5 A Generalized version of the mutual exclusion problem in which up to L processes (L ≥1) are allowed to be in their critical sections simultaneously is known as the L exclusion problem. Precisely, if fewer than L processes are in the CS at any time and