ANNA UNIVERSITY – MIT CAMPUS
DEPARTMENT OF COMPUTER TECHNOLOGY

B.E Computer Science and Engineering
Semester – 6/8
Continuous Assessment Test - 1

CS6303 - DISTRIBUTED SYSTEMS

Time: 50 Minutes

Max.Marks: 30

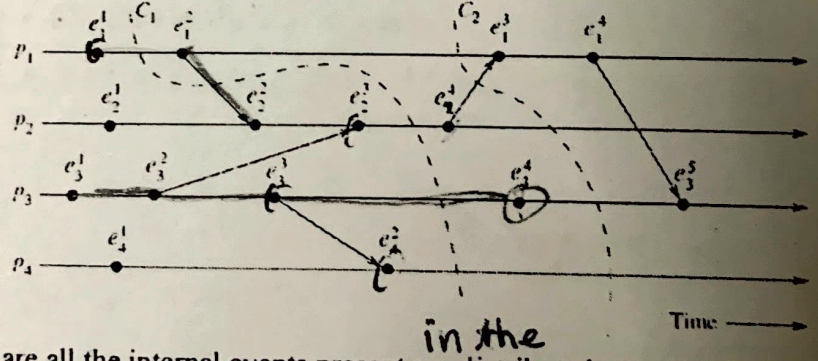
PART- A (7 x 2 = 14 Marks)

(Answer all Questions)

Q. No	Questions	Marks
1	What is mean by distributed execution? How does it differ from normal execution?	2
2	Define the term coupling. Identify SIMD and MIMD models are either tightly or loosely coupled with proper justification.	2
3	Compare and contrast network, distributed, and multiprocessor operating systems.	2
4	Explain in brief why the *receive call* cannot be asynchronous.	2
5	What is meant by the consistent cut?	2
6	How 'Send' and 'Receive' operations can be replaced during the emulation of message-passing on a shared memory system	2
7	How the global state of distributed system can be recorded ?	2

PART- B (2 x 8 = 16 Marks)

(Answer any two)

Q. No	Questions	Marks
8	Explain in detail about various types of communication primitives used in distributed communications with a suitable timing diagram.	8
9	What is mean by interconnection network? List its types and give short notes about them. Draw the Omega networks for n = 8 inputs and outputs.	8
10	Answer the following question in correspondence with the following space-time diagram.  a) What are all the internal events present in the distributed execution? List them. (1) b) What are all the event information available at the event e_3^4 (2) c) List any two pairs of events that can occur concurrently? (2) d) Check whether this global state $\{LS_1^1, LS_2^3, LS_3^3, LS_4^2\}$ consistent or not? (1) e) List the events which are future(C1) and past(C2). (1) f) Identify the event which will be affected most by e^4_2 in among the future of C2. (1)	8

ANNA UNIVERSITY – MIT CAMPUS
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B.E Computer Science and Engineering
Semester – 6/8
Continuous Assessment Test - 2
CS6303 - DISTRIBUTED SYSTEMS

Time: 50 Minutes

Max. Marks: 30

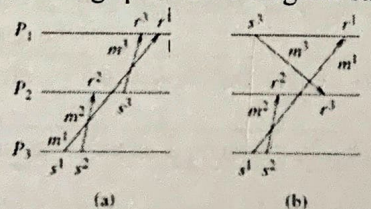
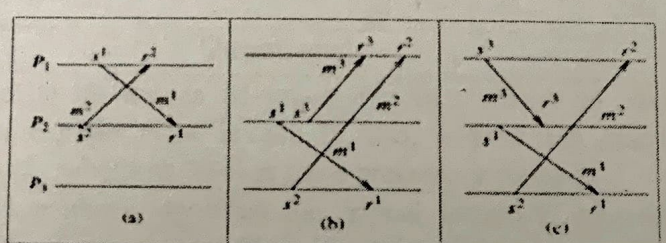
PART- A (7 x 2 = 14 Marks)

(Answer all Questions)

Q. No	Questions	Marks
1	Summarize why the recording of total ordering is not possible with scaler times and how it can be possible vector time.	2
2	Write down the rules for updating the vector clock in distributed execution.	2
3	Why is it difficult to keep a synchronized system of physical clocks in distributed systems?	2
4	Prove that the CO property and the MO property characterize an identical class of executions.	2
5	Define the term overtaken messages. How it can be resolved to ensure the CO property?	2
6	How an asynchronous execution can be claimed as realizable with synchronous communication?	2
7	Differentiate open and closed group in group communication.	2

PART- B (2 x 8 = 16 Marks)

(Answer any two)

Q. No	Questions	Marks
8	Write the Bagrodia's Algorithm for implementing crown-free message scheduling. Explain all terms and different types of messages used in this.	8
9	Explain in detail how the physical clock synchronization is achieved using NTP.	8
10	(a) Define crown with example. What is the role crown in determining an RSC execution? (2) (b) Identify whether the following space-time diagram satisfies CO or not. Justify it (3)  (a) (b) (c) Identify the crown sequence and its size from the following space-time diagram. (3) 	8

B.E Computer Science and Engineering
Semester – 6/8

MID-SEM ASSESSMENT

CS6303 & DISTRIBUTED SYSTEMS
(Regulation 2018)

Time: 90 Minutes | Max.Marks: 50

CO 1	Elucidate the foundations and issues of distributed systems
CO 2	Point out the various synchronization issues and global state for distributed systems
CO 3	Demonstrate the mutual exclusion and deadlock detection in distributed systems
CO 4	Demonstrate the agreement protocols and fault tolerance mechanisms in distributed systems
CO 5	Describe the features of peer-to-peer and distributed shared memory systems

BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analyzing, L5 - Evaluating, L6 - Creating)

PART- A (5 x 2 = 10 Marks)
(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	Identify how can a receive() call not be asynchronous?	2	1	2
2	Distinguish logical local clock and logical global clock. State the rules for updating these.	2	1	2
3	Illustrate how the asynchronous execution is claimed as realizable with synchronous communication?	2	2	3
4	Discover how a global state of a distributed system can be considered as a consistent global state.	2	2	3
5	State the Safety, Liveness, and Fairness property of a distributed system	2	3	1

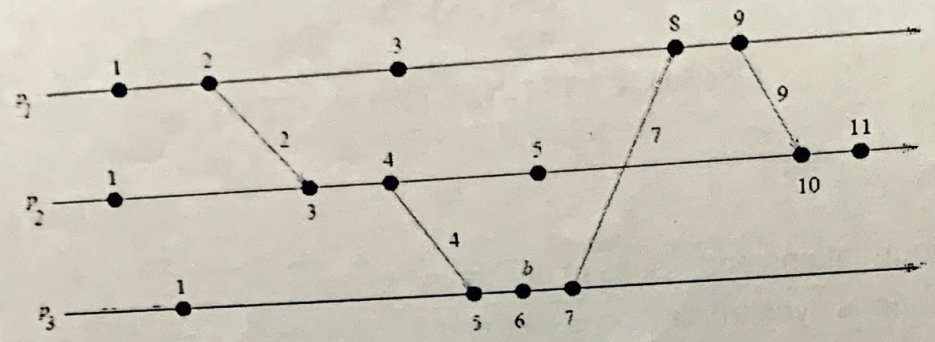
PART- B (4 x 8 = 32 Marks)
(Answer any four Questions)

Q. No	Questions	Marks	CO	BL
6	Identify the different modes of processing that adhere to Flynn's taxonomy and explain them in detail. Also, address the coupling, concurrency, and granularity level of these processing modes.	8	1	2
7	Show that in Lamport's algorithm the critical section is accessed in increasing order of timestamps. How it can be optimized in terms of message complexity for accessing critical sections?	8	3	3
8	Design an Omega Network of N = 8 input and outputs. Also, trace the path from P5 to M2, and from P6 to M1.	8	3	3
9	Write Bagrodia's Algorithm for implementing crown-free message scheduling. Explain all terms and different types of messages used in this.	8	2	3
10	a) Infer about logical clocks and the necessity of using logical clocks in a distributed environment. (2)	8	2	4

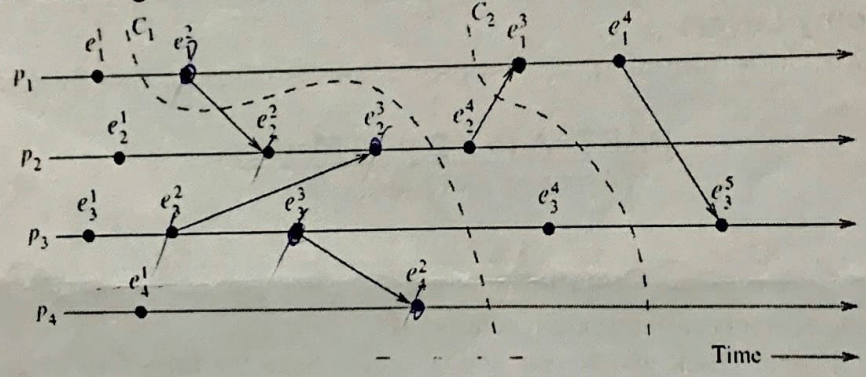
b) Compare and contrast the functionality and limitations of scaler time and vector time. (2)

c) Assume that the following space-time diagram represents the distributed execution of three processes and events are recorded using scalar time. How many events are sequentially completed before the event pointed by b? (1)

d) Draw the equivalent space-time diagram suppose it is recorded using vector time. (3)



Answer the following question in correspondence with the following space-time diagram



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a) Check the relation of the following pair of events. (3)
e^3_1 and e^3_3, e^1_1 and e^3_2

b) Check whether this global $\{LS_1^2, LS_2^3, LS_3^5, LS_4^2\}$ state is consistent or not? Summarize your answer. (2)

c) Identify the event which was affected very least by e_2^4 (with respect C2). (1)

d) Summarize why the C1 is an inconsistent cut. Show the condition in which it can be a consistent cut. (2)

		8	2	6

PART- C (1 x 8 = 8 Marks)

(Q.No.12 is compulsory)

Q. No	Questions	Marks	CO	BL
12	Identify and list the issues of recording the global state in distributed systems. Discuss how the Chandy-Lamport snapshot algorithm resolves it.	8	3	3