Course Code : CST 416 **KOLP/RW – 19 /9621**

Eighth Semester B. E. (Computer Science and Engineering) Examination

DISTRIBUTED SYSTEMS

Time : 3 Hours] [Max. Marks : 60

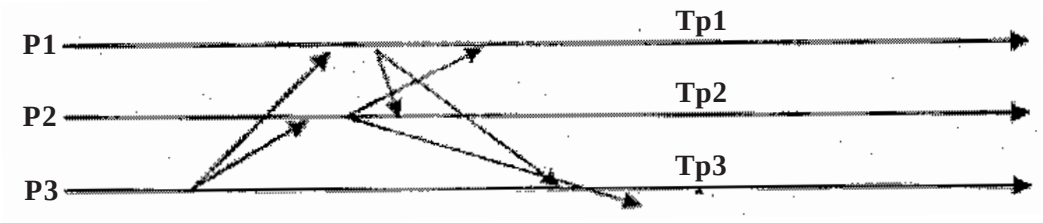
Instructions to Candidates :—

(1) Number your answers properly.

(2) Assume suitable data and illustrate answers with neat sketches wherever necessary.

1. (a) Consider a system with 5 processes P1 , P2 , P3 , P4 , P5. Trace the working of the Chandy Lamport's global state recording algorithm. P1 sends a message to P2 , P3 and P5. After this, P1 initiates the algorithm. In replay to P1's, P3 sends a message to P1. Show the sequence in which the states of the 5 processes and the communication channels between them will be recorded. 5(CO1)

(b) Consider the following space–time diagram. Using Birman–Stephension–Schiper (BSS) algorithm, what should be the contents of vector VT at P1 , P2 and P3 at the end ? (i. e. after all message exchanges are completed).



5(CO1)

2. (a) State and explain the conditions for constructing the request set in Makewa's algorithm. Give example using the staircase approach. 5(CO2)

(b) Consider 7 processes P1 , P2 , P3 , P4 , P5 , P6 and P7. Show the working of ring algorithm if coordinator fails. What will happen when the coordinator recovers ? 5(CO2)

3. (a) Explain the working of Suzuki Kasami's broadcasting algorithm with an example where n = 6 , P2 , P3 and P4 want to enter CS with sequence numbers 2 , 3 and 4 respectively. Assume P1 is in the CS. List the contents of RN , LN and Q at each stage.
How are the following issues resolved in Suzuki – Kasami's broadcasting algorithm ?

(i) Distinguishing between outdated and current request messages.

(ii) Determining which site has an outstanding request for the CS. 6(CO2)

(b) Obermarck's path – pushing deadlock selection algorithm works so that only certain transactions propagate potential deadlock chains. For example : Ex –> T1 –> T2 –> Ex is propagated if T1 is lexicographically greater than T2.
Explain why this selective propagation does not lead to a missed deadlock. 4(CO2)

4. (a) What are the main causes of thrashing in a DSM system ? What are the commonly used methods to solve the thrashing problem in a DSM system ? 3(CO3)

(b) Given below are three processes P1 , P2 and P3 executing concurrently. The data items (variables x , y and z) are stored in a distributed shared sequentially consistent memory (data store). Assume that each variable is initialized to 0. All statements are indivisible. Here, an assignment corresponds to a write operation and a print statement corresponds to a simultaneous read.

Process P1	Process P2	Process P3
x = 1	y = 1	z = 1
print (y , z)	print (x , z)	print (x , y)

Viewing the concatenated output of P1 , P2 and P3 in that order, will the output 001111 be a legal output if the above concurrent execution runs on a sequential consistent memory ? If yes, give the interleaving. If no, explain why not ? 4(CO3)

(c) To what extent does Sun NFS deviate from one – copy file update semantics ? Construct a scenario in which two user – level processes sharing a file would operate correctly in a single UNIX host but would observe inconsistencies when running in different hosts. 3(CO3)

5. (a) Compare the load sharing policies of V – System and Condor. 5(CO3)

(b) "The selection policy for receiver – initiated load sharing algorithm is mostly a preemptive one. It normally assumes task pre – emption at the sender site". Justify the above statement and explain the working of Receiver initiated algorithm for distributed scheduling. 5(CO3)

6. (a) Discuss the pros and cons of the tagged and partitioned approaches to implement a capability based protection system. 3(CO4)

(b) A checkpoint is said to be strongly consistent if

(i) States of all pairs of processes are mutually consistent, and

(ii) Every message recorded as sent by a sender process is recorded as received by a receiver process.

Discuss whether a synchronous checkpoint is both consistent and strongly consistent. 4(CO4)

(c) Differentiate :

(i) Static voting and Dynamic voting

(ii) Deadlock and Livelock 3(CO4)