Reg. No.											

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

I SEMESTER M.TECH(COMPUTER NETWORKING & ENGINEERING) END SEMESTER EXAMINATIONS, NOVEMBER, 2019

SUBJECT: ADVANCED OPERATING SYSTEMS (ICT 5171)

REVISED CREDIT SYSTEM

(23/11/2019)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data, if any, may be suitably assumed.

1A. Differentiate between Lamport's logical clock and vector clock. Write the implementation rules for both. Write the vector clocks for the events defined in Fig.Q.1A.

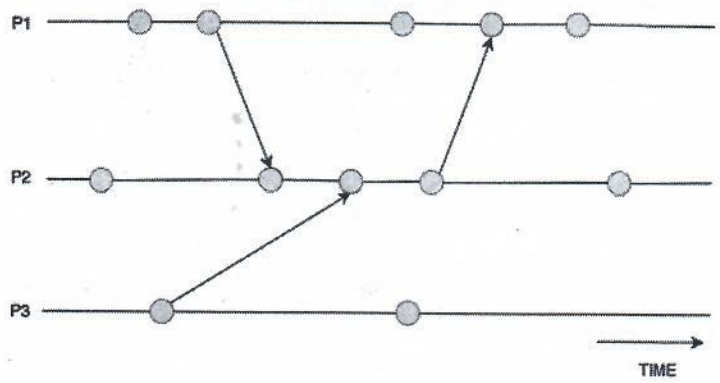

Fig.Q.1A. 5

1B. Cache validation for consistency check of a file is a technique in which the client decides whether or not a locally cached copy of data is consistent with the master copy. What are the different types of cache validation techniques depending upon the component which initiates validation? Explain. 3

1C. Distinguish between strong consistent check points and consistent check points in failure recovery. Explain with an appropriate diagram. 2

2A. Write Maekawa's algorithm to distributed mutual exclusion. Compare it with Ricart_Agrawala algorithm. Give an example to show that the maekawa's algorithm has the problem of deadlock and also write the steps to handle the deadlock. 5

2B. Prove that a requesting site in Raymond's tree based algorithm enters the critical section in finite time 3

2C. Differentiate between Queuing-Theoretic perspective and Algorithmic perspective approach of stability. 2

3A. How can you estimate the performance of deadlock detection algorithms? Describe Obermarck's path-pushing distributed deadlock detection algorithm. How does it differ from Chandy, Misra, and Haas's edge-chasing algorithm? Explain. 5

3B. Write Birman-Schiper-Stephenson protocol for causal ordering of messages. Trace the algorithm for the events shown in Fig Q.3B

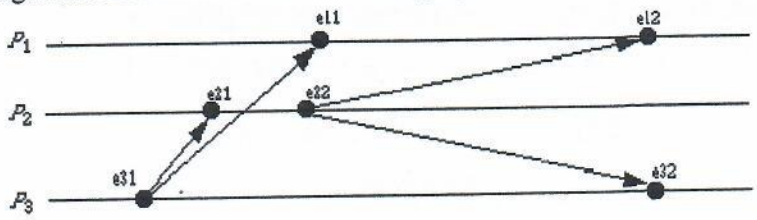

Fig Q.3B 3

3C. Guaranteeing cache consistency is expensive as it requires elaborate cooperation between clients and servers. Suggest and explain an alternative technique in which cache data are expected to be completely accurate. 2

4A. Explain symmetrically initiated and adaptive algorithms for load distribution in a distributed system. 5

4B. Design a hypercube SIMD and Mesh SIMD module and explain how the parallelism is achieved by considering an arithmetic operation of your choice. 3

4C. List and explain 3 levels of process management in Amoeba distributed operating system. 2

5A. Write the basic time stamp ordering algorithm and multiversion timestamp ordering algorithm for concurrency control and differentiate between them. 5

5B. In the Latest Deadline First algorithm of scheduling in Real Time Operating System, the system constructs schedule from tail to head using a queue using the following 2 rules:

i. Pickup a task from the current DAG that has the latest deadline
ii. Remove the selected task from the DAG and put it in the queue

For the task set and deadline given in Table Q.5B, construct the DAG and determine the sequence of scheduled tasks.

Table Q.5B

	T1	T2	T3	T4	T5	T6
C	1	1	1	1	1	1
D	2	5	4	3	5	6

3

5C. What is meant by priority inversion in real time operating systems? Explain. 2