Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104

(Constituent College of Manipal University)



SEVENTH SEMESTER B.TECH(IT) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC – 2015 SUBJECT-ELECTIVE-II: ADVANCED OPERATING SYSTEMS – ICT 415 (REVISED CREDIT SYSTEM)

TIME: 3 HOURS

05/12/2015

MAX. MARKS: 50

Instructions to candidates

- Answer any **FIVE FULL** 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.



- 1B. Write Maekawa's algorithm to distributed mutual exclusion. Compare it with Ricart_Agrawala algorithm.
- 1C. What is a phantom deadlock? Explain with an example.
- 2A.What is meant by causal ordering of messages. Write Birman-Schiper-Stephenson protocol for causal ordering of messages. Trace the algorithm for the events shown in Fig. Q2A.



- 2B. Explain the following:
 - i. Blocking vs. nonblocking communications primitives
 - ii. Synchronous vs. Asynchronous communication primitives
- 2C. List and explain the semantics of Remote Procedure Call.
- 3A. Explain Suzuki-Kasami's broadcast algorithm and Raymond's tree based algorithm for distributed mutual exclusion and compare them.

[5+3+2]

[5+3+2]

- 3B. Explain in detail different cache validation techniques in distributed file systems.
- 3C. With a neat diagram explain CODA virtue client machine and its roles.

[5+3+2]

- 4A. Write symmetrically initiated and adaptive algorithms for load distribution in distributed systems.
- 4B. With neat diagrams, explain hypercube SIMD and 2D mesh SIMD modules of multiprocessor systems.
- 4C. List and explain different approaches of stability.

[5+3+2]

- 5A. Explain backward error recovery. Why the backward error recovery is simpler than the forward error recovery.
- 5B. Explain the following with respect to multiprocessor operating systems:
 - i. Smart scheduling
 - ii. Affinity based scheduling
 - iii. Co-scheduling
- 5C. What are livelocks? Explain with a diagram.

[5+3+2]

- 6A. Explain the basic time stamp based and mutiversion time stamp based concurrency control algorithms.
- 6B. List the important features of different scheduling algorithms in real time operating systems.
- 6C.What is meant by priority inversion? Explain.

[5+3+2]