Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

I SEMESTER M.TECH. (COMPUTER NETWORKING AND ENGINEERING)

END SEMESTER EXAMINATIONS, NOVEMBER 2017

SUBJECT: ADVANCED OPERATING SYSTEMS [ICT 5104]

REVISED CREDIT SYSTEM
(23/11/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

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

1A. Write a detailed diagram that illustrates the remote procedure call (RPC) mechanism and explain any three design issues. 5

1B. Explain Global knowledge and Naming with respect to DOS. 3

1C. Consider a system with 2 copies of resource A, 3 copies of resource B, and 3 copies of resource C. The process 1 holds one unit of resource B and C, and is waiting for a unit of A. The process 2 is holding a unit of A and waiting on a unit of B. The process 3 is holding one unit of A, two units of B, and one unit of C. Draw the resource allocation graph. Is the system in a deadlocked state? Justify the answer. 2

2A. Given a distributed system with 5 processes as given in Fig. Q.2A at different sites where mutual exclusion is enforced using Suzuki-Kasami's broadcast algorithm. Initially, token is with process P_0 and enters its critical section. Consider the scenario where, the request for token is made by processes P_1 and P_2. Processes P_0, P_3 send request for token while P_1 is in critical section. Draw all intermediate steps in detail until all processes complete their critical sections.

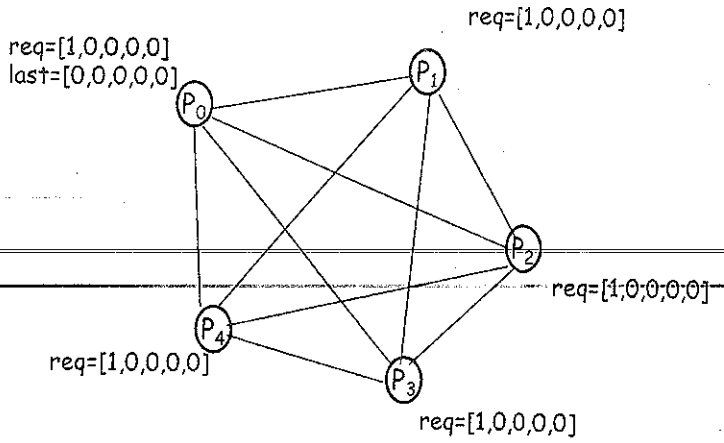

Fig. Q.2A 5

2B. Explain the Ho-Ramamurthy 2-phase algorithm of distributed deadlock detection. 3

2C. Explain the full-replication algorithm for implementing the distributed shared memory (DSM). 2

3A. What is meant by causal ordering of messages? Write the Birman-Schiper-Stephenson (BSS) protocol for causal ordering of messages. Trace the algorithm for the events shown in Fig. Q.3A.

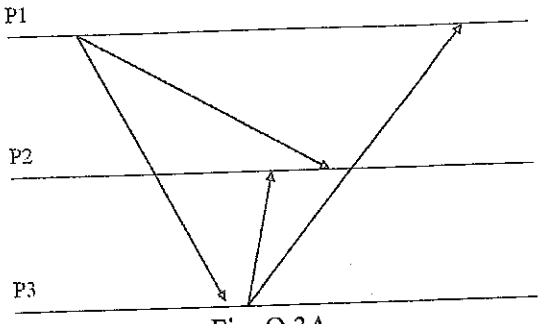

Fig. Q.3A 5

3B. Explain the various cache modification techniques used in distributed file systems. 3

3C. Describe smart and affinity based scheduling of multiprocessor operating system. 2

4A. Explain the following for the sender-initiated distributed load scheduling algorithm.
(i) transfer policy
(ii) selection policy
(iii)location policy
(iv) information policy
(v) stability 5

4B. Explain the 2-phase commit protocol. 3

4C. Explain the architecture of a distributed system with a neat diagram. 2

5A. Consider two processes, P1 and P2, where p1=50, t1=25, p2=75, and t2=30.
(i) Can these two processes be scheduled using rate monotonic scheduling? Illustrate the answer using a Gantt chart .
(ii) Illustrate the scheduling of these two processes using earliest deadline first (EDF) scheduling 5

5B. Explain the following with an example for recovery in concurrent systems: 3
(i)livelocks (ii) orphan messages (iii) lost messages

5C. Explain the completely centralized concurrency control algorithm. 2