Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(CSE)/SEM-7/CS-704D/2011-12

2011

ADVANCED OPERATING SYSTEM

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

   i) The primary goal of distributed file system is
      a) network transparency
      b) location transparency
      c) access transparency
      d) all of these.

   ii) In tightly coupled system, the memory is
      a) centralized b) shared
      c) distributed d) private.

   iii) In AND deadlock model
      a) only one deadlock may occur at a time
      b) multiple deadlocks may occur at a time
      c) not more than three deadlocks may occur at a time
      d) no fake deadlock occurs.

iv) Which deadlock model is used for Resource acquisition ?
   a) Single-unit b) AND
   c) OR d) AND-OR.

v) Prefix table is associated with
   a) remote file b) remote process
   c) naming d) broadcasting.

vi) Rollback of processes occurs during deadlock
   a) recovery b) prevention
   c) avoidance d) detection.

vii) Semantic transparency in Remote Procedure Call is maintained by
   a) client b) client stub
   c) server stub d) both (b) and (c).

viii) In a processor pool architecture CPU, user is
   a) equal to 1 b) less than 1
   c) greater than 1 d) none of these.

ix) A situation where a process waits for a resource that is continuously available but never assigned to the process is
   a) Deadlock b) Starvation
   c) Recovery d) Avoidance.

x) In which of the following distributed mutual exclusion algorithms, 3 (n –1) messages are required per critical section invocation ?
   a) Lamport's algorithm
   b) Ricart-Agrawala's algorithm
   c) Mackawa algorithm
   d) None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following 3 × 5 = 15

2. Show and explain the 'expedient state' of a general resource graph. Discuss the OR model of deadlock. Is 'Knot' sufficient for deadlock to occur in the 'expedient state' general resource graph ?

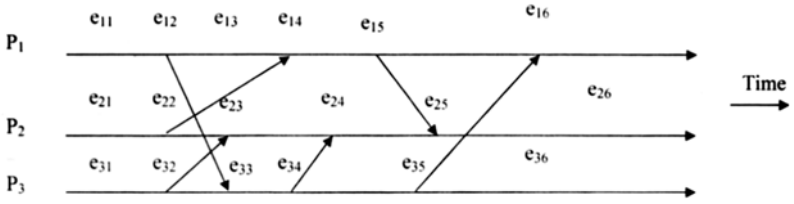
3. What is Dining Philosophers' problem ? Why semaphores may not be able to provide solution to it ? How can a solution be obtained ?
4. What different transparencies can be achieved through distributed system ? What are the underlying advantages ?
5. Discuss the 'capability-based' implementation of Access matrix model along with its advantages.
6. Explain the 'happens-before' relation in detail.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) With a suitable example briefly describe the Chandy-Misra Haas distributed deadlock detection algorithm.
   b) Differentiate between tightly coupled and loosely coupled systems.
   c) How is a Remote Procedure Call performed ? Show the steps in detail. 6 + 3 + 6
8. a) What is meant by Asymmetric key (or Public key) cryptography ? How does a message get encrypted using the above technique ?
   b) What is the difference between security policies and mechanisms ?
   c) What is meant by security threat ? What is breach of security ?
   d) What is a worm ? 7 + 3 + 3 + 2
9. a) What is phantom deadlock ?
   b) Figure below shows events of three processes P_1, P_2 and P_3. Let e_{ij} denotes the j th event of process P_i. Arrows indicate transmission of message.



Assume the processes use Lamport's logical clocks where C_i denotes the local clock at process P_i. The initial value of C_i = 0 for every process P_i. Assume that the increment value is d = 1 for all processes.

i) To each event shown in the figure, assign the correct clock value.

ii) Does Lamport's logical clock require that the increment value d is identical at each process ? Explain your answer.

c) What are partial ordering and total ordering in distributed operating system ? How can partial ordering of 'happened-before' relation be converted to total ordering ?

d) How is naming service implemented in a distributed system that does not support object migration ?

1 + 6 + 4 + 4

10. a) What are the different process migrations in distributed system ?

b) What are the differences between a stateful and stateless server ?

c) Describe Ricart-Agrawala's distributed mutual exclusion algorithm.

d) What metrics are used for measuring the performances of different distributed mutual exclusion algorithms ?

3 + 3 + 6 + 3

11. a) Name an algorithm that is able to detect 'false deadlock' for distributed deadlock detection. Show how it is detected.

b) Compare and contrast user level thread and kernel level thread.

c) Where do you find the applications of Queuing Theory ?

d) What is the difference between load balancing and load sharing ?

e) What are the advantages and disadvantages of Distributed Shared Memory ? 4 + 4 + 1 + 2 + 4

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