



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 : $10 \times 1 = 10$
 - 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 $3 \times 5 = 15$

- 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 ?



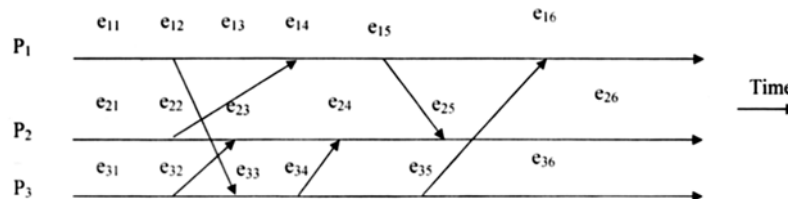
3. What is Dining Philosophers' problem ? Why semaphores may not be able to provide solution to it ? How can a solution be obtained ?
4. What different transparencies can be achieved through distributed system ? What are the underlying advantages ?
5. Discuss the 'capability-based' implementation of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

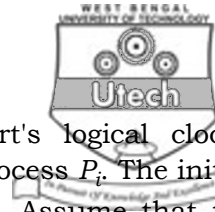
GROUP - C

(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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