



Name :
Roll No. :
Invigilator's Signature :

CS/M.TECH(CSE)/SEM-1/MTCSE-15/2011-12

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

(Short Answer Type Questions)

Answer any *five* questions.

5 × 5 = 25

1. Compare paging with segmentation with respect to the amount of memory required by the address translation structures in order to convert logical address to physical addresses.
2. Briefly explain the drawbacks of Ricart-Agarwala Algorithm and propose some solutions for the drawbacks.
3. Illustrate the following scenario of a distributed system having a critical section with a suitable diagram. There are four distributed processes P_0 , P_1 , P_2 and P_3

T_0 : P_0 wants to enter critical section

T_2 : P_1 wants to enter critical section

T_3 : P_2 wants to enter critical section

T_4 : P_0 releases the critical section

T_6 : P_1 releases the critical section

T_7 : P_2 releases the critical section



4. What is priority inversion in task scheduling of a real time operating system ? How the priority inversion is handled ?

2 + 3

5. What are the differences between distributed operating system and network operating system ? What are the advantages and disadvantages of distributed operating system ?

2½ + 2½

6. In ring-based election algorithm, a unidirectional ring was used. Suppose the ring is bidirectional. Can the election algorithm be made more efficient ? If no, explain why. If yes, explain why.

7. How can we estimate the length of next CPU request in SJF scheduling algorithm ? What is the problem of priority based scheduling algorithm ? How can it be overcome ?

3 + 2

8. Consider the following snap shot of a system :

	<u>Allocation</u>	<u>Max</u>	<u>Available</u>
	<u>A B C D</u>	<u>A B C D</u>	<u>A B C D</u>
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm :

- a) What is the content of the matrix Need ?
b) Is the system in a safe state ?

If a request from process P_1 arrives for (0, 4, 2, 0), can the request be granted immediately ?

1 + 2 + 2



GROUP – B
(Long Answer Type Questions)

Answer any *three* of the following

3 × 15 = 45

9. Explain the concept of logical clocks and their importance in distributed systems. A clock of a computer system must never run backward. Explain how this issue can be handled in an implementation of the logical clocks concept. How does the Berkley's Algorithm solve the drawback of Active Time Server Algorithm for clock synchronization ? 4 + 5 + 6
10. Describe the replacement policy used by the Distributed Shared Memory system of IVY. What are the approaches for storing a useful block at the time of replacement ? Briefly explain the schemes of file modification propagation in a distributed file system. 6 + 4 + 5
11. Briefly describe the operative environment of an RTOS. What are the major tasks scheduling policies followed in an RTOS ? Compare the advantages and the disadvantages of each of the policies. 5 + 6 + 4
12. a) Prove that the presence of a cycle in a general resource allocation graph is a necessary but not a sufficient condition for the existence of deadlock.
b) What is a phantom deadlock ? What might be the reason for phantom deadlocks in a distributed system ? A centralized deadlock detection algorithm does not detect false deadlock. Find out how this algorithm prevents the detection of false deadlocks ?
c) What are the main advantages of probe-based distributed algorithm over a WFG-based distributed algorithm ?



- d) Initiation of an election is actually needed only when the current coordinator process fails. However, this is not the case in the bully algorithm, in which an election is also initiated whenever a failed process recovers. Is this really necessary ? If yes, explain why. If no, suggest a modification to the bully algorithm in which an election is initiated only when the current coordinator fails.

2 + 7 + 3 + 3

13. a) What is key distribution problem ? How does it differ for symmetric and asymmetric cryptosystems ?
- b) Describe centralized and fully distributed approach for solving key distribution problem for a symmetric cryptosystem and discuss their relative advantages and disadvantages.
- c) Describe a method for solving the key distribution problem for an asymmetric cryptosystem.
- d) Describe Kerberos Authentication System. 3 + 5 + 3 + 4
14. a) A distributed operating system uses the ACL-based access control mechanism but does not use the negative rights concept. What type of access control activity is difficult to perform in this system ? Why is this difficulty not faced in a centralized system that uses the ACL-based access control mechanism ?
- b) A stateful file server records state information for its clients. What problems are associated with this type of file server ? Give two examples where it might be necessary to use stateful file servers.
- c) Explain how a stable storage system converts fallible disks into reliable devices. A stable storage system is designed with two conventional disks. Can this idea be extended to three disks for better crash resistance capability ? If no, explain why. If yes, explain why.

4 + 5 + 6

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