ANNA UNIVERSITY, CHENNAI.

B.E / B.TECH DEGREE EXAMINATIONS, APRIL / MAY, 2012.

CS 9252 - Operating Systems

Semester: Four **Regulation : 2008**

Time : 3 Hrs **Max : 100 Marks**

Answer ALL questions

PART A (10 X 2 = 20 Marks)

1. Mention one essential feature each of a Time- sharing operating system and a Real-time operating system.
2. List the various components of an operating system.
3. Define a thread. Give one example where multithreading provides better performance than single-threaded solution.
4. List two circumstances under which CPU scheduling takes place.
5. What is a semaphore? What are the operations that can be done on it?
6. What are the necessary conditions for a deadlock to occur in a system?
7. What is meant by external fragmentation? How can that be overcome?
8. What is the working-set model?
9. List the attributes of a file.
10. What are the data structures that can be used to implement a directory?

PART – B (5 X 16 = 80 Marks)

11. (i) Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. In answering the questions, use non-preemptive scheduling and base all decisions on the information you have at the time the decision must be made.

Process	Arrival Time	Burst Time
P1	0.0	8
P2	0.4	4
P3	1.0	1

What is the average turnaround time and waiting time for these processes with the FCFS scheduling algorithm and with the SJF scheduling algorithm? Also, compute what the average turnaround time and waiting time will be, if the CPU is left idle for the first 1 unit and then SJF scheduling is used. (8)

(ii) What is a critical section? What are the requirements that a solution to a critical section problem should satisfy? Give and explain a two process solution that satisfies all the above requirements. (8)

12. (a) (i) What is a process? How does the OS maintain information about a process. Explain the various states in which a process can be using a process state transition diagram. (8)

(ii) Describe the actions taken by a kernel to switch context between processes. (8)

(OR)

(b) (i) Write down the Banker's algorithm. What is its objective? (8)

(ii) Consider the following snapshot of a system: (8)

	Allocation	Max	Available
	A B C D	A B C D	A B C D
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	

Using the banker's algorithm, find out if the above system is in a safe state?

13. (a) (i) Explain the segmented memory management system. Show clearly how the address translation is done in it? What is the main advantage of this system? (10)

(ii) Consider the following segment table: (6)

Segment	0	1	2	3	4
Base	219	2300	90	1327	1952
Length	600	14	100	580	96

What are the physical addresses for the following logical addresses?

0,430 1,10 2,500 3,400 4,112

(OR)

. (b) (i) What is meant by demand paging? What are the steps taken by the OS when it handles a page fault? (10)

(ii) Consider the following page-reference string:
1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults would occur for the following replacement algorithms assuming three frames? Remember that all frames are initially empty:
LRU replacement FIFO replacement (6)

14.(a) (i) List any three common file operations and show how these can be implemented in an operating system. (8)

(ii) Compare and contrast the sequential access method with the direct access method of a file. (8)

(OR)

(b) (i) Explain any one method by which files can be allocated space in the disks. What are its advantages and disadvantages? (8)

(ii) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from the current head position, what is the total distance in cylinders that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms? FCFS, SSTF and. SCAN. (8)

15. (a) Explain, in detail , the design of the Linux system (16)

(OR)

(b) Explain, in detail, the design of Windows 2000. (16)