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IV SEMESTER B.Tech.I COE /SE

END SEMESTER EXAMINATION *May/June-2016*

CO/SE-213 : Operating System Design

Time: 3:00 Hours *Max. Marks: 70*

NOTE: **Attempt any 5 Questions .**
All parts of a question must be attempted together.
Assume missing data if any.

Q1. (a) Consider 3 processes P1, P2 and P3 on a uniprocessor system. The priorities, CPU time requests and arrival time are as shown below:

Process	Priority	CPU request	Arrival Time (hh:mm:ss)
P1	10(highest)	20 sec	00:00:05
P2	9	10 sec	00:00:03
P3	8(lowest)	15 sec	00:00:00

What are the turnaround time of P1, P2 and P3 using preemptive and non-preemptive scheduling respectively? [5]

(b) What is Readers Writers problem? Explain how synchronization is achieved in this problem using semaphore. [5]

(b) What is a File Control Block and which file structures refer to it for accessing file. [4]

Q2. (a) Consider a system has 3 resource type R1,R2 and R3 each having 5 instances. These resource types are shared by 3 processes P1, P2 and P3. The current allocation and request of each process is shown below.

	Allocation		
	R1	R2	R3
P1	1	2	1
P2	2	0	1
P3	2	2	1

	Request		
	R1	R2	R3
P1	1	0	3
P2	0	1	2
P3	1	2	0

Which of the process will finish last? Explain. [5]

(b) Describe various file allocation strategies. Which allocation scheme will minimize the amount of space required in directory structure and why? [5]

(c) A Computer has 32-bit virtual address space and page size of 4KB. Consider RAM of 128 KB, what is the ratio of page table and inverted page table size if each of page table entry in both is 4Byte. [4]

Q3. (a) Consider a physical memory have 4 free partitions of sizes 4K, 8K, 20 K and 2K respectively. These free partitions are allocated using best fit strategy. The allocation requests of each of 7 jobs are recorded in a queue as shown below.

Req. No	Job1	Job2	Job3	Job4	Job5	Job6	Job7	Job8
Req. Size	2K	14K	3K	6K	6K	10K	7K	20K
Usage time(sec)	4	10	2	8	4	1	8	6

What is the finish time of Job7? [5]

(b) State and explain different process states. Also draw and explain process state transition diagram for non-preemptive system and explain each transition. [5]

(c) A computer has 32 bit virtual address space and 1024 bytes of page . A page table entry is of 4 bytes. A multilevel page table is used because each page table must be contained within a page. How many levels are required? [4]

Q4. (a) How are interrupts and I/O device data transfer handled in operating system? [5]

(b) What are the various methods to maintain large sized page tables in operating system [5]

(c) What is the cause of thrashing? Explain how working set model is used to eliminate this problem. [4]

Q5. (a)Suppose that a disk drive has 5000 cylinders numbered from 0 to 4999. The drive is currently serving the request at cylinder 143 and 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 current head position, what is total distance that the disk arm moves to satisfy all pending request for each of the following scheduling algorithm.
(i) FCFC (ii) SSTF (iii) SCAN (iv) C-SCAN (v) LOOK (vi) C-LOOK [10]

(b) Explain the following directory structures:
(i) Two level directory (ii) Tree structured directory [4]

Q6. (a) Explain how logical memory addresses are translated to physical memory addresses in segmented memory management? [5

(b) The following program consists of 3 concurrent processes and 3 binary semaphores. The semaphores are initialized as S0=1, S1=0, S2=0

Process P0	Process P1	Process P2

while (true) {
wait (S0);
print (0);
release (S1);
release (S2);
}
	wait (S1);
	Release (S0);
		wait (S2);
		release (S0);

How many times will process P0 print '0'?

(c) Comment on the following solution to the Dining Philosophers problem: hungry philosopher waits until his right fork is available, and then picks it up
The following program consists of 3 concurrent processes and
semaphores. The semaphores