Examination of Operating System 2008/05/01

1a. Is it correct that a multi-programmed OS is also a time-sharing OS? Why? (5%)
1b. What hardware supports are needed to prevent a user process from executing I/O instructions? (5%)

2a. Besides system calls, give two more cases under which software interrupts will be generated. (5%)
2b. After a user process invokes a system call, should OS do a context switching? Why? (5%)
2c. A type of OS structure is termed "microkernel". What is the structure of "microkernel"? (%5)

3a. Which process state will a process be moved to after it initiating an asynchronous I/O? (5%)
3b. Many data items are saved in a PCB (process control block). List two data items that belong to memory management or accounting. (5%)

4a. What are the functions of the system calls, fork( ) and exec( )? (5%)
4b. What are the advantage and disadvantage of the inter-process communication method, "shared memory", when compared with "message passing"? (5%)

5a. A process has the components, code, registers, data, file, and stack. Which components are shareable among the threads of the process? (%5)
5b. Suppose that x is a static variable and y is an automatic variable, and both are declared within a for-loop block. Can x and y be shared among the threads of the process? (5%)

6a. If a non-preemptive CPU scheduling algorithm is used, under what conditions will a process lose its turn of CPU usage? (5%)
6b. In designing a CPU scheduling algorithm, the factors, *throughput* and *response-time*, may be considered. What are these factors' meanings? (5%)
6c. Point out one primary difference in process scheduling between Linux and Windows XP? (5%)

7. Suppose that the following processes arrive for execution at the times as indicated. Each process will run the listed amount of time.
   (a) What is the average waiting time when the FCFS scheduling algorithm is used? (5%)
   (b) What is the average waiting time when the Round-Robin scheduling algorithm with time slice, 3, is used? (5%)

Process	Arrival Time	Burst Time
P1	0	10
P2	2	5
P3	4	8

8. Three address binding times are compile time, load time, and execution time.
   (a) In which binding times will logical address equal to physical address? (4%)
   (b) Which binding times are supported by the method of contiguous memory allocation? (6%)

9a. In the method of contiguous memory allocation, what is the strategy of best-fit? (5%)
9b. When the page table is kept in main memory, why we need the two CPU registers, PTBR and PTLR? (5%)
9c. Suppose that in the memory management method of paging, it takes 120 nanoseconds to access main memory and 20 nanoseconds to search the TLB. Compute the effective access time under the hit ratio of 90%? (5%)