Ceng 328 Operating Systems
Final
June 9, 2009 15.00–17.00
Good Luck!

Answer all the questions.

1. (20 pts) ***Choose only 4 items.*** Provide definitions for the following terms:

   - atomic operation,
   - process,
   - process state,
   - multiprogramming,
   - time sharing,
   - notion of locality,
   - dirty bit,
   - deadlock,
   - unsafe state,

2. (12 pts) Describe the operation of a semaphore. What is the difference between a counting semaphore and a binary semaphore?

3. (13 pts) What is Mutual Exclusion? Explain the Peterson's solution for Mutual Exclusion.

4. (10 pts) Describe the difference between preemptive and non-preemptive scheduling algorithms. Which one is more suitable for a timesharing system?

5. (20 pts) Consider the following sets of processes, with the length of the CPU-burst time given in milliseconds. The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.

Process	**Burst Time**	**Priority**
P1	10	3
P2	6	5
P3	2	2
P4	4	1
P5	8	4

   A higher priority number implies a higher priority. For each of the following scheduling algorithms, determine the average turnaround time (Fill the table below by finding turnaround times for each of the scheduling algorithms. Ignore process switching overhead.)

i Round robin; assume that the system is multiprogrammed, and that each job gets its fair share of the CPU,

ii Priority scheduling; assume that only one job at a time runs, until it finishes,

iii FCFS; assume that only one job at a time runs, until it finishes,

iv SJF-nonpreemptive; assume that only one job at a time runs, until it finishes.

Process	**RR**	**PS**	**FCFS**	**SJF**
P1				
P2				
P3				
P4				
P5				
Average				

6. (10 pts) Consider the following factors:

   - internal fragmentation,
   - process table size,
   - I/O overhead,
   - locality of reference.

   Which of these factors could be used to argue for a large page size, and which could be used to argue for a smaller page size? Why?

7. (10 pts) i.What are seek time and latency time? (in disk storage)
   ii. What characteristics determine transfer time?

8. (15 pts) Describe four ways to *prevent* deadlock by attacking the conditions required for deadlock. Is it possible to attack to these conditions and prevent the deadlock in operating systems?