

178 330 Operating Systems
Midterm Examination
8 January 2006 13.00 – 16.00

Instructions:

1. Books are NOT ALLOWED.
 2. A single sheet of A4 note is ALLOWED.
 3. There are 12 questions, 90 marks total, attempts ALL questions.
 4. Do NOT cheat.
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- 1 What are *system calls* ? How do they work ? (5 marks)
- 2 What are relationships among system calls, dual-mode operations, operating systems ? (5 marks)
- 3 What are differences between *monolithic kernel* and *microkernel* ? (5 marks)
- 4 Do we need any special hardware support to implement *virtual machine* ? Why ? (5 marks)
- 5 Describe states of a process, and how can a process transit from one state to another ? (5 marks)
- 6 What are differences among a process, a thread, and a fiber ? (5 marks)
- 7 Compared to the multiprocessing, What are advantages of the multithreading ? Why ? (5 marks)
- 8 Is a kernel thread is faster than a user thread ? Why ? (5 marks)
- 9 From the following processes:

<u>Process</u>	<u>Burst time</u>	<u>Arrival time</u>	<u>Priority</u>
P1	5	1	4
P2	7	2	3
P3	3	3	2
P4	2	4	1

9.1 Find *average waiting time* of SJF, RR with time quantum = 2, and non-preemptive priority scheduling (a higher number implies a higher priority). (10 marks)

9.2 Find *average turnaround time* of FCFS and SJF scheduling (10 marks)

- 10 What are critical-section problems, mutual exclusion, semaphores, and spinlocks ? Are there any relationships among them ? (10 marks)
- 11 Draw the resource-allocation graph following allocations:

<u>Process</u>	<u>Allocated Resources</u>	<u>Requesting Resources</u>
P1	H	A
P2	F	H
P3	G, E	F, B
P4	D	C, K
P5	C	E
P6	B	D, J
P7	I, J	K
P8	A	G

Is there any deadlock ? If there is, which processes do involve ? (10 marks)

- 12 From the system snapshot at t_0 , is it a safe state if total resource is 10?

<u>Process</u>	<u>Max Need</u>	<u>Need at t_0</u>
P1	8	4
P2	7	2
P3	4	4

(10 marks)