



**Please read each question carefully. The total points are 100. You have 180 minutes. Good Luck!**

SECTION I – 70 POINTS (C-, C, C+ GRADES)

- 1) Single-threaded processes have: \_\_\_\_ (4 points)
  - a. Many program counters
  - b. Many registers specifying the location of instructions to execute
  - c. Only one program counter specifying the whole program to run
  - d. Only one program counter specifying the next instruction to execute
  - e. None of these
  
- 2) Which of the following is true? \_\_\_\_ (4 points)
  - a. System calls do not have parameters since everything is on the CPU registers
  - b. System calls do not have parameters, everything is on the main memory
  - c. System calls do not have parameters, everything is on the non volatile storage
  - d. System calls do have parameters and take these from the buffer
  - e. None of these
  
- 3) Which of the following is true? \_\_\_\_ (4 points)
  - a. The API functions are implemented by calling hybrid microkernel functions
  - b. The API functions are implemented by calling high level functions
  - c. The API functions are implemented by calling system programs
  - d. The API functions are implemented by calling low-level hardware functions
  - e. None of these
  
- 4) Which of the following is correct? \_\_\_\_ (4 points)
  - a. Only one process can be running on any processor at any instant
  - b. More than one process can be running on any processor at any instant
  - c. Exactly two processes can be running on any processor at any instant
  - d. The number of processes running on any processor at any instant depends on the type of OS.
  - e. None of these
  
- 5) Which of the following is correct? \_\_\_\_ (4 points)
  - a. The process control block does not include any program counters
  - b. The process control block includes the program counter of the program
  - c. The process control block includes the program counter of the process
  - d. The process control block includes the program counter of the CPU
  - e. None of these



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- 6) Sketch and describe briefly the lifecycle of a process. (10 points)
- 7) Describe the structure of MS-DOS. What is the disadvantage of this system? (10 points)
- 8) Describe the benefits of threads in OS? (10 points)
- 9) What do you understand with virtualization? What is the difference between process virtual machine and system virtual machine? (10 points)
- 10) Describe clearly the whole booting process. (10 points)

SECTION 2 – 20 POINTS (B-, B, B+ GRADES)

- 11) Describe processor affinity. What happens when a process migrates to another processor? (5 points)
- 12) Sketch and describe the structure of Java thread mapping in Solaris. (5 points)
- 13) Describe thread pools. Which are the advantages of this approach? (5 points)
- 14) Suppose you have the following schema of process arrival:

<u>Process</u>	<u>Arrival Time</u>	<u>Burst Time</u>
$P_1$	0.0	7
$P_2$	2.0	4
$P_3$	4.0	1
$P_4$	5.0	4

Sketch the order of execution of the process with preemptive and non-preemptive shortest job first scheduling. (5 points)



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Operating Systems Midterm Exam

Wed, Dec. 5, 2012

Student Name: \_\_\_\_\_

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SECTION 3 – 10 POINTS (A-, A GRADES)

- 15) Explain the necessity for atomic instructions. Give an example of such an instruction and an example of the use of such an instruction for synchronization purposes. (5 points)
- 16) Sketch a synchronization solution based on semaphores that avoids spinlocks. (5 points)

CHEATING POLICY

1. This test is subject to the STUDENT HONOUR CODE of UNYT.
2. If you are found **Cheating** your test will be invalid and the **whole course will be graded with F**.