

**UNIVERSITY OF NAIROBI**

SECOND SEMESTER EXAMINATIONS 2012/2013

SECOND YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

**CSC223: OPERATING SYSTEMS**

**Date: 13th May, 2013 Time: 2:30Pm – 4:30PM**

**SECTION A (COMPULSORY)**

**Instructions: Answer question 1 and any other two questions**

**Question 1 (20 Marks)**

1. What is an embedded operating system? Give an example [2Marks]
2. What is the main **advantage** and **disadvantage** of implementing threads in user space? [2Marks]
3. Describe the roles of the runtime system in the implementation of user level threads.

[3Marks]

1. A process can be in different states. What are the blocked suspend and ready suspend states? What reason would cause a process to transition to either of the two states?

[2Marks]

1. How does a process control block differ from a process table? [2Marks]
2. Suppose you were given the task of designing a system that uses threads. [3Marks]
   1. Which method is more suitable between dynamic or static creation of threads?
   2. Give a reason for your answer.
   3. What is the disadvantage of the alternative?
3. What is the essential difference between block and character oriented devices? [1Mark]
4. Explain how separation of policy and mechanism can lead to design of efficient systems when it comes to scheduling tasks. [2Marks]
5. Describe the difference between the base and limit registers and the swapping methods of managing memory. [2Marks]

**SECTION B**

**Question 2** (15 Marks)

1. State four goals of an operating system [2Marks]
2. Five batch jobs A through E, arrive at a computer center at almost the same time. They have estimated running times of 10, 6, 2, 4, and 8 minutes. Their (externally determined) priorities are 3, 5, 2, 1, and 4, respectively, with 5 being the highest priority. For each of the following scheduling algorithms, determine the mean process turnaround time. Ignore process switching overhead. [8Marks]
3. Round robin (Time quantum = 1).
4. Priority scheduling.
5. First-come, first-served (run in order 10, 6, 2, 4, 8).
6. Shortest job first
7. Disable interrupts mechanism is not useful in some system architectures. Which architectures are these and why is this the case? [2Marks]
8. What do you understand by the term ‘principle of locality’? [1Mark]
9. Explain two methods that can be used by systems to recover from a deadlock [2Marks]

**Question 3** (15 Marks)

1. Discuss the implementation of four mutual exclusion techniques and give a disadvantage for each [8Marks]
2. There are two methods which the CPU can use to communicate with control registers and device data buffers associated with I/O devices. [4Marks]
   1. Use diagrams to differentiate between the two alternatives.
   2. Which of the two is a better alternative and why?
3. Why is setting the quantum in round robin algorithm a critical issue in determining the turnaround time of processes? [1Mark]
4. Explain two conditions for a deadlock and how each can be attacked in deadlock prevention [2Marks]

**Question 4** (15 Marks)

1. Apart from FIFO and LRU, what other algorithms exist for performing page replacement in memory? Describe four of these. [8Marks]
2. What is a TLB? How different are the systems that use the TLB as opposed to those that do not in terms of their implementation? [3Marks]
3. With the aid of a diagram, describe the working of a system that uses DMA [4Marks]

**Question 5** (15 Marks)

1. What is the difference between a safe and an unsafe state? [1Mark]
2. Use an example to illustrate the implementation of the banker’s algorithm [4Marks]
3. How would you enhance the performance of your operating system to exploit the properties of compute and I/O bound processes [2Marks]
4. Describe two techniques that are used to implement file storage highlighting one weakness for each of them [4Marks]
5. For a system to provide mutual exclusion, what four conditions must be adhered to? Explain [4Marks]