



Technical University of Mombasa
Institute of Computer Science and Informatics

DEPARTMENT OF COMPUTER SCIENCE

ICS2202/EIT4109 OPERATING SYSTEM

Main Exam

End of Semester Exam

May 2016 Series

Time: 2 Hours

Instructions to Candidates

- Question ONE is Compulsory
- Answer Any TWO Question in Section B
- Switch OFF mobile phones.

Question One (30 Marks)

- a) Explain three main purposes of an operating system (6 Marks)
- b) Differentiate between operating systems for mainframe computers and personal computers' (4 Marks)
- c) Explain probable challenge a programmer overcome in writing an operating system for a real-time environment? (4 Marks)
- d) Explain difference between kernel mode and user mode function as a basic form of protecting/securing systems (4 Marks)
- e) List down different system calls for performing different kinds of tasks. (4Marks)
- f) Differentiate between pre-emptive and non-pre-emptive scheduling. (4 Marks)
- g) Explain the following terms as used in Operating system
 - a. Semaphore
 - b. Input/output bound (4 Marks)

Question Two (20 Marks)

- a) Define swapping (1 Marks)
- b) Justify that swapping increases Operating Systems' overheads (3 Marks)
- c) Given memory partitions of 100k, 500k, 200k, 300k, and 600k (in order), apply first fit and best fit algorithms to place processes with the space requirement of 212k, 417k, 112k and 426k (in order)? Which algorithm makes the most effective use of memory? (6 Marks)
- d)
 - i. List the steps needed to perform page replacement.
 - ii. Explain the different page replacement policies.
 - iii. List main requirements, which should be satisfied by a page replacement policy. (10 Marks)

Question Three (20 Marks)

- a) Define thread as used in operating system. (2 Marks)
- b) Describe the contents of a Process Control Block (PCB). (6 Marks)
- c) Define deadlock and explain the necessary conditions for deadlock occurrence. (6 Marks)

- d) Consider the following set of jobs with their arrival times, execution time (in minutes), and deadlines.

Calculate the mean turn-around time, the mean weighted turn-around time and the throughput for FCFS, SJN and deadline scheduling algorithms.

(8 Marks)

Job Ids	Arrival Time	Execution time	Deadline
1	0	5	5
2	1	15	25
3	3	12	10
4	7	25	50
5	10	5	12

Question Four (20 Marks)

- a) Define I/O buffer? (2 Marks)
i. Explain the advantage and effectiveness of buffering (4 Marks)
- b) Explain the critical section problem with an example (3 Marks)
- c) Explain race condition (2 Marks)
- d) Differentiate between protection and security and techniques used for protecting user files. (9 Marks)

Question Five (20 Marks)

- a) Define inter process communication? (2 Marks)
i. Explain the two fundamental models of inter process communication. (6Marks)
- b) Explain interrupts as used in process management? (2 Marks)
i. How are they handled by the operating system (2 Marks)
- c) List the major activities of an operating system with respect to memory management, secondary storage management and process management. (8 Marks)

