



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (MATHEMATICS AND COMPUTER SCIENCE)

SCO 107: OPERATING SYSTEMS

DATE: 23/7/2019

TIME: 8.30-10.30 AM

INSTRUCTIONS

This paper consists of FIVE questions

*Answer **question one** and other **two questions** in this paper*

QUESTION ONE (30 MARKS)

- a) List three characteristics of modern operating systems. (3 marks)
- b) Briefly explain any three operations that are associated with files (6 marks)
- c)
 - i Briefly explain two reasons for process switch. (4 marks)
 - ii Outline three advantages of threads. (3 marks)
- d) Discuss three types of interrupts in operating systems: (6 marks)
- e) Explain the meaning of the following terms as used in operating systems (6 marks)
 - i. System call.
 - ii. Swapping
 - iii. Memory Management Unit
- f) Describe how a multi-threaded application can be supported by a user-level threads package. (4 marks)

QUESTION TWO (20 MARKS)

- a) Explain any four principles of I/O software (8 marks)
- b) Discuss three file allocation methods. (6 marks)
- c) Describe three factors to consider when selecting a file design method. (3 marks)

- d) Briefly explain three requirements of any solution to the critical sections problem. Why are the requirements needed? (3 marks)

QUESTION THREE (20 MARKS)

- a) Name and describe four page replacement algorithms. Critically compare them with each other. (8 marks)
- b) i Briefly explain four measures that can be undertaken to ensure security of the computer system. (4 marks)
- ii Explain the difference between block and character devices. (2 marks)
- c) Consider the following set of processes :

Process	Burst Time	Arrival	Start	Wait	Finish	TA
P1	8	0				
P2	4	1				
P3	9	2				
P4	5	3				

- i. Draw the Gantt chart that illustrates the execution of these processes using the SRTF algorithm. (2 marks)
- ii. Determine the average waiting time using SRTF algorithm? (2 marks)
- iii. What is the average turnaround time for the SRTF scheduling algorithm? (2 marks)

QUESTION FOUR (20 MARKS)

- a) i) Explain what is virtual memory and give reason why it is important (2 marks)
- ii) Describe three disk scheduling algorithms. (6 marks)
- b) Discuss two methods of handling race conditions in process concurrency and synchronization. (4 marks)
- c) Discuss two major operations on processes. (4 marks)
- d) Explain the following memory fragmentation techniques: (4 marks)
- i. External fragmentation
- ii. Internal fragmentation

QUESTION FIVE (20 MARKS)

- a) One of the ways of preventing occurrence of deadlocks is by ensuring that deadlock conditions do not hold. Discuss how each of the conditions can be eliminated. (8 marks)

- b) Describe the two major roles of an operating system, and elaborate why these roles are important (4 marks)
- c) Other than SRTF, discuss two process scheduling algorithms giving one advantage and drawback for each. (4 marks)
- d) Explain TWO challenges one is likely to face when using monolithic operating system structure. (4 marks)