



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 107: OPERATING SYSTEMS

DATE: 22/1/2021

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer Question ONE and any other TWO Questions

QUESTION ONE (30 MARKS)

- a) Explain the following terminologies as used with operating systems (5marks)
- Process
 - Process state
 - Program counter
 - Dispatch latency
 - starvation
- b) Explain any THREE conditions in which CPU scheduling decisions may take place in a process (3 marks)
- c) Briefly explain any FOUR scheduling criteria in a process (6marks)
- d) Using First-Come, First-Served (FCFS) Scheduling algorithm, calculate average waiting time for the processes (3 marks)

Process	Burst Time (<i>milliseconds</i>)
<i>P1</i>	24
<i>P2</i>	3
<i>P3</i>	3

Suppose that the processes arrive in the order: $P1$, $P2$, $P3$

- e) Using a well-labeled diagram, explain various process states (5 marks)
- f) State TWO advantages and TWO disadvantages of demand paging as used in operating system virtual memory. (4 marks)
- g) Explain services provided by Kernel I/O subsystems in relation to operating system I/O software (4 marks)

QUESTION TWO (20 MARKS)

- a) Using the shortest job First(SJF) scheduling algorithm for non-preemptive, calculate the average waiting time for the processes. (5 marks)

Process	Arrival Time	Burst Time
$P1$	0.0	7
$P2$	2.0	4
$P3$	4.0	1
$P4$	5.0	4

- b) Explain any FIVE ways of optimizing scheduling criteria in processes (10 marks)
- c) List any THREE program threats and TWO system Threats as used with Operating systems. (5 marks)

QUESTION THREE (20 MARKS)

- a) using Round Robin scheduling criteria with time quantum = 20, draw a Gantt chart and calculate the average waiting time for the processes (8 marks)

Process	Burst Time	Waiting Time of each Process
$P1$	53	
$P2$	17	
$P3$	63	
$P4$	26	

- b) Explain any FOUR conditions that characterizes a deadlock (8 marks)
- c) Explain any TWO ways operating system uses to authenticate users (4 marks)

QUESTION FOUR (20 MARKS).

- a) Explain FOUR ways of effecting deadlock prevention (8 marks)

- b) Explain the following terminologies as used with operating system memory management
- i. Segmentation
 - ii. Paging
 - iii. Fragmentation
 - iv. Memory allocation
 - v. Swapping (10 marks)
- c) List TWO ways of implementing one time passwords in operating system security (2 marks)

QUESTION FIVE (20 MARKS).

- a) i) Outline THREE ways of accessing Files in operating systems (3 marks)
- ii) Explain THREE main ways operating system uses to allocate disk space to files. (6 marks)
- b) Explain any FOUR ways of Recovering from a deadlock condition (8 marks)
- c) Explain the following terminologies as used with operating systems (3 marks)
- i. Pooling
 - ii. Direct memory access(DMA)
 - iii. Program status register