



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

CODE 2920/105: OPERATING SYSTEMS

DATE: 30/3/2023

TIME: 11:30-2:30 PM

Instructions:

Answer any FIVE questions

Don't write on this question paper

QUESTION ONE

- a) Explain the following terms as used in memory management:
 - i. Virtual address;
 - ii. Thrashing. (4 marks)
- b) Memory is a key function that should be carefully managed. Explain **four** requirements that the memory management design of an operating system should endeavor to satisfy. (8 marks)
- c) Describe **three** differences between *Random Access Memory* and *Associative Memory*. (6 marks)
- d) Outline **two** limitations of paging as used in virtual memory. (2 marks)

QUESTION TWO

- a) Explain the following terms as used operating systems:
 - i. Multithreading;
 - ii. Process. (4 marks)
- b) Differentiate between *Static and dynamic linking* as used in memory management. (4 marks)
- c) Tony was required to configure buffering in an operating system that he was installing to a client. Explain **three** types of buffering he could use. (6 marks)
- d) Differentiate between synchronous (blocking) and asynchronous (interrupt driven) transfers. (4 marks)
- e) Describe the term *roll-back* as used in process management. (2 marks)

QUESTION THREE

- a) Explain the following terms in relation to deadlocks:
- i. *Two phase locking*
 - ii. *Starvation*
 - iii. *Safe and unsafe states* (6 marks)
- b) Gijo Consultants have advised Your Institution to consider installing a *multiprocessor* system for its server room.
- i. Describe the system. (2 marks)
 - ii. Explain **two** advantages of the system that could have influenced the advice. (4 marks)
- c) The table below shows execution information of four processes in a system using SRTN scheduling algorithm. Use it to answer the questions that follow.

Process	Arrival time	Service
W	0	1
X	1	10
Y	2	3
Z	3	7

Evaluate:

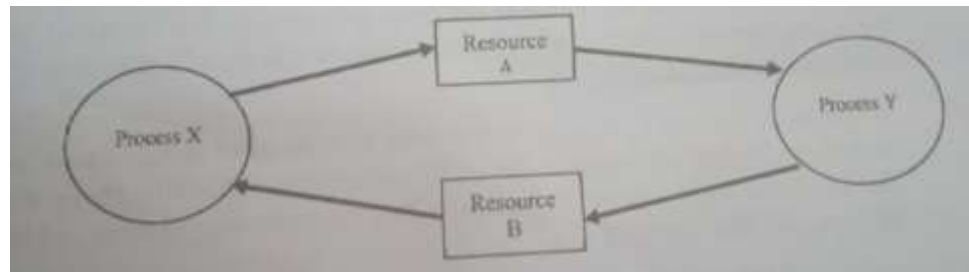
- i. The average waiting time for the processes; (4 marks)
- ii. The average turnaround time for the system. (4 marks)

QUESTION FOUR

- a) Fred is designing an input device for his mini laptop that would use the DMA I/O technique. Describe the process of reading a block of data from the device. (6 marks)
- b) Define the term *port* as used in I/O devices. (2 marks)
- c) Consider a swapping system in which memory consists of the following memory hole sizes in the following order: 10 KB, 4 KB, 20 KB, 18 KB, 7 KB, 9 KB, 12 KB, and 15 KB. Which hole is taken for successive segment requests of: 12 KB, 10 KB and 9 KB for:-first fit, best fit, worst fit, and next fit. (4 marks)
- d) Differentiate between *human and machine readable* I/O devices. (4 marks)
- e) Describe the **two** fetching policies used in virtual memory management. (4 marks)

QUESTION FIVE

- a) The figure below shows allocation of resources to two processes. Use it to answer the questions that follow.



- i. Describe the condition depicted in the figure. (4 marks)
 - ii. Explain the measures that could have prevented the condition. (6 marks)
- b) Outline **four** possible reasons for suspending a process during processing. (4 marks)
- c) The following options are displayed while installing operating system software on a computer:
- i. Custom;
 - ii. Full.
- State the function of each of the options when selected. (4 marks)
- d) Describe a *page table* as used in operating systems. (2 marks)

QUESTION SIX

- a) A particular hard disk has a total of 200 tracks. Six processes make requests for data from the following tracks respectively: 60 70 50 30 98 130
For each of the following disk scheduling algorithms, determine the average seek length assuming that the starting track is 100.
- a. FIFO;
 - b. SSTF;
 - c. C-SCAN. (9 marks)
- b) Differentiate between *high level* and *low level* formatting as used in storage disks. (4 marks)
- c) Outline **three** functions of device drivers as used in I/O management. (3 marks)
- d) Differentiate between *base* and *bound registers* as used in memory management (4 marks)

QUESTION SEVEN

- a) An operating system uses detection and recovery methods to deal with possible deadlocks. Explain **two** criteria that could be used when selecting the process to abort. (4 marks)
- b) With the aid of a diagram describe *fixed partition* memory management technique. (4 marks)
- c) Outline **two** advantages of using fixed partitioning. (4 marks)
- d) Stella was required to identify categories of memory management unit (MMU) in her computers operating system. Explain **two** categories that she could have identified. (4 marks)
- e) With the aid of a diagram, describe the *memory hierarchy* in computer systems. (4 marks)

QUESTION EIGHT

- a) Explain each of the following terms as used in I/O operations:
 - i. Spooling;
 - ii. Device controller; (4 marks)
- b) Describe **four** objectives of device management (I/O) management. (8 marks)
- c) Outline **two** limitations of using best fit memory placement policy. (2 marks)
- d) Describe any **three** page replacement policies. (6 marks)