



MACHAKOS UNIVERSITY

University Examination for 2023/2024
DIRECTORATE OF TVET

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY
FIRST YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN
INFORMATION COMMUNICATION TECHNOLOGY
2920/105: OPERATING SYSTEMS

DATE: 27/11/2023

TIME: 8:30-11:30AM

INSTRUCTIONS:

Answer any FIVE questions

Don't write on this question paper

QUESTION 1

- a) Outline **four** objectives of operating systems in computers. (4 marks)
- b) Explain **two** circumstances under which a pre-emptive scheduling decision would be made by the operating system during inter-process communication. (4 marks)
- c) Describe **two** functions of a job control language as used in operating systems. (4 marks)
- d) The following options are displayed while installing operating system software on a computer:
 - a. Custom;
 - b. Full.

State the function of each of the options when selected. (4 marks)

- e) Outline **four** disadvantages of using command-line interface in a computer system. (4 marks)

QUESTION 2

- a) Process synchronization is important during execution. Explain **four** methods employed by operating systems to achieve it. (8 marks)
- b) Jesse has realized that all the active tasks on his computer system are deadlocked. Explain **three** approaches he could employ to recover from this situation. (6 marks)
- c) Distinguish between kernel and shell as used in operating systems. (4 marks)
- d) Explain how priority scheduling algorithm deals with the problem of starvation on processes with lower priority. (2 marks)

QUESTION 3

- a) With the aid of a diagram, describe *swapping* technique as applied in memory management. (4 marks)
- b) Describe **three** main characteristics of the 3rd generation operating systems. (6 marks)
- c) The table below shows the CPU burst time for different processes.

<u>Process</u>	<u>Burst time</u>
P ₁	12
P ₂	25
P ₃	6
P ₄	9
P ₅	15

Determine:

- i. The average waiting time using shortest job first scheduling algorithm. (4 marks)
- ii. The waiting time for process P₁ and P₄ using FCFS scheduling algorithm. (4 marks)
- iii. Outline **two** disadvantages of Priority scheduling algorithm. (2 marks)

QUESTION 4

- a) Describe **four** scheduling criteria that an operating system could use to select a scheduling algorithm for a particular situation and environment. (8 marks)

- b) A running process can be terminated by an operating system depending on the prevailing circumstances. Explain **four** such circumstances. (8 marks)
- c) With the aid of a diagram, describe the memory hierarchy in a computer system. (4 marks)

QUESTION 5

- a) Junta intends to purchase an operating system for his computer. Describe **two** factors he should consider. (4 marks)
- b) Walter would like to design an operating system for a multi-level process scheduling system. Explain **three** parameters he should consider to guarantee efficiency in the system. (6 marks)
- c) Explain each of the following types of operating systems stating the most appropriate area where it could be applied:
- a. Real time operating system;
 - b. Distributed operating system;
 - c. Network operating system. (6 marks)
- d) Explain any **two** limitations associated with round robin scheduling algorithm. (4 marks)

QUESTION 6

- a) With the aid of a diagram, describe circular wait in process management. (4 marks)
- b) ICT module 1 students in Machakos University were carrying out an assignment on objectives of memory management in operating systems. Explain **four** objectives that they could have mentioned. (4 marks)
- c) Suppose we have 4 processes that arrived in the order P1, P2, P3 and P4 and their burst times is as provided.

Process	Arrival Time	Burst Time
P1	0	5
P2	2	8
P3	3	4
P4	4	1

Considering the FCFS scheduling algorithm,

- a. Draw the Gantt chart; (2 marks)
- b. Calculate the average waiting time for the processes; (4 mark)
- c. Calculate the average turn around time. (4 marks)
- d) Describe the term *virtual machine* as used in operating systems (2 marks)

Question 7

- a) Outline **four** advantages of a distributed operating system. (4 marks)
- b) An IT professional designed an operating system consisting of several modules. Each module was designed on one below it.
 - i. State the name given to the resultant structure after design. (1 mark)
 - ii. Outline **two** advantages and **one** disadvantage of this structure. (3 marks)
- c) Describe **two** objectives of process management as used in operating system. (4 marks)
- d) Differentiate between *monolithic and non-monolithic* operating systems. (4 marks)
- e) Sifa was required to identify advantages of the pre-emptive job scheduling techniques. Explain **two** advantages that she could have identified. (4 marks)

Question 8

- a) Sam was required to enumerate objectives of inter process communication in operating systems during a regional symposium for programmer's. Explain **three** objectives that he could have outlined. (6 marks)
- b) Differentiate between I/O bound and CPU bound jobs. (4 marks)
- c) With the aid of a sleeping barber classical example, describe the inter-process communication problem as used in process management. (6 marks)
- d) Several resources are prerequisite for a successful process execution by the CPU, Outline four examples of these resources that should be availed to the CPU. (4 marks)