2920/105
OPERATING SYSTEMS
July 2023
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE I

OPERATING SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

*This paper consists of **EIGHT** questions.*
*Answer any **FIVE** of the **EIGHT** questions in the answer booklet provided.*
Candidates should answer the questions in English.

This paper consists of 5 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

Turn over

1. (a) (i) Outline **four** characteristics of a priority scheduling algorithm. (4 marks)

(ii) Distinguish between *dumb* and *smart controllers*. (4 marks)

(b) Explain **three** circumstances under which an ostrich algorithm would be used to deal with deadlock in an operating system. (6 marks)

(c) (i) Outline **two** rules that should be followed when implementing a layered operating system. (2 marks)

(ii) Mary noted several caching issues while using an operating system. Explain **two** such issues that she could have noted. (4 marks)

2. (a) Distinguish between *seek time* and *latency* as applied is disk drives. (4 marks)

(b) Contiguous file allocation method is commonly used in operating systems. Outline **four** advantages of this file allocation method. (4 marks)

(c) Audit trail is an important file protection feature in operating systems. Outline **four** typical content of the audit records captured by this feature. (4 marks)

(d) (i) Distributed Operating System allows applications running on multiple computers to be linked via a communications link. Describe **two** types of this operating system. (4 marks)

(ii) A lecturer described the computer clocking system during an operating system lesson. Describe **two** types of clocks that he could have mentioned. (4 marks)

3. (a) (i) Outline **four** characteristics of round robin scheduling algorithm. (4 marks)

(ii) Differentiate between *maskable* and *non-maskable* interrupts. (4 marks)

(b) (i) Explain the term *process swapping* used in process management. (2 marks)

(ii) Computer terminals are commonly used for input of data in organizations. Describe **two** types that are likely to be used. (4 marks)

(c) John was required to mention several disadvantages of memory overlay during a job interview. Explain **three** disadvantages that he could have mentioned. (6 marks)

4. (a) (i) Distinguish between *address* and *address space* as applied in memory management. (4 marks)

(ii) Explain **two** types of semaphores used in process management. (2 marks)

(b) Explain **two** circumstances under which an organization would implement a tree-structured directory. (4 marks)

(c) A kernel is key in operating systems. Outline **four** roles it plays in operating system. (4 marks)

(d) Virtual memory does affect the performance of a system. Explain **three** disadvantages of implementing virtual memory in highly computational environments. (6 marks)

Clock
Keyboard
hard disk
floppy disk

5. (a) Explain each of the following terms as used in operating systems:

(i) system call; (2 marks)

(ii) hypervisor. (2 marks)

(b) Figure 1 shows a memory management technique. Use it to answer the questions that follow.

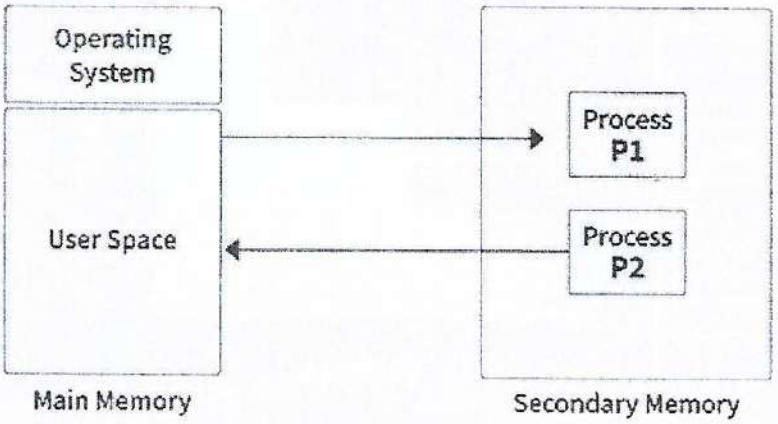

Figure 1

(i) Identify the memory management technique depicted in the Figure 1. (1 mark)

(ii) Outline **two** benefits of the technique in (i). (2 marks)

(iii) Outline **two** limitations of the technique in (i). (2 marks)

(c) The operating system maintains separate types of process scheduling queues throughout the process life cycle. Explain **two** types of these process scheduling queues. (4 marks)

(d) (i) Outline **three** factors that determines the efficiency of an I/O device. (3 marks)

(ii) Ruben intends to implement a disk scheduling algorithm in an operating system that he was designing for a client. Describe **two** reasons for the inclusion of the algorithm. (4 marks)

6. (a) Explain each of the following terms used in computer memory:

(i) dual channel; (2 marks)

(ii) Error Correcting Code . (2 marks)

(b) Distinguish between *ready* and *ready suspended* process states. (4 marks)

(c) RAM disk are commonly used by computer users to temporarily store data. Explain **three** features that are likely to be exhibited when using it. (6 marks)

(d) Figure 2 shows a contiguous memory allocation technique. Use it to answer the questions that follow.

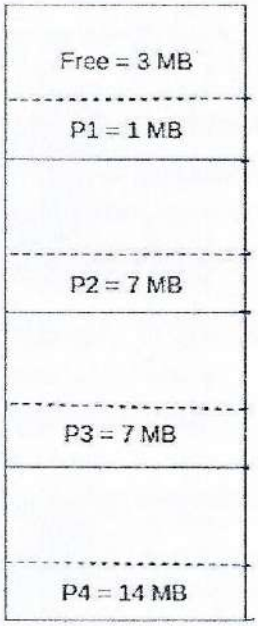

Figure 2

(i) Outline the memory technique shown in Figure 2. (2 marks)

(ii) Explain **two** advantages of the memory technique identified in (i). (4 marks)

7. (a) Explain **three** design flaws common in I/O throughput. (6 marks)

(b) Zack was researching on types of I/O devices that could be used in organizations. Explain **two** types that he could have established. (4 marks)

(c) File naming requires careful consideration by the users. Outline **five** guidelines that should be followed. (5 marks)

(d) Andy was required to diagnose the reasons for process termination in an operating system. Outline **five** reasons that he could find. (5 marks)

8. (a) (i) List **four** examples of file extensions used in computers. (2 marks)

(ii) Outline **four** ways of securing files stored in a computer. (4 marks)

(b) Figure 3 shows memory hierarchy in a computer. Use it to answer the question that follows.

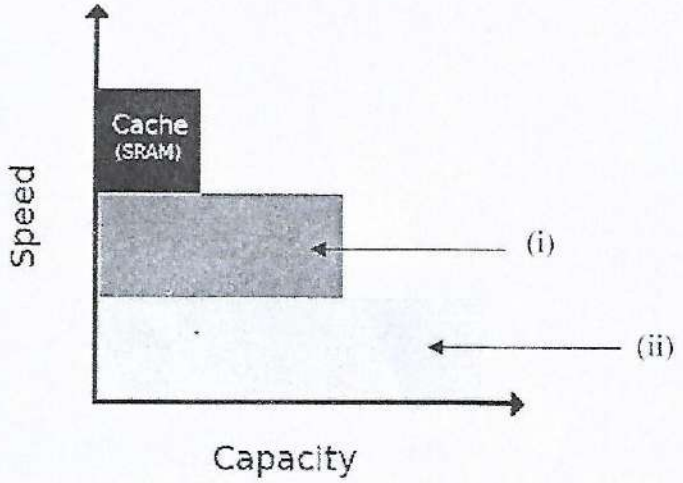

Figure 3

Describe the **two** memory hierarchy levels labelled (i) and (ii). (4 marks)

(c) Modern operating system uses inverted page tables for memory management. Explain **two** disadvantages that could be realized from this method of paging. (4 marks)

(d) (i) List **four** system file formats used in operating systems. (2 marks)

(ii) Explain **two** reasons for disk defragmentation in computers. (4 marks)

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