

2920/105
OPERATING SYSTEMS
November 2018
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 4 printed pages.

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

1. (a) (i) Explain **one** function of a *memory-management unit (MMU)*. (2 marks)
- (ii) Differentiate between *logical* and *physical* memory addresses. (4 marks)
- (b) A typical operating system is bound to be upgraded over time for a number of reasons. Outline **four** reasons that could influence the upgrade. (4 marks)
- (c) Judy was required to design a job scheduling algorithm for a proposed operating system. Explain **three** features she should consider in the design. (6 marks)
- (d) Operating systems should make several types of scheduling decisions with respect to process execution. Describe **two** of these processor scheduling decisions. (4 marks)
2. (a) (i) Outline **three** process states as used in operating systems. (3 marks)
- (ii) Modern operating system uses dynamic link memory technology. Explain **two** advantages of this technology. (4 marks)
- (b) Peter was required to design a file system for a client. Outline **five** factors that he should consider in the design. (5 marks)
- (c) Passwords are normally used to enhance security of a file system. Outline **four** guidelines that should be observed when using passwords. (4 marks)
- (d) Preemptive process scheduling policies incur greater overheads than non-preemptive policies. Explain **two** strategies that could be used to mitigate these overheads. (4 marks)
3. (a) Explain each of the following terms as used in operating systems:
- (i) kernel; (2 marks)
- (ii) interrupt. (2 marks)
- (b) Purity was required to design an operating system that would provide necessary operating system's services but only mechanisms needed to implement such services.
- (i) Identify the most appropriate category of operating system. (2 marks)
- (ii) Outline **four** benefits that could realize when using the operating system identified in (i). (4 marks)
- (c) (i) Explain the term *dispatcher* as used in inter-process communication. (2 marks)
- (ii) Differentiate between *human* and *machine* readable I/O devices. (4 marks)
- (d) A lecturer described single buffering scheme to an OS class. Outline **two** techniques used with this scheme that he could have mentioned. (4 marks)
4. (a) Outline **three** file access methods in operating systems. (3 marks)
- (b) (i) Define the term *disk cache* as used in I/O communication. (2 marks)
- (ii) There are several file directories systems but all support similar file operations. Outline **five** examples of these file operations. (5 marks)

4. (i) Outline **two** objectives of memory management in operating systems. (2 marks)
- (ii) Differentiate between a *CD recordable (CD-R)* and a *CD Rewritable (CD-RW)*. (4 marks)
- (d) Modern operating system does not use fixed memory partitioning. Explain **two** limitations of this memory management technique that could be influence this trend. (4 marks)
5. (a) Explain the term *segment* as used in memory management. (2 marks)
- (b) List **four** requirements for a memory management technique. (4 marks)
- (c) Deadlock in resource allocation exists only if several conditions hold. Explain **three** conditions that are likely to trigger deadlock. (6 marks)
- (d) (i) Distributed Deadlock Detection algorithms are more commonly used in distributed operating systems. Explain **two** strengths that could be influencing their application. (4 marks)
- (ii) An authentication process consists of two steps. Explain **two** of these steps that could be incorporated in operating systems. (4marks)
6. (a) Figure 1 shows a cross section of a hard disk platter. Describe the function of the parts labeled (i) and (ii). (4 marks)

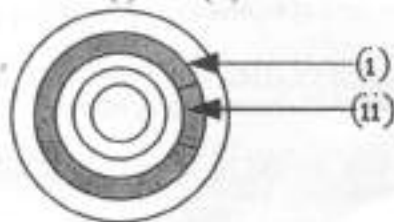


Figure 1

- (b) Mary would like to implement shortest remaining time (SRT) processor scheduling algorithm. State **four** characteristics expected of the operating system with respect to the process control. (4 marks)
- (c) Paul was advised to enable I/O buffering in his computer. Explain **two** conditions that could have informed his friend's advice. (4 marks)
- (d) (i) With the aid of a diagram, outline a process control block. (4 marks)
- (ii) Disk mirroring is a feature of Redundant Array of Independent Disks 1 (RAID 1). Explain **two** limitations that could be realized while using it. (4 marks)
7. (a) (i) Outline **two** examples of resources needed for process execution. (2 marks)
- (ii) Outline **four** factors that may affect performance of a storage disk. (4 marks)
- (b) Differentiate between *rename* and *modify* as used in file operations. (4 marks)

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Figure 2 shows a typical memory hierarchical map used in computers. Describe each of the layers labelled (i) and (ii). (4 marks)

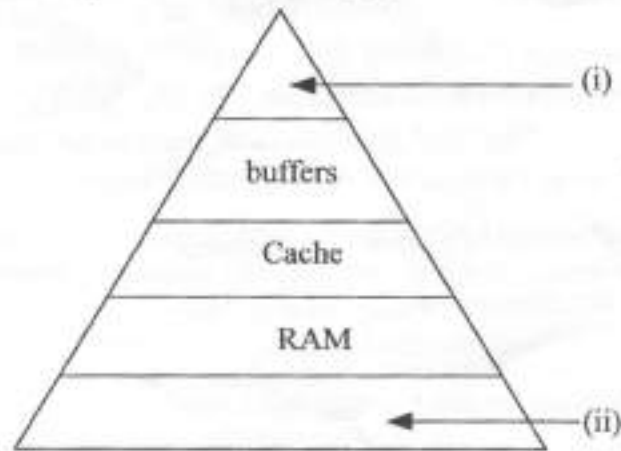


Figure 2

(d) Describe **three** circumstances under which a new process could be generated in an operating system. (6 marks)

8. (a) (i) Outline **two** reasons that could be influencing the use of cache memory in computers. (2 marks)

(ii) Differentiate between *asynchronous* and *synchronous* as applied in windows I/O communication. (4 marks)

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(i) Define the term *spatial locality* as used in operating systems. (2 marks)

(ii) Explain **three** types of information that should be found in a memory table. (6 marks)

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Typically, users or groups of users are granted certain access rights to a file in a computer system. Describe **three** examples of these access rights that could be found in computer systems. (6 marks)

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