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.

Turn over

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)

(c) (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)
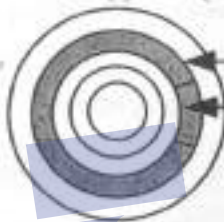

Figure 1

(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)

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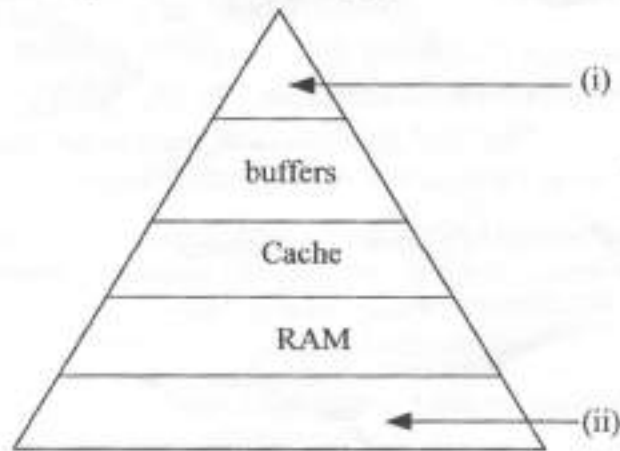

Figure 2

(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)

(b) (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)

(c) 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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