

2920/105
OPERATING SYSTEMS
November 2016
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE I

OPERATING SYSTEMS

3 hours

INSTRUCTIONS TO THE CANDIDATES

This paper consists of EIGHT questions.

Answer any FIVE of the EIGHT questions in the answer booklet provided.

All questions carry equal marks.

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) Explain the term *system call* as applied in operating systems. (2 marks)
- (b) Outline **four** benefits of virtual memory in computers. (4 marks)
- (c) Describe **three** strategies that could be used to mitigate deadlocks in operating systems. (6 marks)
- (d) (i) 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)
- (ii) Sifa was required to identify advantages of the pre-emptive job scheduling techniques. Explain **two** advantages that she could have identified. (4 marks)
2. (a) Outline **three** file operations that could be applied to a file. (3 marks)
- (b) (i) Define the term *sector* as applied in computer storage. (2 marks)
- (ii) With the aid of a diagram, describe file allocation table as used in operating systems. (5 marks)
- (c) (i) Outline **two** limitations of fixed memory partitioning. (2 marks)
- (ii) Differentiate between *single* and *double buffering* as used in I/O ports registers. (4 marks)
- (d) Tom would like to design a memory system that uses best-fit placement algorithm. Explain **two** limitations of this algorithm that would affect the performance of the memory. (4 marks)
3. (a) Explain each of the following terms as used in operating systems:
 - (i) kernel; (2 marks)
 - (ii) monitor. (2 marks)
- (b) Elsie was required to select an operating system that would be used on a server computer to provide a wide range of services to other desktop computers.
 - (i) Identify the most appropriate type of operating system that she could select justifying your answer. (2 marks)
 - (ii) Explain **two** benefits that her company could realize when using the operating system identified in (i). (4 marks)
- (c) (i) Explain the term *Remote Procedure Call (RPC)* as used in operating systems. (2 marks)
- (ii) Differentiate between *communication* and *storage I/O* devices. (4 marks)
- (d) A computer is made up of different types of internal buses to facilitate communication. Explain **two** types of such buses found in a computer system. (4 marks)
4. (a) (i) Outline **three** examples of roles that could be provided by a parent processor. (3 marks)
- (ii) With the aid of a diagram, describe the burst DMA mode of operations. (4 marks)

- (b) With the aid of a diagram, describe a hierarchical file system. (5 marks)
- (c) Mark proposed a file encryption technique for his company's file system. Explain **two** techniques that he could have proposed. (4 marks)
- (d) Deadlocks are inevitable in operating systems. Explain **two** conditions that should hold to trigger this anomaly. (4 marks)
5. (a) (i) Name **two** ways of creating processes during execution by operating system. (2 marks)
- (ii) Outline **four** advantages of peer-to-peer file sharing. (4 marks)
- (b) Differentiate between *seek time* and *rotational delay* as used in disk management. (4 marks)
- (c) Identify the type of memory used in each case:
- (i) temporarily store results of processing by CPU; (1 mark)
- (ii) retains stored information event after computer restarts; (1 mark)
- (iii) portion of hard disk that is logically addressed as a main memory; (1 mark)
- (iv) bridges the speed gap between the processor and RAM; (1 mark)
- (d) 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)
6. (a) (i) Explain the term *frame* as applied in memory management. (2 marks)
- (ii) Differentiate between *base register* and *bound register* as used in memory management. (4 marks)
- (b) Monolithic operating systems are not popular. Outline **four** limitations of monolithic operating systems that could be influencing this trend. (4 marks)
- (c) With the aid of sketches, explain **two** issues associated with memory fragmentation. (4 marks)
- (d) Maria intends to use round robin job scheduling algorithm in an operating system. Explain **three** benefits of using this algorithm. (6 marks)
7. (a) (i) Outline **two** factors to be considered when selecting computer memory, other than cost. (2 marks)
- (ii) Differentiate between *I/O bound* and *CPU bound* jobs. (4 marks)
- (b) (i) Define the term *dispatcher* as used in operating systems. (2 marks)
- (ii) Describe **three** advantages of paging memory as used in memory management. (6 marks)

- (c) Lloyd was required to design a file system for a client that will support indiscriminate access of files by system users.
- Identify the most appropriate file access method that he could use justifying your answer. (2 marks)
 - Explain **two** advantages of file access method identified in (i). (4 marks)
8. (a) Figure 1 shows a sketch of a section of a hard disk. Explain the functions of each of the parts labeled (i) and (ii). (4 marks)

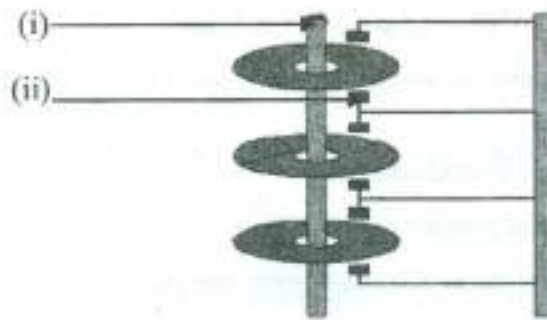


Figure 1

- Dennis investigated challenges faced while using non-preemptive job scheduling in operating systems. Explain **two** challenges that he could have established. (4 marks)
- Bernard intends to configure access control list (ACL) in a one of his client's file system. Explain **two** reasons that could influence his decision. (4 marks)
- Cindy was required to identify characteristics of a 4th generation operating system during an exam. Outline **four** characteristics that she could have listed. (4 marks)
 - RDS Company Ltd. intends to deploy Redundant Array of Independent Disks (RAID) in its file system. Explain **two** benefits that the company could realize from using the technology. (4 marks)

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