

2920/105
OPERATING SYSTEMS
July 2016
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE I

OPERATING SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

Answer any FIVE of the following 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 *interrupt* as used in operating system. (2 marks)
- (b) (i) Describe the term *swapping* as used in memory management. (2 marks)
- (ii) Outline **four** types of computer registers. (4 marks)
- (c) Explain **three** roles of process control block in operating systems. (6 marks)
- (d) (i) Outline **two** objectives for designing an operating system. (2 marks)
- (ii) Most processors support at least two modes of process execution. Explain **two** modes that are likely to be supported. (4 marks)
2. (a) Explain each of the following terms as used in operating system:
 - (i) time slice; (2 marks)
 - (ii) thread. (2 marks)
- (b) James was required to design an operating system that would perform a number of essentially independent tasks that do not need to be serialized.
 - (i) Identify the most appropriate processing technique that he could use justifying your answer. (2 marks)
 - (ii) Outline **four** advantages of the processing techniques identified in (i). (4 marks)
- (c) (i) Explain the term process spawning as used in operating systems. (2 marks)
- (ii) Differentiate between *cluster* and *sector* as applied to physical storage disks. (4 marks)
- (d) Joy intends to buy an I/O device for her computer. Outline **four** factors that she should consider, other than the cost. (4 marks)
3. (a) (i) Outline **three** disadvantages of system buffering in I/O communications. (3 marks)
- (ii) Mitchell was required to investigate characteristics of a First-In, First-Out (FIFO) disk scheduling algorithm system. Describe **two** typical characteristics that she could have established. (4 marks)
- (b) A lecturer explained the desirable qualities of file organization to a class. Outline **five** qualities that he could be possibly facing. (5 marks)
- (c) Reader Company Ltd. is experiencing data security threats. Outline **four** threats that the company could be facing. (4 marks)
- (d) Pato installed a micro kernel operating system in his computer. Explain **two** benefit that he could realize while using it. (4 marks)
4. (a) Outline **three** typical address information in a file directory. (3 marks)
- (b) (i) Define the term *key field* as used in file management. (2 marks)
- (ii) Typically, users are granted certain access rights to a file. Outline **five** examples of access rights that can be assigned to a user. (5 marks)
- (c) (i) Outline **two** problems that could be experienced with fixed memory partitioning. (2 marks)

- (ii) Differentiate between *block-oriented* and *Stream-oriented* devices. (4 marks)
- (d) Memory paging is a popular technology in operating systems. Explain **two** advantages of the technology that could be influencing the trend. (4 marks)
- 5. (a) Outline **four** desirable features of a file system. (4 marks)
- (b) Differentiate between memory address register (MAR), and memory buffer register (MBR), as applied in operating systems. (4 marks)
- (c) (i) Outline **four** reasons that would render a process into suspension state. (4 marks)
- (ii) Figure 1 shows virtual memory addressing scheme in an operating system. Explain the **two** memory addresses labelled I. and II. (4 marks)

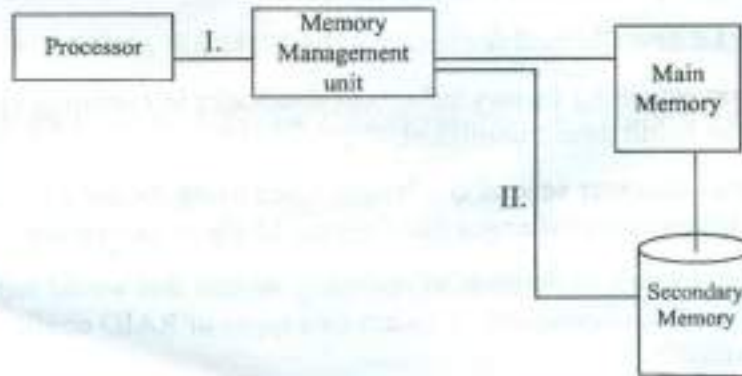
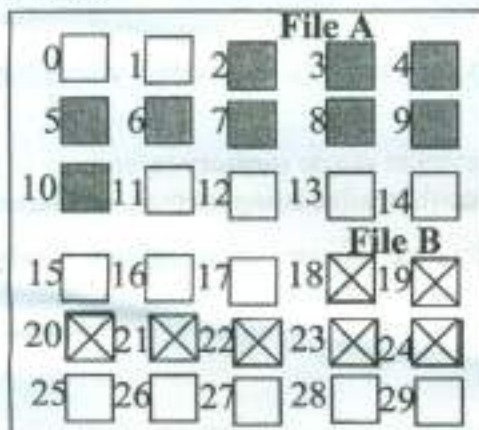


Figure 1

- (d) Oliver was required to prepare a presentation on I/O facilities in operating system. Describe **two** I/O facilities that she could have highlighted in her presentation. (4 marks)
- 6. (a) (i) Outline **two** requirements for virtual memory in computers. (2 marks)
- (ii) Differentiate between a *parent* process and a *child* process. (4 marks)
- (b) (i) Define the term *thrashing* as used in memory management. (2 marks)
- (ii) Explain **two** types of virtual memory replacement policy/strategy. (4 marks)
- (c) Figure 1 shows a typical file allocation method. Use it to answer the question that follows.



File Name	Start Block	Length
File A	2	9
File B	18	7

Figure 1

- (i) Describe the file allocation method depicted in the diagram. (2 marks)
- (ii) Outline **two** advantages of the file allocation method described in (i). (2 marks)
- (iii) Explain **two** strategies that could be adapted to conserve disk space when using file allocation method described in (i). (4 marks)
7. (a) For each of the following tasks identify appropriate file operation that could be used:
- (i) replacing filename; (1 mark)
- (ii) display file content; (1 mark)
- (iii) formatting a disk that contains files; (1 mark)
- (iv) stores a new file in disk. (1 mark)
- (b) Lucky was investigating factors influences deadlocks in operating systems. Outline **four** factors that he could have established. (4 marks)
- (c) Programmers encounter several challenges when using memory overlay in operating systems. Explain **two** challenges that they are likely to experience. (4 marks)
- (d) (i) Nancy intends to develop an operating system that would supports several types of RAID configurations. Explain **two** types of RAID configurations she should consider. (4 marks)
- (ii) The CPU uses several types of interrupt to handle I/O communications in a computer. Outline **four** types of interrupts that could be used in a computer. (4 marks)
8. (a) (i) Explain the term *frame* as applied in memory management. (2 marks)
- (ii) Differentiate between *fetch* and *cleaning* policies as applied in virtual memory. (4 marks)
- (b) Clifford was required to design a general-purpose time-sharing system for his client.
- (i) Describe the most appropriate process scheduling technique that he could use. (2 marks)
- (ii) Outline **two** disadvantages of process scheduling technique described in (i). (2 marks)
- (iii) Explain **one** factor that affects performance in the process scheduling technique described in (i). (2 marks)
- (c) Memory segmentation allows programmers to create memory references in their design. Outline **four** advantages programmers could realize using memory references. (4 marks)
- (d) Distributed operating systems are widely used in many organizations. Explain **two** features that could be influencing the trend. (4 marks)

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