2920/105
OPERATING SYSTEMS
July 2019
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** questions in the answer booklet provided.*
Candidates should answer all 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) Outline **three** disadvantages of serial file organization. (3 marks)

   (b) (i) Define the term *port* as used in I/O devices. (2 marks)

   (ii) Access Control Matrix shows the types of access that each user has in a file system. Outline **five** types of access used in a file system. (5 marks)

   (c) (i) Outline **two** typical characteristics of cache memory. (2 marks)

   (ii) Differentiate between *interrupt handler* and *interrupt vector* as used in I/0 communications. (4 marks)

   (d) With the aid of a diagram, describe a page table as used in operating systems. (4 marks)

2. (a) Explain the term *compaction* as used in memory fragmentation. (2 marks)

   (b) List **four** factors that should be considered when selecting random access memory (RAM) for a computer, other than cost. (4 marks)

   (c) With the aid of a diagram, describe **three** states process model in a used in operating system. (6 marks)

   (d) (i) Joan intends to design a job scheduling algorithm. Explain **two** objectives that should be achieved by the algorithm. (4 marks)

   (ii) It is recommended that users change their passwords to guarantee good file management. Outline **four** circumstances that necessitate this action. (4marks)

3. (a) (i) Outline **three** resources required in process execution. (3 marks)

   (ii) Gerald was required to highlight principles of memory management in operating systems in a job interview. Outline **four** principles that he could have highlighted. (4 marks)

   (b) Paul investigated the disadvantages of a contiguous file allocation method. Outline **five** disadvantages that he could have established. (5 marks)

   (c) File recovery is a critical feature in a file system. Explain **two** functions of this feature. (4 marks)

   (d) The principle goal of a multiprocessor system is to balance the load between processors. Explain **two** load balancing strategies used by these systems. (4 marks)

4. (a) (i) Explain the term *virtual address space (VAS)*as used in memory management. (2 marks)

   (ii) Differentiate between *static* and *dynamic* linking as used in memory management. (4 marks)

   (b) System timer is important in multiprogramming of systems. Explain **two** roles of the timer. (4 marks)

   (c) Tony was required to configure buffering in an operating system that he was installing to a client. Explain **three** types of buffering he could use. (6 marks)

   (d) A lecturer described different categories of system calls in a lesson on operating systems. Outline **four** categories of system calls that he could have mentioned. (4 marks)

5. (a) (i) Outline **two** benefits of a microkernel operating systems. (2 marks)

(ii) Differentiate between *blocking* and *non blocking* I/O. (4 marks)

(b) (i) Define the term *segment table* as used in operating systems. (2 marks)

(ii) Explain **three** limitations of a best-fit memory placement algorithm. (6 marks)

(c) Patricia was required to describe advantages of distributed operating systems to a client. Describe **three** advantages that she could have mentioned to the client. (6 marks)

6. (a) Figure 1 shows a cross section of a hard disk. Explain the function of the parts labeled (i) and (ii). (4 marks)

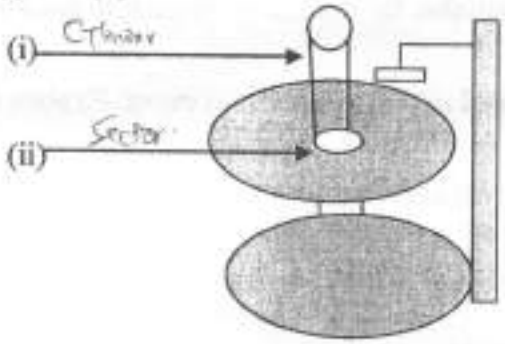

Figure 1

(b) Explain **two** circumstances under which pre-emptive job scheduling algorithms would be used in operating systems. (4 marks)

(c) I/O disk read operation involves several interrupts. Explain **two** typical interrupts that are likely to be used. (4 marks)

(d) (i) Describe **two** categories of I/O devices giving **two** examples in each case. (4 marks)

(ii) File sharing technologies have promoted the concept of global village. Explain **two** file sharing technologies that are used. (4 marks)

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

(i) shell; (2 marks)

(ii) thread. (2 marks)

(b) Doreen discovered that some of her files in her computer were encrypted and her computer prompted her to pay a certain fee through Internet in order to decrypt her files.

(i) Identify the most appropriate type of attack justifying your answer. (2 mark)

(ii) Outline **four** possible causes for the attack identified in (i). (4 marks)

(c) (i) Explain the term *spatial locality* as used in memory management. (2 marks)

(ii) Differentiate between *long-term scheduler* and *short-term scheduler*. (4 marks)

(d) Memory fragmentation is not popular with the modern operating systems. Explain **two** limitations that could be aiding this trend. (4 marks)

8. (a) (i) Outline **two** functions of device drivers in I/O communication. (2 marks)

(ii) Outline **four** conditions necessary for deadlock in computing. (4 marks)

(b) Differentiate between *high level* and *low level formatting* as used in storage disks. (4 marks)

(c) For each of the following scenario, identify the appropriate type of computer memory:

(i) highly volatile; (1 mark)

(ii) stores firmware; (1 mark)

(iii) parts of hard disk addressed as computer memory; (1 mark)

(iv) very short access time and suitable for storage of frequently used instructions by CPU. (1 mark)

(d) Creation of processes is a fundamental role of operating systems. Explain **three** ways of creating the processes. (6 marks)

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