

2920/105

**OPERATING SYSTEMS**

July 2021

Time: 3 hours



**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 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) Outline **four** objectives of memory management as a function of the operating system. (4 marks)
- (b) Explain **two** functions of shell as used in operating systems. (4 marks)
- (c) In an operating system a process may go through several states. Outline **six** such process states. (6 marks)
- (d) Paging is a significant technique used in memory management. Explain **three** advantages that paging could provide when implemented. (6 marks)
2. (a) Outline **four** types of Direct Memory Access (DMA) transfer mode. (4 marks)
- (b) Explain **two** features of the 3<sup>rd</sup> generation computer operating system. (4 marks)
- (c) Explain **two** circumstances under which memory overlay could be implemented in memory management. (4 marks)
- (d) When a user program processes a malicious task it causes a threat to the operating system. Explain **four** such threats. (8 marks)
3. (a) Outline the functions of each of the following drivers:
  - (i) kernel device; (1 mark)
  - (ii) use mode device; (1 mark)
  - (iii) block; (1 mark)
  - (iv) character. (1 mark)
- (b) Describe each of the following multiprocessor operating system models:
  - (i) master-slave; (2 marks)
  - (ii) symmetric. (2 marks)
- (c) Computer operating systems access files using specific mechanism. Explain **three** file access mechanisms that could be used. (6 marks)
- (d) RAID storage techniques were introduced to manage the challenges of computer storage. Explain **three** benefits that could be realised from these techniques. (6 marks)
4. (a) Outline **two** types of *job control language* statements used in operating systems. (2 marks)
- (b) Explain **two** divisions of addresses generated by the CPU. (4 marks)
- (c) Distinguish between *record* and *file* as used in operating systems. (4 marks)
- (d) (i) Explain **two** circumstances under which deadlocks could occur in process management. (4 marks)
- (ii) In order to achieve device independence, the computer organizes the I/O software in layers. Describe **three** such layers. (6 marks)

5. (a) Explain each of the following terms as used in I/O devices:
- (i) external interrupt; (2 marks)
  - (ii) software interrupt. (2 marks)
- (b) Differentiate between *deterministic* scheduling and *non-deterministic* scheduling algorithms for processes. (4 marks)
- (c) The Manager of ABC Company Ltd. intends to learn about the functions of virtual devices. Explain **two** functions of the device giving an example. (4 marks)
- (d) Figure 1 represents the structure of a computer disk. Use it to answer the questions that follow.

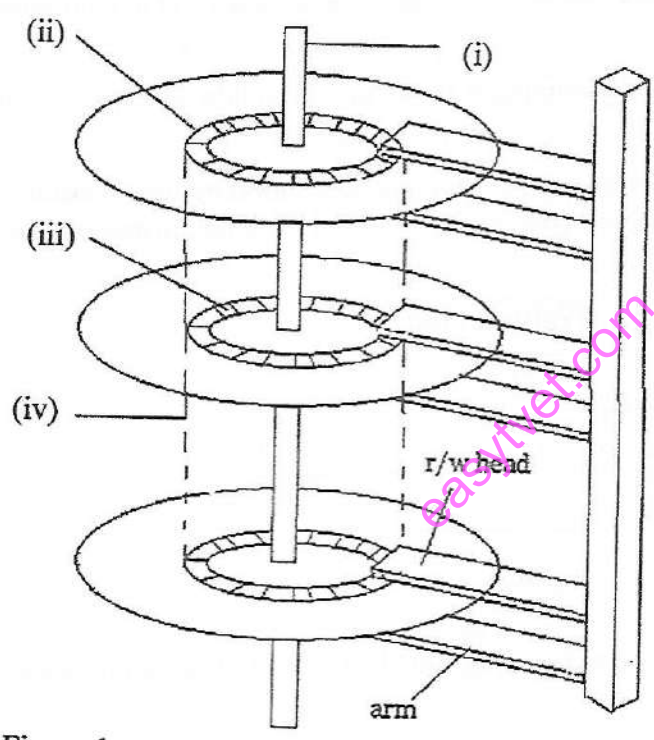


Figure 1

- (i) Identify the parts labelled (i), (ii), (iii) and (iv). (4 marks)
  - (ii) Explain **two** uses of the R/W head of the computer disk. (4 marks)
6. (a) Explain **two** ways of enforcing *mutual exclusion* in operating systems. (4 marks)
- (b) Distinguish between *multiple-partition allocation* and *single-partition allocation* as applied in computer memory. (4 marks)
- (c) A student intends to study the functions of the dispatcher in process management. Explain **three** such functions. (6 marks)
- (d) (i) Outline **two** types of queues that could be used in process scheduling. (2 marks)
  - (ii) Explain **two** circumstance that would lead to *external fragmentation* in computer memory. (4 marks)

7. (a) Outline four factors to consider when choosing computer file organization methods. (4 marks)
- (b) Distinguish between *static loading* and *dynamic loading* in memory management. (4 marks)
- (c) A computer technician intends to list the good qualities of a computer clock to employees in a company. Outline six such qualities. (6 marks)
- (d) Most computer systems provide directories to aid users in different areas. Explain three advantages that users would realize from using these directories. <sup>easy to understand</sup> <sup>efficient</sup> <sup>flexible</sup> (6 marks)
8. (a) Outline four causes of *thrashing* in computer memory management. (4 marks)
- (b) Distinguish between *synchronous I/O* and *asynchronous I/O* in computer devices. (4 marks)
- (c) A lecturer repaired a faulty computer RAM disk. Explain two types of the disks he could have repaired. (4 marks)
- (d) Table 1 shows processes in a queue awaiting execution by the scheduler in a round robin scheduling algorithm. Use the information provided to answer the questions that follow.

Process	Burst time	Waiting time
P1	63	
P2	27	
P3	58	
P4	34	

Table 1

- (i) Draw a Gantt chart to represent the data in table 1, given quantum time as 20. (4 marks)
- (ii) Determine the average waiting time. (4 marks)

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