Name _____   Index No._____

2920/105   Candidate's Signature _____
OPERATING SYSTEMS
November 2015   Date_____
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE I

OPERATING SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number on the question paper in the spaces provided above.
Sign and write the date of examination in the spaces provided above.
*Answer any **FIVE** of the following **EIGHT** questions in the spaces provided in this question paper.*
Candidates should answer the questions in English.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	Total Score
Candidate's Score									

This paper consists of 12 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 the term *page table* as applied in operating systems. (2 marks)

   (ii) Outline **four** advantages of First Come First Served (FCFS) scheduling algorithms. (4 marks)

   (b) Paul was investigating the challenges that his company might be experiencing as a result of using monolithic operating system. Explain **two** challenges he could have identified. (4 marks)

   (c) Explain **two** circumstances that could necessitate implementation of a client server operating system in an organization. (4 marks)

(d)   Sam was required to investigate disadvantages of virtual machines in computers.
      Explain **three** disadvantages that he could have established.   (6 marks)

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2.   (a)   (i)   Outline **two** file allocation methods that could be used in operating systems.
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           (ii)   Explain **two** reasons for adapting buffering technique in I/O communication.
                                                                      (4 marks)

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     (b)   Figure 1 shows inbound memory hierarchy diagram. Describe each of the layers
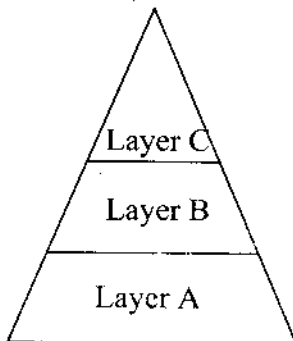   labeled A, B and C.   (6 marks)

Figure 1

(c)   Several design issues are of concern in disk cache implementation.   Explain **two** typical considerations that should be observed.   (4 marks)

(d)   Beth intends to adopt a full backup scheme for her company's file system.   Explain **two** disadvantages that she could likely realize while using this backup scheme.
(4 marks)

3.   (a)   Distinguish between *human-readable* and *machine-readable* I/O devices.   (4 marks)

(b) Sarah intends to select a file system for her company. Outline **four** factors that she should consider other than cost. (4 marks)

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(c) Define each of the following terms as used in file system:

(i) field; (2 marks)

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(ii) record. (2 marks)

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(d) (i) The short-term scheduler is invoked whenever an event occurs that may lead to the blocking of the current process in an operating system. Outline **four** examples of such events that could be invoked. (4 marks)

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(ii) Explain **two** circumstances under which an operating system would prompt a user to rename a file. (4 marks)

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

    (i) port;   (2 marks)

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    (ii) message.   (2 marks)

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    (b) (i) Figure 2 shows a cross section of a disk platter. Outline each of the parts label
              (i) and (ii).   (4 marks)

Figure 2

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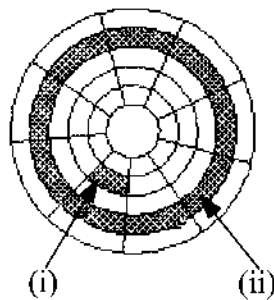
        (ii) Kate was investigating conditions necessary for deadlocks in operating systems.
              Outline **four** conditions that she was likely to identify.   (4 marks)

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(c) Julie intends to use fixed memory partitioning in an operating system that she was designing for a client. Explain **two** difficulties that she could experience while using this memory technique. (4 marks)

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(d) Load sharing is one of un-processor scheduling technique. Explain **two** versions of this technique that could be implemented in operating systems. (4 marks)

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5. (a) Explain each of the following types of I/O operations:

(i) control; (2 marks)

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(ii) status; (2 marks)

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(iii) transfer. (2 marks)

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(b) Explain **two** circumstances that could render use of context switching in operating systems. (4 marks)

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(c) Hillary was required to identify disadvantages of sequential file access method during a job interview. Outline **five** disadvantages that he could have mentioned. (5 marks)

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(d) With the aid of a diagram, describe a process control block PCB as applied in operating system. (5 marks)

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6. (a) Explain each of the following terms as used in memory management:

(i) address space; (2 marks)

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     (ii)   user space.   (2 marks)

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(b)   Distinguish between a *ready-state* and *blocked-state* of a process.   (4 marks)

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(c)   Amos was required to implement remote file sharing system for a client. Explain **three** methods that he could consider for the client.   (6 marks)

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(d)   Figure 3 shows a memory allocation technique. Use it to answer questions that follow.
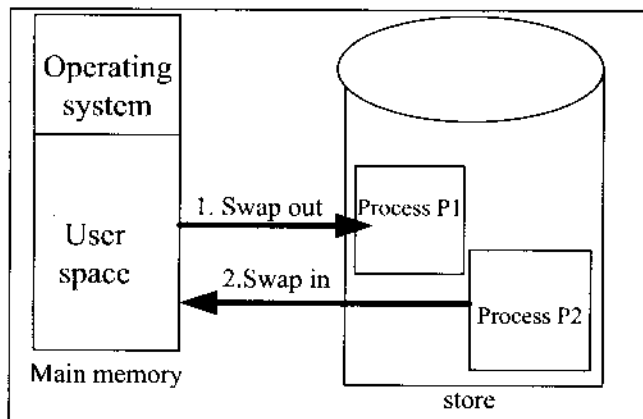

Figure 3

(i)   Identify the appropriate memory management techniques depicted in the figure.

(2 marks)

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(ii)   Explain **two** benefits that could be realized when using memory management technique identified in (i). (4 marks)

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7.   (a)   (i)   Outline **four** typical resources needed in a process execution.   (4 marks)

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(ii)   Differentiate between *data* and *system* buses as used in computers. (4 marks)

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(b)   (i)   Describe the term *disk cache* as applied in computers.   (2 marks)

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(ii) Anna was required to investigate I/O protection measures that could be implemented in an operating system for her company. Explain **two** measures that could have identified. (4 marks)

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(c) A number of memory placement techniques exist in an operating system. Explain **three** of such techniques that could be adapted in a given operating system.

(6 marks)

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8. (a) (i) Define the term _monitor_ as used in process management. (2 marks)

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(ii) Distinguish between _logical_ and _physical_ addresses as applied in memory management. (4 marks)

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(b) Tom was required to develop a clock module for an operating system for a client. Outline **four** functions of this module to the proposed operating system. (4 marks)

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(c) Nabat described several objectives for developing an I/O module to his friends. Outline **four** objectives that he could have mentioned. (4 marks)

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(d) Nissi Company Ltd. was experiencing security issues with its file system. Explain **three** logical security measures that it could implement in order to mitigate the issue. (6 marks)

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