Name:_____ Index No:_____

2920/105   Signature:_____
OPERATING SYSTEMS
November 2012   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** 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.*
All questions carry equal marks.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	Total Marks
Marks									

This paper consists of 14 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 **two** roles for each of the following computer components in operating systems:

  (i) processor: (2 marks)

  _____

  _____

  (ii) RAM. (2 marks)

  _____

  _____

  (b) A group of Module II students were carrying out research on types of operating systems. They listed the following features of a certain type of an operating system:

  • allows multiple users to simultaneously access the system through terminals.
  • supports collection of autonomous computers connected through network .
  • supports sharing of data and resources.

  (i) Identify the most appropriate type of operating system that exhibited these features justifying your answer. (2 marks)

  _____

  _____

  (ii) Explain **two** advantages of the type of operating system identified in (i). (4 marks)

  _____

  _____

  _____

  _____

  (c) (i) Explain the term _kernel_ as used in operating systems. (2 marks)

  _____

  _____

  (ii) Differentiate between _block-oriented_ and _stream-oriented_ I/O devices. (4 marks)

  _____

  _____

  _____

  _____

  _____

(d)	Susan was required to configure RAID on a computer system that contained two hard disks. Explain **two** most appropriate type of RAID she could use.

(4 marks)

_____

_____

_____

_____

2.	(a)	(i)	Outline **two** objectives of developing an operating system.	(2 marks)

_____

_____

(ii)	Differentiate between *SJF* and *FCFS* process scheduling algorithms.

(4 marks)

_____

_____

_____

_____

_____

(b)	(i)	State **four** process *states* in an operating system.	(2 marks)

_____

_____

_____

(ii)	Explain **two** benefits of using round robin scheduling algorithm in operating systems.	(4 marks)

_____

_____

_____

_____

_____

_____

(c)   With the aid of a diagram, outline the client server structure of an operating system.   (4 marks)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(d)   Mary, a secretary with a certain company used operating systems to create directories for various lecturers. Outline **four** benefits of Mary's approach.
                                                                                        (4 marks)

_____

_____

_____

_____

3.   (a)   Outline **three** file access methods that could be used in an operating systems.
                                                                                        (3 marks)

_____

_____

_____

_____

(b)   With the aid of a diagram, outline the **five** levels of typical file systems architecture as used in operating systems.   (7 marks)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(c)   (i)   Outline **two** goals of memory management in operating systems.
                                                                            (2 marks)

_____

_____

_____

(ii) Differentiate between *device drivers* and *device I/O* as used in operating systems. (4 marks)

_____

_____

_____

_____

_____

(d) Paul, a programmer with a certain software company was required to design an operating system that would use segmentation to manage memory. Outline **four** advantages for using this memory management technique. (4 marks)

_____

_____

_____

_____

_____

_____

_____

4. (a) Explain the term *pipe* as used in operating systems. (2 marks)

_____

_____

(b) Outline **four** factors that should be considered when selecting computer memory other than cost. (4 marks)

_____

_____

_____

_____

_____

(c)   Explain **three** approaches that could be used to manage deadlocks in an
        operating system.   (6 marks)

_____

_____

_____

_____

_____

_____

_____

(d)   Figure 1 shows a typical a process control block diagram in an operating
        system. Use it to answer the questions that follow.

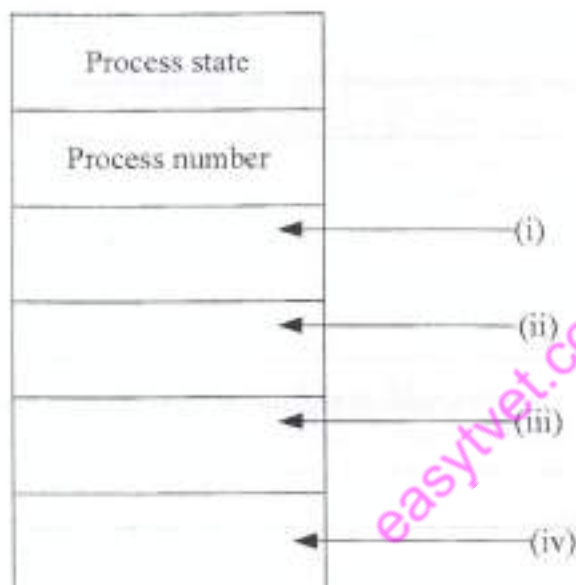Figure 1

(i)   Identify each of the layers of the diagram labeled (i), (ii), (iii) and (iv).
                                                                             (4 marks)

_____

_____

_____

_____

(ii)   Outline **four** elements of *process control information* in a process
control block diagram.   (4marks)

_____

_____

_____

_____

_____

5.   (a)   (i)   Explain the term *semaphore* as used in operating system.   (2 marks)

_____

(ii)   Differentiate between *fixed* and *dynamic* memory partitioning.
(4 marks)

_____

_____

_____

_____

_____

(b)   Figure 2 shows a typical I/O communication technique. Use it to answer the
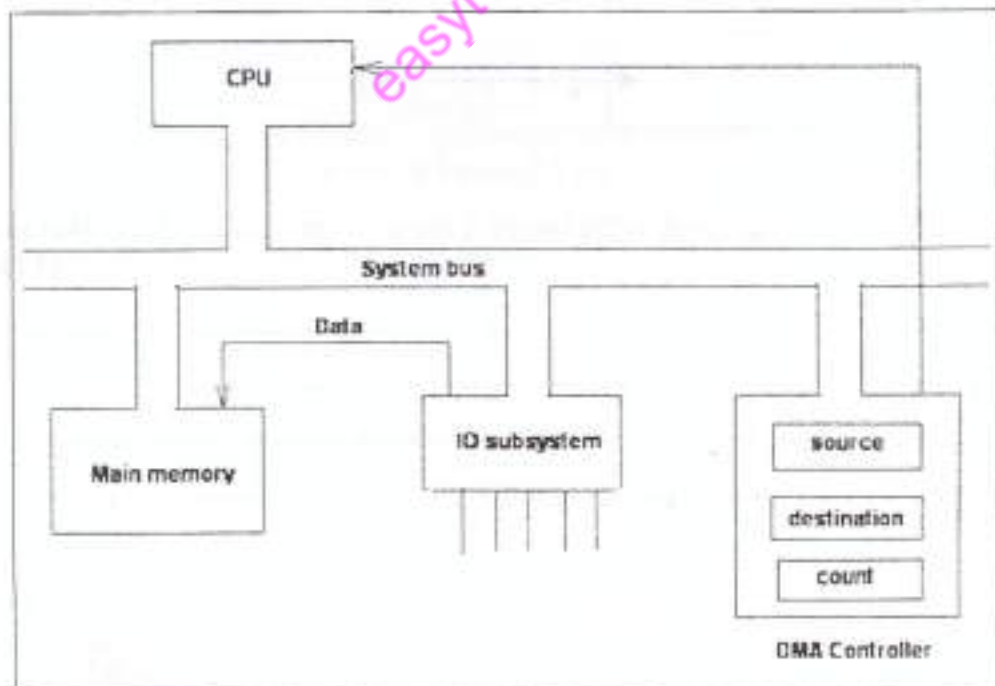questions that follow.

Figure2

(i)   Identify the I/O communication technique exhibited in the diagram justifying your answer.   (2 marks)

_____

_____

_____

(ii)   Outline the procedure used by the I/O communication technique identified in (i).   (4 marks)

_____

_____

_____

_____

_____

(c)   Tom, an intern student was required to design I/O module for a certain operating system. Explain **two** objectives that he could consider.   (4 marks)

_____

_____

_____

_____

_____

_____

_____

(d)   Mark, a systems consultant recommended an I/O buffering add-on module to an operating system. Explain **two** conditions that could justify Mark's recommendation.   (4 marks)

_____

_____

_____

_____

_____

_____

6. (a) Explain each of the following terms as used in I/O devices:

(i) disk cache; (2 marks)

_____

_____

_____

(ii) cache manager. (2 marks)

_____

_____

_____

(b) A group of Module II students were carrying out assignment on categories of I/O devices. Explain **two** categories they are likely to have mentioned in the report. (4 marks)

_____

_____

_____

_____

_____

_____

(c) Ann, an intern student was required to list elements in a file descriptor in her company's file system. Outline **four** elements that she could have listed. (4 marks)

_____

_____

_____

_____

_____

(d) For each of the following cases, explain the most appropriate disk scheduling algorithm for the following scenarios:

(i) fair clustered requests; (2 marks)

_____

_____

_____

(ii)   minimizes seek time;   (2 marks)

_____

_____

_____

(iii)   services requests in track order based on the movement of the head;

(2 marks)

_____

_____

_____

(iv)   changes directions when read/write head reaches the last request in the current direction.   (2 marks)

_____

_____

_____

7.   (a)   Outline **four** properties of a file system as used in operating systems.

(4 marks)

_____

_____

_____

_____

_____

_____

_____

(b)   Differentiate between *cache memory* and *main memory* as used in computer systems.   (4 marks)

_____

_____

_____

_____

_____

_____

_____

_____

_____

(c)   XWZ Software Company Ltd. intends to design an operating system that would ensure efficient memory placements. Explain **three** types of placement algorithms it could design.   (6 marks)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(d)   Figure 2 shows a memory management technique used in systems. Use to answer the questions that follow.

Figure 2

(i) Describe the memory management technique represented in the figure. (4 marks)

_____

_____

_____

_____

_____

(ii) Outline **two** advantages of the technique described in (i). (2 marks)

_____

_____

_____

8. (a) (i) Outline **three** components of processor's I/O instruction in a programmed I/O communication technique. (3 marks)

_____

_____

_____

_____

_____

(ii) With the aid of a diagram in each case, describe the following parts of a disk:

I. sector; (2 marks)

II. track. (2 marks)

(b)   Maurine, an intern system analyst with Ujuzi Company Ltd. was required to establish a file organization method for her Company's database system. Outline **five** criteria she could consider when selecting the file organization method.   (5 marks)

(c)   Jua-kali Company Ltd. is experiencing privacy issues with confidential information in their system. Explain **two** logical security measures it could use to mitigate the problem.   (4 marks)

(d)   An operating system has been designed to use memory overlay. Explain **two** disadvantages of this technique.   (4 marks)