1. (a) (i) Outline **four** disk operating system commands that could be used to manage files in a computer. (4 marks)

        (ii) Explain **two** advantages of Network Operating Systems. (4 marks)

    (b) Differentiate between *stacks* and *heaps* in respect to memory management by operating system. (4 marks)

    (c) A group of students were discussing the following terms during an operating system lesson. Provide the possible explanation they would have provided for each of the following terms:

        (i) job; (2 marks)

        (ii) shell. (2 marks)

    (d) James intends to change attributes of computer files in a network so as to control their access. Explain **two** file access modes he would consider t apply. (4 marks)

2. (a) Define each of the following terms in respect to computers' input/output devices:

        (i) spooling; (1 mark)

        (ii) caching; (1 mark)

        (iii) buffering. (1 mark)

        (iv) device controller. (1 mark)

    (b) Computer systems use different disk file systems to control data storage and retrieval. Describe **three** examples of such file systems. (6 marks)

    (c) Input/output device controllers are associated with computer peripheral devices. Explain **three** functions of these controllers. (6 marks)

    (d) Figure 1 represents an architecture of an operating system. Identify the parts labelled (i), (ii), (iii) and (iv). (4 marks)
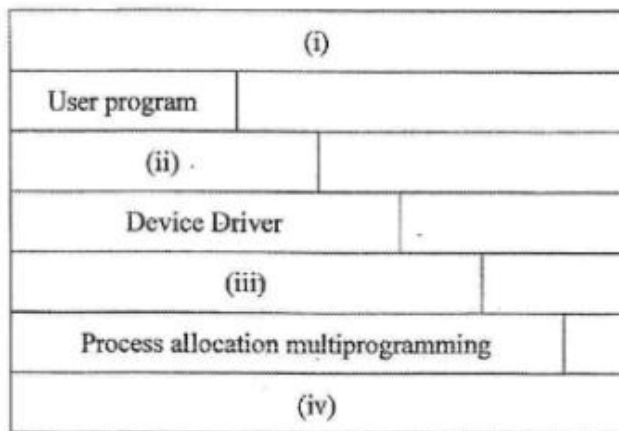
(i)		
User program		
(ii)		
Device Driver		
(iii)		
Process allocation multiprogramming		
(iv)		

Figure 1

3. (a) (i) Explain **two** types of inter-process communication in operating systems.
— Mutual communication.
(4 marks)

(ii) Differentiate between *automatic repeat request* and *forward error correction* operating systems.
(4 marks)

(b) With the aid of a diagram, outline a *two-level directory structure*.
(4 marks)

(c) Internal fragmentation occurs during file storage. Explain **two** disadvantages of this type of fragmentation.
(4 marks)

(d) The administrator of a computer intends to identify the properties of files in a directory. State **eight** file properties that he may identify.
(4 marks)

4. (a) Outline **four** objectives of computer memory management in regards to relocation.
(4 marks)

(b) Explain **two** categories of computer input/output devices in respect to data transfer.
(4 marks)

(c) Explain **two** circumstances that would cause *user level threading* during process execution.
(4 marks)

(d) A computer technician intends to manage computer files. Explain **four** file operations he could perform during this process.
(8 marks)

5. (a) Outline **three** components of the *process scheduler*.
(3 marks)

(b) Explain **two** advantages of *memory overlay*.
(4 marks)

(c) The CPU passes information to and from an input/output device using the computer buses. Explain **three** types of such buses. — Address
— Data
— Control
(6 marks)

(d) With the aid of a diagram, outline the five-state process model.
(7 marks)

6. (a) Outline **four** essential approaches used when implementing mutual exclusion to manage shared resources.
(4 marks)

(b) Differentiate between *least frequently used* and *most frequently used* page replacement algorithms.
(4 marks)

(c) Explain **two** circumstances under which biometric security system could be used for the purpose of file security.
(4 marks)

(d) With the aid of a block diagram, outline the layers of the input/output software system.
(8 marks)

7. (a) Outline **four** computer *disk head scheduling algorithms*.
(4 marks)

(b) Explain **two** functions of computer directories in a computer system.
(4 marks)

(c) Distinguish between *logical file system* and *basic file system* in file systems structure.
(4 marks)

(d) Files are allocated disk space by the operating system using linked allocation method. Explain **four** characteristics of this method.
(8 marks)

8. (a) Explain **two** emerging trends in respect to computer hard disks. (4 marks)

(b) Distinguish between *virtual memory* and *primary memory* of the computer system. (4 marks)

(c) An operating system is required to choose the process that should be executed in order to avoid deadlocks. Outline **four** criteria used to choose the best scheduling policy. (4 marks)

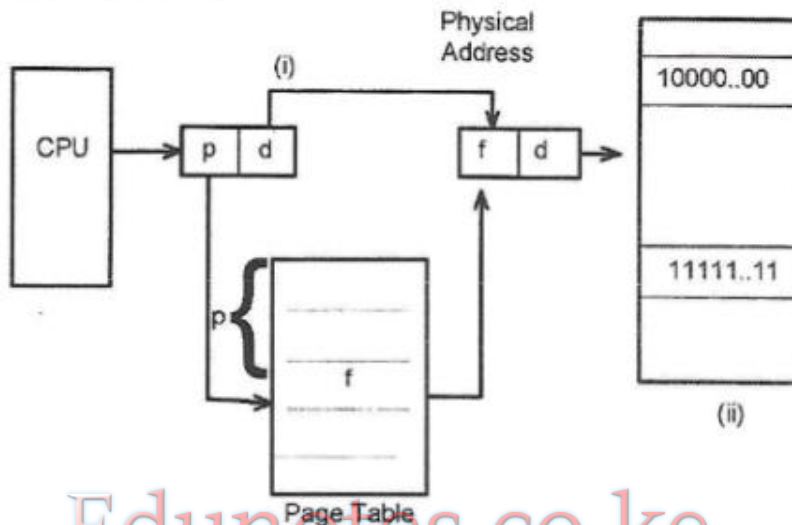(d) Figure 2 represent paging mechanism in a hardware device. Use it to answer the questions that follow.

Figure 2

(i) Identify the parts labelled (i) and (ii). (4 marks)

(ii) Explain **two** causes of fault pages in paging. (4 marks)

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