1. (a) Define each of the following terms as used in computer operating systems.

    (i)   shell;   (2 marks)

    (ii)   system call.   (2 marks)

    (iii)   buffer   (2 marks)

(b) Explain each of the following Inter Process Communication methods:

    (i)   semaphore;   (2marks)

    (ii)   signal.   (2 marks)

(c) (i) With the aid of a diagram, describe the NTFS file system.   (4 marks)

    (ii) Describe *single streaming batch processing* as used in operating systems.   (2 marks)

(d) Lara, a database administrator used each of the following file lock mechanisms in her design. Explain the result from each lock when enforced:

    (i)   file lock;   (2 marks)

    (ii)   write lock.   (2 marks)

2. (a) Distinguish between *coherency* and *inclusion* as used in memory management.   (4 marks)

(b) With the aid of diagrams, describe each of the following memory allocation techniques:

    (i)   fixed partitioned allocation;   (4 marks)

    (ii)   paged allocation.   (4 marks)

(c) June came across the following file name extensions during a lesson. Identify the file type for each extension:

    (i)   .bmp   (1 mark)

    (ii)   .xlsx   (1 mark)

    (iii)   .rar   (1 mark)

(iv)   .exe   (1 mark)

(d)   Jeremy prefers the online method when storing his company's files. Outline **two** reasons for his preference.   (4marks)

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3.   (a)   Outline **four** criteria that could be used when choosing a scheduling algorithm for an operating system.   (4 marks)

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(b)   Purity prefers the command line user interface over the GUI for her computer. Explain **three** reasons for this preference.   (6 marks)

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(c)   Differentiate between *reusable* and *consumable* resources as used in inter-process communication.   (4 marks)

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(d)   Explain **three** reasons that could cause a process to be suspended.   (6 marks)

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4.   (a)   (i)   List **four** examples of utility programs used in computers.   (2 marks)

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       (ii)   Distinguish between *spatial locality* and *sequential* locality as used in memory management.   (4 marks)

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      (b)   Describe each of the following terms as used in file management:

       (i)   alias file names;   (2 marks)

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       (ii)   pathnames.   (2 marks)

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      (c)   Joss used the *RAID* and *disk caching* to help improve the performance of the disk. Describe each of these techniques as used in file management.   (4 marks)

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      (d)   With the aid of a diagram, describe the structure of the *I/O control system*.   (6 marks)

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5. (a) Define each of the following terms as used in memory management:

    (i)   thrashing;   (2 marks)

    (ii)   starvation.   (2 marks)

(b) With the aid of a diagram, describe the *round robin* scheduling algorithm as used in computer operating system.   (6 marks)

(c) Describe each of the following terms as used in process management:

    (i)   race condition;   (2 marks)

    (ii)   critical section.   (2 marks)

(d) During an operating system lesson the teacher addressed various functions of the software clock. Explain **three** such functions that the teacher could have discussed.   (6 marks)

6. (a) Define each of the following terms as used in operating systems:

    (i)   device independence;   (2 marks)

    (ii)   virtual device.   (2 marks)

(b) Explain the circumstance under which each of the following disk system algorithms could be applicable:

(i) first come first served; (2 marks)

(ii) shortest seek time first; (2 marks)

(iii) SCAN. (2 marks)

(c) Distinguish between *software interrupt* and *trap* as used in operating systems. (4 marks)

(d) Explain the function of each of the following terms as used in memory management:

(i) relocating loader; (2 marks)

(ii) job control language; (2 marks)

(iii) segmentation. (2 marks)

7. (a) Define each of the following terms as used in process management:

(i) Dispatch latency; (2 marks)

(ii) Reschedule latency. (2 marks)

(b) (i) Joan came across the following DOS commands when revising for her operating systems examination.

CD, DIR, FORMAT, BACKUP, RESTORE, CLS.

Categorize each of them as either *external* or *internal* commands. (3 marks)

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(ii) Differentiate between *independent* and *cooperating* process as used in process management. (3 marks)

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(c) Differentiate between each of the following replacement policies as used in memory management:

(i) least recently used ; (2 marks)

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(ii) not recently used. (2 marks)

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(d) During an operating systems class, Peter came across the following file attributes. Explain the function of each of the attributes.

(i) archive ; (2 marks)

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(ii) hidden ; (2 marks)

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(iii) system. (2 marks)

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8. (a) Define each of the following terms as used in operating systems:

(i) address translation; (2 marks)

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(ii)   address exception.   (2 marks)

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(b)   With the aid of a diagram, describe the *message passing* as used in inter
       process communication.   (3 marks)

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(c)   During revision for an operating systems paper, ken came across the term *metaphors*. Outline
       two functions of this facility.   (4 marks)

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(d)   Figure 1 shows a variable memory partition of the sizes in the order as indicated.
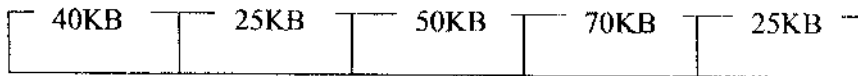
| 40KB | 25KB | 50KB | 70KB | 25KB |

Figure 1

Assume that a new process of size 42KB is to be loaded in the partition, use sketch diagrams
to show how the operating system would fit the new process using each of the following
placement methods: (9 marks)

(i)   best fit method;

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(ii)   worst fit method;

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(iii)   first fit method.

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