SECTION A

*Answer **all** questions.*

1. (a) State the function of a compiler and an interpreter.   *[1 mark]*

    (b) Outline **one** difference between a compiler and an interpreter.   *[2 marks]*

2. Describe **one** reason why MICR might be used rather than OCR to input data. *[2 marks]*

3. Determine how many bits per second a device transmits if it sends 16kB of data per second (where 1 byte = 8 bits). *[2 marks]*

4. Outline **two** advantages of a shared database on a network.   *[4 marks]*

5. State whether the transfer of data using a 64-bit bus is serial **or** parallel transmission. *[1 mark]*

6. Identify the **three** types of programming error, and give an example of **each**. *[6 marks]*

7. State **two** different forms of secondary memory.   *[2 marks]*

8. Outline the difference between *batch processing* and *on-line processing*, stating an example of when **each** would be used. *[4 marks]*

9. Two types of error-checking during data entry are verification and validation.

    (a) Describe verification and identify the type of error that it tries to prevent. *[3 marks]*

    (b) Describe **one** validation technique and identify **one** situation in which it might be used. *[3 marks]*

SECTION B

*Answer **three** questions.*

10. The following algorithm carries out an error-checking routine:

```
function CHECK(val DATA integer array [1..8])
   result boolean
   declare POS, COUNT integer

   COUNT <-- 0
   for POS <-- 1 upto 8 do
      if DATA[POS] = 1 then
         COUNT <-- COUNT+1
      endif
   endfor

   return (COUNT mod 2)=0
endfunction CHECK
```

(a) State the result of CHECK for DATA

0	1	1	1	0	1	1	0
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]

by copying and completing the following trace table:

POS	DATA [POS] = 1	COUNT	CHECK
		0	
1	false	0	
2	true	1	

[4 marks]

(b) Deduce the result of CHECK for:

1	1	0	0	1	0	1	0
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]

DATA

[1 mark]

(c) Identify the error-checking method that the function CHECK is performing.   *[2 marks]*

(d) State a situation when this type of error-checking would be used.   *[1 mark]*

(e) Describe **one** problem with this error-checking method.   *[2 marks]*

Turn over

11.   The computer-aided design (CAD) department of a company has recently had its computer system upgraded, which cost a lot of money. The employees create designs of parts which are entered into the system using special input devices. New software has been purchased that automatically outputs a list of the components needed to manufacture a new part, so that staff in the warehouse can collect them. In the previous system the component list was made by hand.

When an employee is updating a file, the system creates a copy of the file before the update is made. After the update, the copy is deleted.

The computer system used in the CAD department is:
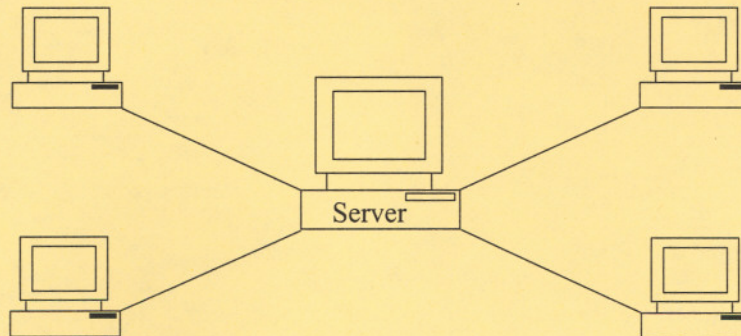
(a)   State the network topology used in the CAD department.   *[1 mark]*

(b)   Explain why a copy of the file is made when it is being updated.   *[3 marks]*

(c)   Identify **two** comparisons that the company might make with the old system to make sure that it has been worth the cost.   *[2 marks]*

(d)   (i)   Identify **one** input device and **one** output device that an employee might use when creating a design for a new part.   *[2 marks]*

      (ii)   Outline the purpose of **each** device identified in (d) (i) in the creation of the design.   *[2 marks]*

12. A group of musicians wish to publish a song they have written. They have created a web-site to do this. The song was recorded digitally ready for publication.
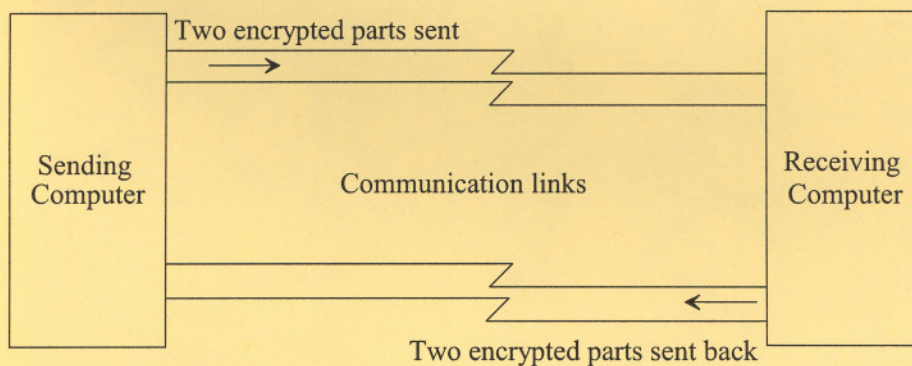
    (a) Outline the need for the conversion of data between analog and digital formats in this application. *[3 marks]*

    (b) Explain **two** methods that could be used to speed up the time it takes to download the file that stores the recorded music. *[4 marks]*

The web page is sent in HTML format, and the user's browser uses the code to expand the data (text, graphics, sound and video) into a web page.

    (c) Explain why HTML format is used **and** why the data is separated into different files. *[3 marks]*

Turn over

13. Data sent over a wide area network can be encrypted. One computer system splits the data into two parts. Each part is encrypted and sent separately to the destination. (For example, a credit card number is split into two parts; each part is encrypted and sent separately). After the data has been received, a different encryption algorithm is used and the data is sent back to the sending computer.

Two encrypted parts sent

```
+-----------+                                    +-----------+
|           |  -->                               |           |
|  Sending  |          Communication links       | Receiving |
| Computer  |                                     | Computer  |
|           |              <--                    |           |
+-----------+                                     +-----------+
```

Two encrypted parts sent back

(a) Define the term *encryption*, and outline **why** data is encrypted.   *[3 marks]*

(b) Outline why the data is sent in two parts, rather than as a complete item of data.   *[2 marks]*

(c) Explain the processes that occur at the sending computer **and** the receiving computer to make sure that the data is received correctly.   *[5 marks]*