

SECTION A

Answer **all** questions.

1. An analog to digital converter (A-D converter) transfers data to a computer. After conversion the binary value is 0100111.
 - (a) State the equivalent decimal integer value. [1 mark]
 - (b) State **one** application that requires an A-D converter. [1 mark]
 - (c) Outline the need for an A-D converter. [2 marks]
2.
 - (a) Outline the difference between a serial file and a sequential file. [2 marks]
 - (b) State **one** advantage of using a sequential file rather than a serial file. [1 mark]
3.
 - (a) State **one** application that uses on-line processing. [1 mark]
 - (b) State **one** application that uses real-time processing. [1 mark]
4. Describe the use of a check digit in the detection of data entry errors. [3 marks]
5. State **two** applications for data compression software. [2 marks]
6. Describe the improvements in performance of a personal computer by:
 - (a) increasing the size of RAM. [2 marks]
 - (b) increasing the size of cache memory. [2 marks]
7. Outline the need for standard protocols within a network. [2 marks]
8. Outline **two** anti-social or illegal activities which have occurred as a result of the growth of computer technology. [4 marks]
9. Explain **two** advantages of modularity in creating a software solution to a problem. [6 marks]

SECTION B

Answer *three* questions.

10. Consider the following algorithm, which processes an input string:

```

procedure DISPLAY(val LIST string)
  declare POSITION integer
  declare ITEM string
  declare CHAR character

  ITEM <-- ""
  POSITION <-- 1
  repeat
    CHAR <-- copy(LIST, POSITION, 1)
    if CHAR = "-" then
      output ITEM
      ITEM <-- ""
    else
      concat(ITEM, CHAR)
    endif
    POSITION <-- POSITION + 1
  until POSITION > length(LIST)
  output ITEM
endprocedure DISPLAY
  
```

- Notes:**
- Each output will display the expression on a new line.
 - "" is a null (empty) string.
 - Recall that **copy**(S, START, COUNT) extracts a substring from S, for example **copy**("healing", 4, 2) extracts "li", and that **concat** concatenates (joins) the two parameters, for example **concat**("fat", "her") gives "father".

(a) Trace the algorithm for the call DISPLAY("ant-bat-fish") by copying and completing the following table up to the line when POSITION becomes 6.

ITEM	POSITION	CHAR	CHAR = "-"	OUTPUT
""	1	"a"	false	
"a"	2	"n"	false	
...	...	...	...	...

[4 marks]

(b) Deduce the purpose of this algorithm.

[3 marks]

(c) The output is dependent on the precise format of the parameter string. For example, DISPLAY("ant- bat-fish") would not generate the desired output, because of the space before bat.

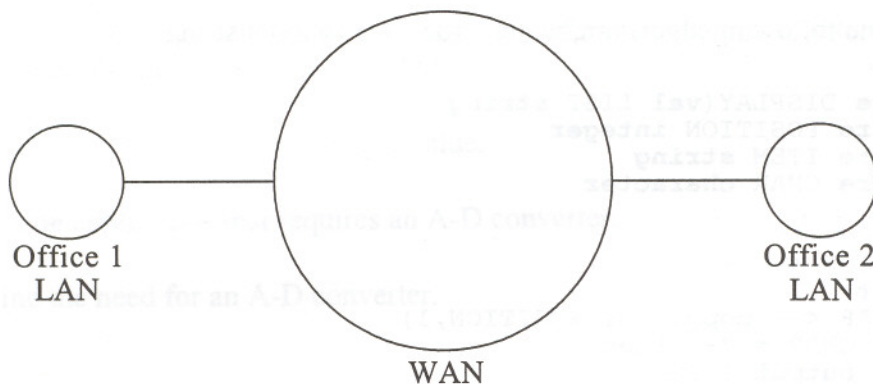
(i) Identify **one** further string that would cause another error in the output.

[1 mark]

(ii) Explain how user documentation could help to prevent data entry errors.

[2 marks]

11. The diagram below shows the local area networks (LANs) of two offices of an international company. The LANs are connected to a wide area network (WAN) using a modem and a public analog telephone line. The networks are used for email and video-conferencing.



- (a) State **two** other possible communication links that could be used between the LANs and the WAN. [2 marks]
- (b) State **two** resources that could be shared on a LAN. [2 marks]
- (c) Compare the use of email with video-conferencing for communication between the offices. [6 marks]

12. A software system can be supplied to a customer with either the source code or the executable (object) code.

- (a) Outline the difference between the two kinds of code. *[2 marks]*
- (b) State **one** advantage and **one** disadvantage to the customer of only having the executable (object) code. *[2 marks]*
- (c) Discuss the role of an editor **and** a debugging tool in the translation from the source code to the executable code. *[4 marks]*
- (d) Describe **one** situation in which a source code is generated by software, rather than being written directly by a programmer. *[2 marks]*

13. A doctor who is treating a patient sends medical data to a local hospital. The data includes an identity number, name, various readings such as heart rate and blood pressure, and notes made by the doctor. The data is sent using a telecommunications link.
- (a) (i) State what is meant by maintaining the integrity of the data. [1 mark]
 - (ii) Outline **one** method of trying to maintain the integrity of the data being sent over the telecommunications link. [2 mark]
 - (b) (i) State what is meant by maintaining the security of the data. [1 mark]
 - (ii) Outline **one** method of trying to maintain the security of the data being sent over the telecommunications link. [2 marks]
 - (c) Discuss the implications of a systems failure in this situation, identifying **two** possible components where failure could occur. [4 marks]
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