



**COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1**

Monday 9 May 2005 (afternoon)

1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Section A: answer all the questions.
- Section B: answer three questions.

SECTION A

Answer *all* the questions.

1. State **one** function of a compiler. [2 marks]

2. The following algorithm describes a function that accepts an integer. The function returns the absolute value of the array element specified by the integer. Assume that the array X[] is declared as a GLOBAL integer array and has been initialised.

```
function ABSOLUTE (val P integer) result
  if X[P] < 0 then
    return -1 * X[P]
  else
    return X[P]
  endif
endfunction ABSOLUTE
```

(a) Describe a run-time error that could occur. [2 marks]

(b) Explain a way that the error could be prevented before the function was called. [2 marks]

3. State **one** advantage and **one** disadvantage of *direct access*. [2 marks]

4. By use of an appropriate example, outline the key characteristics of:

(a) an *online (interactive)* computer system. [2 marks]

(b) a *real-time* computer processing system. [2 marks]

5. Explain the difference between data *verification* and data *validation*. [2 marks]

6. Using 5 bits, answer the following and show all working:

(a) calculate the largest positive integer that can be represented, given that there is no sign bit used. [1 mark]

(b) if the 5 bits were to be used to represent product ID numbers how many different product numbers could be represented? [1 mark]

7. State the main function of data *compression* software and describe a situation where it might be used. [2 marks]
8. Define the terms *syntax errors* and *logical errors*, and state **one** example of each. [4 marks]
9. Outline the functions of *primary* and *secondary* memory. [4 marks]
10. There are a number of stages in the *software development life cycle*.
- (a) Outline **one** reason why it is important to specify the requirements of the software clearly before starting the design phase of the *software life cycle*. [2 marks]
- (b) Outline **one** reason why testing is important during the *program construction* (development) phase of the *software life cycle*. [2 marks]

SECTION B

Answer **three** questions.

11. The following algorithm is referred to by the questions that follow.

N.B. a string is an array of characters. For example, in this function the element referred to by A[9] is the 10th element in the string and A[0] refers to the first element in the string.

A single space character is represented as " " in the algorithm.

```

function CALC (ref A string) result real
  declare C integer
  declare S integer
  declare T integer
  C <-- 0
  T <-- 0
  S <-- 0
  repeat
    if (A[S] =" ") then
      C <-- C + 1
    else
      T <-- T + 1
    endif
    S <-- S + 1
  until (A[S] = ".")
  return T / (C + 1)
endfunction CALC
    
```

(a) Copy and complete the trace table below for the following call to the function CALC ("it is. "). [4 marks]

A	C	T	S	A[S]
it is.	0	0	0	i
	0	1	1	

- (b) State the value returned by the function. [1 mark]
- (c) Explain why the function needs to return a result of type real. [2 marks]
- (d) Explain what is meant by *pass-by-reference*. [3 marks]

12. A small business sells its products by mail order. A database is held which is comprised of a main customer file, an order file and a products file. The order file is unordered and contains five fields for each order: an order ID number, the customer ID number, the product ID number, the quantity ordered and a Boolean field to say whether or not the order has been processed. The customer file contains the customer ID and customer name. The product file contains the product ID and product name. Both are unordered.
- (a) Explain how the order quantity could be *verified* as accurate when entered at input time. [2 marks]
- (b) Explain why the customer would have to be given a customer number. [2 marks]
- (c) The manager wants a list of all the names of customers who have ordered a specific product.
- (i) Outline how the computer system could perform the processing. [4 marks]
- (ii) Outline the type of *file processing* involved. [2 marks]

13. A *local area network* **LAN** is used in a small business. It has a server, five work stations, a central printer and a hub to allow each work station and the printer to connect to the **LAN** server.
- (a) Draw a labelled diagram of the network that clearly shows each hardware component of the network. [2 marks]
 - (b) State the name of the network topology. [1 mark]
 - (c) Outline the role of the hub. [2 marks]
 - (d) Outline **two** advantages of the **LAN** to users. [2 marks]
 - (e) Outline **one** security measure that is likely to be used in the network. [1 mark]
 - (f) Users wish to be able to access the Internet from the **LAN**.
 - (i) State the name of the *hardware device* needed to provide the access. [1 mark]
 - (ii) Briefly describe the role of this hardware device. [1 mark]

14. A new Internet based music service that users can subscribe to is available via the world wide web (www). The service enables users to get information about upcoming CD releases and their favourite artists. Users are provided with an email at the end of each week informing them about new CDs. Users can also login to the site at any time to request the most up to date information about CDs.
- (a) State **two** types of software that the customer needs to have in order to access the service. [2 marks]
 - (b) Outline the type of *computer processing* that would be involved in distributing the weekly email newsletter. [2 marks]
 - (c) Outline the characteristics of the computer system needed so that many users can login to access the system *online*. [2 marks]
 - (d) Outline how the user data could be restored in case of system failure. [2 marks]
 - (e) The owner of the service wants a count of the new users displayed on their PC screen as they subscribe. Outline the type of *computer processing* that is required. [2 marks]
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