INTERNATIONAL BACCALAUREATE
BACCALAURÉAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Wednesday 14 November 2001 (afternoon)

1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all of Section A.
- Answer three questions from Section B.

SECTION A

*Answer **all** questions.*

1. Convert the binary number 10111011 to its decimal equivalent. *[1 mark]*

2. Describe **one** situation where the use of mark sense reader (OMR) is a suitable form of data input and state **one** reason why it is suitable. *[2 marks]*

3. Identify the functions of *server* and *client* in a local area network. *[4 marks]*

4. Outline the use of data buses in the central processing unit and describe why they are parallel. *[3 marks]*

5. A program is written for the home market, which enables people who are ill to diagnose their own illness. Outline **one** advantage and **one** disadvantage of medical self-diagnosis by computer. *[4 marks]*

6. Outline the differences between storing a queue in circular form as opposed to linear form. *[4 marks]*

7. Describe **one** method of minimising data entry errors. *[3 marks]*

8. A computer processor works at 750 MHz.

(a) Explain the meaning of MHz. *[2 marks]*

(b) Identify the type of computer that would have such a processor. *[1 mark]*

9. Outline the reasons why the size of main memory has increased rapidly in recent years. *[2 marks]*

10. Two of the stages of software production are systems analysis and code preparation. Explain how each of these would be involved in the production cycle of a software system. *[4 marks]*

SECTION B

*Answer **three** questions.*

11. The following algorithm fragment uses a binary search on the array VALUE, of order 6, to test if a number stored in an integer variable, ITEM is present in the array. Three integer variables, LEFT, RIGHT and POSITION are also used:

```
LEFT <-- 1
RIGHT <-- 6
repeat
   POSITION<-- (LEFT+RIGHT) div 2
   if VALUE[POSITION] = ITEM then
      output "item found"
   else
      if ITEM > VALUE[POSITION] then
         LEFT <-- POSITION + 1
      else
         RIGHT <-- POSITION - 1
      endif
   endif
until LEFT > RIGHT
```

The contents of VALUE are:

1	8	16	22	40	47

and ITEM is:

22

(a) State all the values that POSITION stores until the message "item found" is displayed. *[2 marks]*

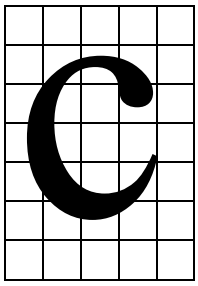
(b) Explain how to improve the algorithm so that it does not continue searching the array after ITEM has been found. *[4 marks]*

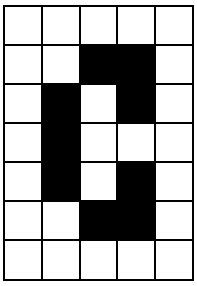
(c) Copy and complete the following trace table when ITEM stores 21. Assume the improvement suggested in (b) has been made.

LEFT	RIGHT	POSITION	**output**
1	6		
. .	. .	. .	. .

[4 marks]

12. A scanner is used to transfer printed documents into text that can be used by a program. The sketch below illustrates this process.





0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	0	0	0
0	1	0	1	0
0	0	1	1	0
0	0	0	0	0

(a) State the name for this technique. *[1 mark]*

(b) Explain how the software converts the original character to its character code. *[3 marks]*

(c) Outline why manufacturers of such systems prefer to use a standard font for characters to be read. *[2 marks]*

(d) Such a system can be used to read data from customers' cheques (checks) at a bank's processing centre. Compare the use of this method with the use of MICR. *[4 marks]*

13. A company that sells holidays decides to advertise using the Internet. The company employs an expert to create a website that includes photographs of holiday locations as well as explanatory text and prices.

(a) Outline the use of HTML and the use of an HTML editor in the creation of the website. *[2 marks]*

(b) Explain **two** advantages of using a digital camera rather than a scanner to input the photographs for the website. *[4 marks]*

(c) Outline the use of a web browser and a search engine by a user who is looking to book a holiday. *[4 marks]*

14. Drivers who use a bridge crossing a wide river have to pay to use the bridge. They can do this by stopping the car and paying in cash before crossing or, if they are regular users, they can pay a fixed fee per year. In this case, the driver attaches a special device to the windscreen that is detected as the car uses the bridge.

The company that owns the bridge needs to collect data about the number of drivers using it to see if more money-collectors are required, or if a second bridge needs to be built. The data collected will be sent by a wide area network (WAN) to the company's main office.

(a) Describe how the device attached to the windscreen could be used to allow the driver to cross the bridge without stopping. *[3 marks]*

(b) Outline the methods of data collection needed that would obtain the data required for the company. *[2 marks]*

(c) Explain **one** possible problem for the company if data integrity is lost during transmission using the WAN. *[2 marks]*

(d) Describe **one** method of trying to maintain data integrity. *[3 marks]*