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International Baccalaureate®
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**COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1**

Thursday 8 November 2012 (afternoon)

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Section A: answer all the questions.
- Section B: answer all the questions.
- The maximum mark for this examination paper is *[70 marks]*.

SECTION A

Answer **all** the questions.

1. State **one** application that uses:
 - (a) on-line processing; [1 mark]
 - (b) real time processing. [1 mark]
2. State **two** characteristics that should be considered when comparing different computers. [2 marks]
3. Describe how increasing the size of *cache memory* improves the performance of a computer. [2 marks]
4. Outline the need for an *A-D converter* in a voice recognition system. [2 marks]
5. Outline **one** advantage to computer system designers of using the prototyping approach. [2 marks]
6. Describe how a *parity check* is used to ensure data integrity in the transmission of data. [3 marks]
7. Integers are represented in an 8-bit register using the *two's complement* method.

1	1	1	1	0	0	0	1
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- (a) State the *decimal* value of the integer represented. [2 marks]
 - (b) State the *binary* representation of the largest possible positive integer. [1 mark]
8. Convert $FA71_{16}$ into binary. [1 mark]
9. An international organization has offices in five different world regions. Compare the use of e-mail with video conferencing for communication between the staff. [4 marks]

10. Define the term *multi-tasking*. [1 mark]

11. The following code is used to display discount depending on the number of units bought.

```
int no = inputInt("Enter the number of units bought");
if (no < 5)
{ output("discount is 2 %"); }
if ((no >= 5) && (no < 10))
{ output("discount is 5 %"); }
else
{ output("discount is 10 %"); }
```

(a) State the output produced for:

(i) 15 units bought; [1 mark]

(ii) 7 units bought; [1 mark]

(iii) 3 units bought. [1 mark]

(b) Identify the type of error that occurs in this code. [1 mark]

12. Describe **one** advantage and **one** disadvantage of the growing use of computers in society. [4 marks]

SECTION B

Answer **all** the questions.

13. A system analyst has been asked to oversee the computerization of a new department of a large firm and uses *interviews* and *questionnaires* to collect data.

(a) Outline **one** advantage of using:

(i) interviews rather than questionnaires; [2 marks]

(ii) questionnaires rather than interviews. [2 marks]

At the end of the analysis stage a *feasibility report* is produced which contains several possible solutions.

(b) Explain why more than one possible solution is proposed. [2 marks]

The hardware and software have now been installed.

(c) Explain **two** tasks that should be carried out before the new computer system can be fully implemented. [4 marks]

14. At the end of each school year up to 200 students take an examination. Exams are marked by the teacher and results input using a keyboard. Sample data about two students is shown below.

Student Code: 9902-008	Score: 28	Passed: No
Student Code: 9902-028	Score: 82	Passed: Yes

(a) (i) State appropriate data types for the **three** data items listed above. [3 marks]

(ii) Describe a data structure that could be used to hold data about all students in the school. [3 marks]

A multiple choice examination will be used the following year in order to capture and process the data automatically.

(b) Suggest suitable input devices and data preparation requirements so that this can be carried out. [4 marks]

15. (a) State the purpose of the following when creating a Java program.

- (i) *editor* [1 mark]
- (ii) *compiler* [1 mark]
- (iii) *interpreter* [1 mark]

(b) A processor is executing the following simple program.

```
class QuestionApp
{
    public static void main(String[] args)
    {
        int x = inputInt();
        int y = inputInt();
        int s = x + y;
        output("The sum is " + s);
    }
}
```

- (i) State where instructions are stored. [1 mark]
- (ii) State where input data is stored. [1 mark]
- (iii) Identify the arithmetic operation in this program. [1 mark]
- (iv) State where this operation will be performed. [1 mark]
- (v) State where the result will be stored. [1 mark]
- (vi) Outline the purpose of *address buses* in the execution of $s = x + y$; . [2 marks]

16. Consider the following method and array.

```
public void find(int[] A, int target)
{
    int pos = -1;
    boolean found = false;
    while (!found)
    {
        pos = pos + 1;
        found = (A[pos] == target);
    }
    if (found)
    {
        output(target + " is found at position " + pos);
    }
}

int[] Numbers = {25, 32, 76, 85, 96, 101}
```

(a) Copy and complete the trace table for the method call.

find(Numbers, 32)

[4 marks]

pos	found	A[pos] == target	output

(b) State the name of this type of algorithm.

[1 mark]

The method call find(Numbers, 20) will cause an error.

(c) (i) Explain what will happen after this method call.

[2 marks]

(ii) Suggest changes needed to take this situation into account and alert the user about the error.

[3 marks]