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

Thursday 17 November 2011 (afternoon)

1 hour 30 minutes

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**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.

**SECTION A**

Answer **all** the questions.

1. (a) State **one** advantage and **one** disadvantage of communication by *electronic mail* rather than by telephone. [2 marks]
- (b) Outline **two** possible measures that prevent computers from being affected by *viruses*, when using electronic mail. [2 marks]

2. (a) State **one** application that uses *robots*. [1 mark]
- (b) Outline **two** advantages of using robots rather than manual-based systems. [2 marks]

3. A code for representing colours is used, where each colour is stored using 8 bits.
- (a) State the number of different colours that can be represented. [1 mark]
- (b) The *binary* representation of a particular colour is shown below.

0	0	0	1	1	1	0	0
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- (i) State the *decimal* representation of this colour. Show all of your working. [2 marks]
- (ii) State the *hexadecimal* representation of this colour. [1 mark]
4. (a) Define the term *syntax*. [1 mark]
- (b) Define the term *semantics*. [1 mark]
- (c) Describe, using examples from the code below, how each of the following types of error could occur: *syntax error*, *logical error* and *run-time error*.

$$a = b / c + d$$
 [3 marks]

5. Systems analysis, software design and program construction are all stages of the *software life cycle*.
- Outline **two** other stages in the software life cycle. [4 marks]

- 6. (a) Using computer memory as an example, outline the meaning of the term *volatile*. [2 marks]
- (b) Outline the reasons for having both *primary memory* and *secondary memory*. [2 marks]

7. Consider the following program fragment.

```
String name1 = new String("Maria");
String name2 = new String("Maria");

if (name1 == name2)
{ output("TWO NAMES ARE THE SAME"); }

else
{ output("TWO NAMES ARE DIFFERENT"); }

if (name1.equals(name2))
{ output("TWO NAMES ARE THE SAME"); }

else
{ output("TWO NAMES ARE DIFFERENT"); }
```

The following output is produced by this program fragment.

```
TWO NAMES ARE DIFFERENT
TWO NAMES ARE THE SAME
```

- Explain line by line, how this output is produced. [4 marks]
- 8. Outline **two** functions of an *operating system*. [2 marks]

**SECTION B**

Answer *all* the questions.

9. Consider the following method.

```
public int mystery(int x, int y)
{
    int q = x;
    if (y < x)
    { q = y; }
    return q;
}
```

(a) (i) Define the term *method signature*. [1 mark]

(ii) Identify the *parameters* passed to this method. [1 mark]

(b) Consider the following statements.

```
c = mystery(2, 1);
b = (mystery(1, 2) < c);
```

(i) State the value of variable *c*. [1 mark]

(ii) State the data type and the value of variable *b*. [2 marks]

(iii) Deduce the purpose of the method. [2 marks]

(c) The same class contains the following method.

```
public int two(int i, int j, int k)
{
    return mystery(mystery(i, j), k);
}
```

Explain how the following statement is executed.

```
int a = two(4, 1, 5); [3 marks]
```

- 10.** A program accesses a text file on disk. To edit the text the user of the program enters data using a keyboard. The program then amends the text which was read from the file, writes the updated file back to disk and produces a printed report of all amendments made to the text file.
- (a) Construct a *systems flowchart* representing this process. [4 marks]
- The data on disk can be lost due to various errors.
- (b) (i) State **two** examples of how data can be lost due to human error. [2 marks]
- (ii) State **two** examples of how data can be lost other than by human error. [2 marks]
- (iii) Describe how data lost from disk could be recovered. [2 marks]
- 11.** (a) State **two** problems associated with the use of images, that have large file sizes, in computer systems. [2 marks]
- (b) One photograph is estimated to occupy 2000 KB. Outline the steps needed to calculate the number of gigabytes (GB) required for 50 000 photographs. [2 marks]
- (c) Outline **one** advantage of using *data compression* software on stored images. [2 marks]
- (d) Discuss the ethical considerations linked to the misuse of image processing software. [4 marks]
- 12.** A garage uses a computer system to test whether the amount of exhaust fumes emitted by a car is at an acceptable level.
- A *sensor*, used to measure exhaust fumes, is placed in the exhaust pipe.
- (a) Outline the processing taking place in this computer system. [4 marks]
- (b) Explain why the sensor data needs to be converted before being processed. [2 marks]
- (c) Outline **three** errors that can occur in this system. [3 marks]
- (d) Identify **one** appropriate output device for this system. [1 mark]
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