N11/5/COMSC/SP1/ENG/TZ0/XX

International Baccalaureate®
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COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Thursday 17 November 2011 (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.

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

(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]*