M09/5/COMSC/SP1/ENG/TZ0/XX

International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Tuesday 19 May 2009 (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. Explain **two** differences between the analysis and design stages of the software development life cycle. *[4 marks]*

2. Explain **two** advantages of using a modular approach in constructing computer programs. *[4 marks]*

3. The implementation of computer systems often has an effect on individuals. Describe a situation where a new system could have

(a) a positive effect on a group of people. *[2 marks]*

(b) a negative effect on a group of people. *[2 marks]*

4. State **two** functions of an operating system. *[2 marks]*

5. The method `calculateHours()`, listed below, is called by the statement

```
double hours = calculateHours(minutes);

public void calculateHours(double mins)
{
  double h = mins/60;
}
```

An attempt is made to compile the program.

(a) Define the term *compilation*. *[2 marks]*

(b) By considering the code given above, identify the type of error that would cause the compilation process to fail. *[1 mark]*

(c) Explain the reason why this error has occurred. *[2 marks]*

6. Describe a single data structure that would store the following data:

(a) rainfall data on 30 consecutive days *[3 marks]*

(b) the age of a person and whether or not football is his/her favourite sport *[3 marks]*

7. Outline the function of the *address bus*. *[2 marks]*

8. Express the 8-bit binary number **01011111** in

(a) hexadecimal. *[1 mark]*

(b) decimal. *[1 mark]*

9. Outline what is meant by the term *user-defined method* in relation to Java programs. *[1 mark]*

SECTION B

*Answer **all** the questions.*

10. Consider the class `SelectionSort` shown below.

```
public class SelectionSort
{
  public static void main(String[] args)
  {
    int[] unsortedArray = {3,6,2,8,5};
    int[] sortedArray = selection(unsortedArray);
  }
  public static int[] selection(int[] list) // sorts array in ascending order
  {
    for (int x = 0; x < 4; x++)
    {
      int p = x;
      int smallest = list[p];
      for (int y = x + 1; y < 5; y++)
      {
        if (list[y] < smallest)
        {
          p = y;
          smallest = list[y];
        }
      }                    // end of 'y' loop
      if (p != x)
      {
        list[p] = list[x];
        list[x] = smallest;
      }
    }                      // end of 'x' loop
    return list;
  }
}
```

(a) Describe the information given in the following line.

```
public int[] selection(int[] list)
```

[4 marks]

(b) State the values of the array `list[]` when the end of the 'x' loop is reached for the first time. *[2 marks]*

(c) Explain what would happen if the array `unsortedArray[]` was already sorted. *[2 marks]*

(d) Explain, without writing code, how the method `selection()` could be modified to sort an integer array of any size. *[2 marks]*

11. A company stores the details of all of its employees in a sequential master file. Every month the payroll program is run during which the master file is updated by a transaction file.

(a) With reference to the payroll program, explain the relationship between the master file and the transaction file. *[4 marks]*

(b) Identify the characteristics of the above system that would allow batch processing to take place. *[2 marks]*

(c) Outline

(i) how a deliberate error could enter the system. *[2 marks]*

(ii) how the company could try to prevent this type of error. *[2 marks]*

12. A company uses a *wide area network* (WAN) for a variety of reasons, one of which is the sending of large files between one office and another.

(a) Discuss **two** ways in which the company could speed up the transmission of these files. *[4 marks]*

(b) Explain the need for protocols in this network. *[2 marks]*

(c) Other than sending files, describe **two** examples where the company could use its WAN. *[4 marks]*

13. Many modern devices use microprocessors.

(a) Define the term *microprocessor*. *[2 marks]*

(b) Identify a device, other than a computer, that uses a microprocessor. *[1 mark]*

(c) For this device, describe

(i) the function of its microprocessor. *[2 marks]*

(ii) its inputs. *[1 mark]*

(iii) its outputs. *[1 mark]*

(d) Describe **two** different types of memory that might be found within the microprocessor from part (b). *[3 marks]*