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

Thursday 19 May 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. State **two** ways in which the functioning of a compiler differs from that of an interpreter. [2 marks]
  
- 2. (a) Convert the decimal number 17 into 6-bit two's complement. [1 mark]  
(b) Convert the decimal number -17 into 6-bit two's complement. [1 mark]  
(c) Convert the hexadecimal number  $A3_{(16)}$  into binary. [2 marks]
  
- 3. Outline the following functions of an operating system.
  - (a) memory management [2 marks]
  - (b) security [2 marks]
  
- 4. Outline **one** reason for using defragmentation software. [2 marks]
  
- 5. Consider the method `test()` shown below.

```
public static double test(int x, int y)
{
    if (y != 0)
    {
        return (double) (x % y) / y;
    }
    else
    {
        return 0;
    }
}
```

- (a) State the value that would be returned after the call `test(11, 2)`. [1 mark]
  
- (b) Identify a reason for the line `if (y != 0)`. [1 mark]
  
- (c) Suggest a reason for the code `(double)` that appears in the line

```
return (double) (x % y) / y; [2 marks]
```

6. Explain **two** ways of reducing the time required to transmit data in a computer network. [4 marks]
7. (a) State a suitable file format for a graphics file that needs to be made publicly available for low bandwidth download. [1 mark]
- (b) Outline **one** advantage of using the file format for this purpose. [2 marks]
8. Compare *bus topology* with *star topology* for networking. [3 marks]
9. (a) Outline **one** benefit provided by *high-level programming languages*. [2 marks]
- (b) State **two** advantages of using *modularity* in programming. [2 marks]

**SECTION B**

Answer *all* the questions.

10. A college issues student ID cards that contain a magnetic strip. These cards can be used in the college cafeteria to purchase meals.

There is a card reader in the cafeteria which is connected to a server via a local area network (LAN).

- (a) Define the term *LAN*. [1 mark]

The purchase of a meal requires two transactions with the server.

- Before a meal is chosen, the card is read and the account balance is displayed. If the account has a negative balance no meal will be allowed. Otherwise the student chooses a meal.
- After the student has chosen a meal, the cashier enters the cost of the meal which is deducted from the account (which may become negative).

- (b) Identify the processes that take place in the server for both transactions. [5 marks]

- (c) Discuss **two** possible improvements to the system. [4 marks]

11. A children’s hospital has decided to provide Internet facilities to its long-term patients to support their education during medical treatment.

Two schools have offered to support this initiative. School A will allow access to class work stored on files. School B will provide classes where pupils in hospital can interact in real-time with those in the school.

- (a) Identify **two** additional input devices that would be required for School B’s approach. [2 marks]

- (b) Compare the advantages of School A’s approach and School B’s approach for the patients. [4 marks]

- (c) Discuss the social implications of implementing this educational project in hospitals. [4 marks]

12. Consider the following method.

```

public static boolean whatPropertyIsIt(String s)
{
    int i = 0;
    int j = s.length() - 1;

    while (i < j)
    {
        if (s.charAt(i) != s.charAt(j))
        { return false; }
        i = i + 1;
        j = j - 1;
    }
    return true;
}

```

Note that `s.charAt(i)` is the character in the  $i^{\text{th}}$  position of `String s`.  
 For example, where `s` is the string "abcde", `s.charAt(2)` is the character 'c'.

(a) By copying and completing the following table, trace the method for the call `whatPropertyIsIt("xyzdyx")`.

[4 marks]

i	j	i < j	s.charAt(i) != s.charAt(j)	return value
0	5	true	false	

(b) Identify the purpose of this program.

[1 mark]

(c) Identify the termination conditions for the loop.

[2 marks]

(d) Explain the effect of changing the condition in the **while** loop to `i <= j`.

[3 marks]

13. A business is considering computerizing its operations and has employed a team of system analysts to investigate possible solutions. The first task of this team is to clearly define the problem.

- (a) Outline the benefits of **two** methods of data collection that will help them to clearly define the problem.

*[4 marks]*

Once the problem is defined, the analysis team will produce different types of documentation.

- (b) Outline the documentation that would be presented to

(i) the business;

*[2 marks]*

(ii) the design team.

*[2 marks]*

- (c) Outline **one** additional piece of documentation that would be produced after the analysis stage.

*[2 marks]*

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