IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
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M07/5/COMSC/SP1/ENG/TZ0/XX

COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Tuesday 8 May 2007 (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. Define the term prototyping. *[1 mark]*

2. State **two** functions of an operating system, other than to control the user interface. *[2 marks]*

3. (a) Outline how a run-time error could occur in a computer program. *[2 marks]*

(b) Suggest a way to prevent this run-time error occurring. *[2 marks]*

4. In relation to data transmission across a network:

(a) Define the term data security. *[1 mark]*

(b) Explain a way to ensure data security. *[2 marks]*

5. State **two** features of a web browser. *[2 marks]*

6. Apply 6 bit two's complement representation to show the binary notation for –7. *[2 marks]*

7. With respect to entering and storing voice data in a computer system:

(a) Define the term analog data. *[1 mark]*

(b) Describe the process of storing voice data in digital form on a computer. *[2 marks]*

8. State **one** advantage and **one** disadvantage of using fibre optics to carry data in a network. *[2 marks]*

9. Draw and label a basic diagram of a CPU. *[4 marks]*

10. Outline a method that can be used to test a program. *[2 marks]*

11. In relation to the array data structure `age []` shown below:

```
int age [] = {23,45,56,67,1,3};
```

(a) Describe the role of an index in accessing elements of the array `age[]`. *[1 mark]*

(b) State the data value represented by `age[3]`. *[1 mark]*

12. Explain the importance of formulating a problem precisely before coding the solution. *[3 marks]*

SECTION B

*Answer **all** the questions.*

13. Study the algorithm shown below and answer the questions that follow.

```
class TestSL
{
    public static void main(String args [])
    {
        new TestSL();
    }
    TestSL()
    {
        String s = formatPhoneNumber("03", "543123", 7);
        Output(s);
        s = formatPhoneNumber("90", "6431231",7);
        Output(s);
    }

1   public String formatPhoneNumber(String d, String p, int n)
    {
2       int c = p.length();

3       if (c = = n)
        {
4           d = "("+d+")";
5           p = p.substring(0, 3)+"-"+p.substring(3,n);
6           return (d + p);
        }
        else
        {
7           return "error";
        }
    }
}
```

note: when s = "abcde", s.substring (0,3) gives "abc" or s.substring (0,4) gives "abcd"

(a) Copy and complete the trace table as shown for the calls made to method `formatPhoneNumber( )`. *[4 marks]*

line	d	p	n	c	if (c= =n)	return
1	03	543123	7			
2				6		
3					false	
etc.						

(b) Explain why method `formatPhoneNumber( )` has a data type. *[2 marks]*

(This question continues on the following page)

(Question 13 continued)

(c) Explain why the programmer used the method `formatPhoneNumber`. *[2 marks]*

(d) Explain why there is a list of arguments in the call to the method `formatPhoneNumber`. *[2 marks]*

14. A database system is used to record customer complaints about products. For each complaint a complaint code (`compID`) is allocated and this code along with the customer code (`custID`) and product code (`prodID`) are stored in a complaints file. The customer code can also be used to locate the surname and phone number of the customer, as they are both stored in the customer file.

There are five products sold. Their product codes are stored in an array called codes and initialized as shown.

```
codes[] = {123, 444, 555, 654, 102};
```

A sample complaints file is shown below:

compID	custID	prodID
1	001	123
2	005	444
3	001	123
4	002	123
5	001	555

(a) Explain how the product code can be validated when it is entered, by using the array `codes[]`. *[2 marks]*

(b) Explain how a customer's code can be used to access the complaints file to find the first complaint made by that customer. *[2 marks]*

(c) Explain the advantage of using the customer code (`custID`) to directly access the customer file. *[2 marks]*

(d) Outline the steps involved in counting the number of complaints made against a specific product. *[4 marks]*

15. A small company uses a LAN (local area network) with a star topology. The LAN connects three PCs and a printer to a server and allows access to the Internet. Additionally, users will be able to access the server remotely and be able to use email.

(a) State the name of a hardware component required to link the LAN to the World Wide Web (WWW). *[1 mark]*

(b) Draw and label a diagram to show the components of the new network. *[3 marks]*

(c) Explain **one** external threat to security that arises from the connection to the WWW. *[2 marks]*

(d) Explain a way to protect against the above external security threat. *[2 marks]*

(e) Outline why email poses a potential threat to data integrity. *[2 marks]*

16. Most international airlines now operate booking procedures via websites. Potential customers can enquire and book tickets. The websites often collect email addresses, which can be used to distribute newsletters to customers once per month.

(a) State the name of the computer processing method used when a customer books a flight. *[1 mark]*

(b) Explain how more than one customer can access the booking system at the same time. *[2 marks]*

(c) State the name of the computer processing method used to mail the newsletter. *[1 mark]*

(d) Discuss the practice of selling the email list to other companies. *[3 marks]*

(e) Describe a suitable method that could be implemented to minimize the chance of disruption in case the disk system on the computer failed. *[3 marks]*