N08/5/COMSC/SP1/ENG/TZ0/XX

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COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Friday 14 November 2008 (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. Draw a diagram showing clearly the cyclical nature of the *systems life cycle*. You should include the different stages of the cycle in your diagram. *[3 marks]*

2. Identify **three** characteristics of a user interface that would make it suitable for use by young children. *[3 marks]*

3. Outline **two** different methods of debugging a program. *[4 marks]*

4. Determine the output from the following Java method.

```
void loop()
{
  for (int counter = 3; counter > 0; counter = counter - 1)
  {
    output (10/counter);
  }
}
```

[2 marks]

5. By giving an actual example, describe a set of data that could be stored in each of the following data structures:

(a) an array of integer; *[2 marks]*

(b) a 2-D array of real. *[2 marks]*

6. Outline the use of **one** software development tool. *[2 marks]*

7. State the calculation required to convert the value **6GB** (gigabytes) into kilobytes (kB). *[2 marks]*

8. With the use of an example, explain the term *volatile* when used to describe computer memory. *[2 marks]*

9. One of the functions of an operating system is *memory management*. Outline the function of memory management. *[2 marks]*

10. Outline the basic difference between the functions of a *hub* and a *router*. *[2 marks]*

11. (a) Outline the function of *defragmentation software*. *[2 marks]*

(b) Explain the reason for running defragmentation software. *[2 marks]*

SECTION B

*Answer **all** the questions.*

12. Consider the following methods.

```
public void numbers()
{
  int x = 1;
  int counter = 0;
  int[] list = new int [100];
  while (x > 0)
  {
    x = inputInt("Input an integer: ");
    if (x > 0)
    {
      if (validate(x))
      {
        list [counter] = x;
        counter++;
      }
    }
  }
}
private boolean validate (int n)
{
  if ((n%2 == 0) && (n%3 == 0))
    return true;
  else
    return false;
}
```

Recall that, in Java, the symbol `%` represents the modulo operator (mod).

(a) Identify the primitive data types used in the above methods. *[1 mark]*

(b) Copy and complete the trace table if the following set of data is input in the method `numbers()`: 6, 8, 24, –999. *[3 marks]*

x	x > 0?	validate(x)	counter	list
6				
8				
24				
–999				

(This question continues on the following page)

(Question 12 continued)

(c) Explain the inclusion of the value **–999** in the data list in part (b). *[2 marks]*

The method `numbers()` is now changed so that it returns the number of items in the array `list[]` to the method that called it.

(d) Determine the **two** changes that need to be made to the method `numbers()`. *[2 marks]*

(e) Explain the significance of the word **`private`** in the first line of the method `validate()`. *[2 marks]*

13. A company is designing a fully-automated, on-line theatre booking system that will be installed on machines at different locations within a major city. At each location, the customer is able to purchase tickets for any of the theatres listed on the system.

(a) Explain, with reference to the above system, what is meant by the term *on-line*. *[2 marks]*

(b) Suggest, with reasons, a suitable method of entering data into this system. *[2 marks]*

(c) Discuss how the system might prevent the same seat being booked by two different people. *[4 marks]*

(d) Explain **one** disadvantage that this system might present to potential customers. *[2 marks]*

14. A weather station is positioned at the top of a mountain, where the temperatures can range between –20º C and +50º C. Temperatures are measured by a sensor and stored in the station's computer memory. Once a day, the data is transferred to the central server, which stores and processes this data. The server is located a large distance away.

(a) State the type of processing that is being used here. *[1 mark]*

(b) Explain why the data from the sensor needs to be converted. *[3 marks]*

(c) Suggest, with reasons, a method of transferring the data from the weather station to the central server. *[2 marks]*

(d) If an item of temperature data is stored as an integer, explain how it might be represented in the memory. *[2 marks]*

(e) Suggest, with reasons, an alternative data representation that would represent the temperatures more accurately. *[2 marks]*

15. A supermarket has bar coded all of the items on sale.

(a) Explain **one** reason for bar coding these items. *[2 marks]*

A check digit is normally added to the code for verification purposes.

(b) Explain how the check digit can be obtained with the use of a modulo operator. *[4 marks]*

The supermarket stores the data from each transaction on a central computer.

(c) Discuss backup strategies that could be put in place to safeguard the data in the event of a system failure to this computer. *[4 marks]*