International Baccalaureate®
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COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Tuesday 16 November 2010 (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)   Outline the purpose of the *systems life cycle* model.   *[2 marks]*

         (b)   Identify the stage of the systems life cycle in which a feasibility report is prepared.   *[1 mark]*

2.   Customer orders are collected on paper, keyed in, and stored in the *customer orders file*.
         A stock *master file* is searched to determine whether sufficient stock is available and
         an appropriate report is produced.

         Construct a *systems flowchart* representing the process described above.   *[5 marks]*

3.   Draw a labelled diagram representing the basic structure of the *central processing
         unit* (CPU).   *[4 marks]*

4.   Outline **one** example of *online processing*.   *[2 marks]*

5.   (a)   Convert, showing your working, the decimal number 205 into binary.   *[2 marks]*

         (b)   Convert the binary number 1010 1001 into hexadecimal.   *[1 mark]*

6.   Describe the *phased introduction* method of implementing a new system.   *[2 marks]*

7.   Data is collected by groups of students on a field trip, and later transferred to a
         central computer.

         (a)   Identify **one** method of *data capture*.   *[1 mark]*

         (b)   Identify **one** method of transferring data from the field to the central computer. *[1 mark]*

         (c)   There have been concerns about the accuracy of the data.   Outline how
                verification and *validation* can be used to ensure it is as accurate as possible.   *[4 marks]*

8.   State the nature of the Boolean data type.   *[1 mark]*

9.   Define the terms *local area network* (LAN) and *wide area network* (WAN).   *[2 marks]*

10.   State **two** types of *utility software*.   *[2 marks]*

SECTION B

*Answer **all** the questions.*

11. Consider the following method.

```
static void calc(int d, int q)
{
  int r = 0, p = 0;
  while (q >= d * p)
  {
    p = p + 1;
  }
  p = p - 1;
  r = q - (d * p);
  output("p = " + p);
  output("r = " + r);
}
```

(a) Construct the trace table, started below, for the method call `calc(8, 37)`.   *[5 marks]*

d	q	p	r	q >= d * p	output

(b) In the method, identify

    (i) the *parameters*;   *[2 marks]*

    (ii) the *local variables*.   *[2 marks]*

(c) Assuming that the arguments are both positive, state the operation performed by this method.   *[1 mark]*

12. A digital music player stores a song as a file of numbers (each of which is called a sample) that are converted to a signal for the audio speaker or headphones.

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

   (b) Define the term *digital data*. *[1 mark]*

   (c) Identify **one** example of analog data and **one** example of digital data in a digital music player. *[2 marks]*

   (d) A CD-quality recording requires 44100 samples for every second of time and each sample is a 16-bit integer (2 bytes).

      (i) Outline how the number of kilobytes required for a CD-quality recording of a 3-minute song would be calculated. *[2 marks]*

      (ii) State the type of software that could be used to reduce the size of the recording. *[1 mark]*

   (e) Discuss **one** ethical issue created by the availability of digital music recordings on a computer network. *[3 marks]*

13. A school has a *local area network* (LAN) used by students, teachers and administrators. The LAN is not connected to the Internet.

   (a) Student marks are stored on a server that is connected to the network. Identify ways in which the data could be protected so that only teachers can change the marks. *[2 marks]*

   It is suggested that all students be given internal e-mail accounts on the system.

   (b) Identify **two** possible technical issues that might result from providing e-mail access to the students. *[2 marks]*

   (c) Discuss **two** possible social/ethical issues that might result from providing e-mail access to the students. *[6 marks]*

14. A particular computer is designed to work with non-volatile memory in place of a disk drive.

   (a) Draw a block diagram of the computer showing the CPU, cache, primary memory and non-volatile memory. *[4 marks]*

   (b) Outline the function of cache memory. *[2 marks]*

   (c) Explain reasons for having both volatile and non-volatile memory in a computer. *[4 marks]*