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International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

COMPUTER SCIENCE
STANDARD LEVEL
PAPER 1

Friday 16 May 2014 (afternoon)

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

• Do not open this examination paper until instructed to do so.
• Section A: answer all questions.
• Section B: answer all questions.
• The maximum mark for this examination paper is *[70 marks]*.

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SECTION A

*Answer **all** questions.*

1. Identify **two** features that need to be considered when planning a new computing system for an organization. *[2]*

2. Explain what is meant by *beta testing*. *[2]*

3. Describe **one** advantage and **one** disadvantage of using observations to gather information when planning a new system. *[4]*

4. Outline **one** usability issue associated with the design of mobile devices. *[2]*

5. Distinguish between the use of **two** types of primary memory. *[2]*

6. Outline, with an example, **one** benefit of using computer-aided design (CAD) applications. *[2]*

7. Outline how a colour can be represented in a computer. *[2]*

8. Identify **two** key features of a peer-to-peer (P2P) network. *[2]*

9. Define the term *data packet*. *[2]*

10. Explain why the speed of data transmission across a network can vary. *[3]*

11. Explain why an object is an example of abstraction. *[2]*

SECTION B

*Answer **all** questions.*

12. Harry is *Tired* (T) depending on the following three variables:
- *Work* (W)
- *Hunger* (H)
- *Sun* (S).

Harry is tired if:
- he works and he is hungry
- he works and it is not sunny
- he does not work and is not hungry.

(a) Represent, as a single logical expression, the conditions that cause Harry to be tired. *[3]*

(b) Construct the truth table to show when Harry is tired. *[4]*

A professor notices that students are generally very tired and decides to investigate the relationship of tiredness with *Work*, *Hunger* and *Sun*.

Consider the following truth table which shows the conditions for *Tired* based on *Work*, *Hunger* and *Sun*.

W	H	S	T
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

(This question continues on the following page)

(Question 12 continued)

The conditions for one of the students to be tired can be expressed in the following array, `TIRED`, where the index is equivalent to the combination of W, H and S in the truth table.

TIRED

[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]
0	0	1	0	0	0	1	1

(c)   Identify a relationship between the value of S and the index of the array `TIRED`.   *[1]*

(d)   Construct an algorithm, `TEST`, in pseudocode, to output the conditions W, H and S from the array `TIRED` for a student who is tired.   *[4]*

A collection, `STUDENT`, is used to hold the name and the array `TIRED` for each student.

(e)   Outline the way in which your algorithm could be used to output the names of all those students who are tired due to *Work* **and** *Hunger*.   *[3]*

13.   An international organization has offices located across several countries. For some of its activities, for example human resource management, it has been decided to adopt a "Software-as-a-Service" (SaaS) solution in order to keep the running costs low.

(a)   Describe the features of SaaS.   *[3]*

(b)   Discuss the limitations of SaaS in relation to security.   *[6]*

Each office makes some data available to external customers through the use of an extranet and allows employees to work from home through a VPN.

(c)   Define the term *extranet.*   *[2]*

(d)   Distinguish between a VPN and an extranet.   *[4]*

14. The faceplate of a car stereo has six buttons for selecting one of six preferred radio stations. As part of the internal representation of a microprocessor there is an array with six positions, carrying the information about the radio frequencies, as follows.

Radio

[0]	[1]	[2]	[3]	[4]	[5]
100.4	88.7	90.2	104.5	93.8	106.2

(a) State the information at `Radio[2]`. *[1]*

(b) Outline how a numerical frequency could be stored in a fixed-length string. *[2]*

(c) Construct an algorithm, in pseudocode, that calculates the range of frequencies (*ie* the difference between the highest and lowest frequencies) of any set of six selected radio stations. *[6]*

A display in the faceplate shows the name and frequency of the selected radio station. The name is automatically captured when storing a preference.

(d) Outline how a collection of objects could be used to store the name and frequency data in the radio. *[2]*

(e) Construct an algorithm, in pseudocode, to access and display the name and frequency of a station when a button is pressed. *[4]*