M14/4/COMSC/SP1/ENG/TZ0/XX



22147014

**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]*.

2214-7014 6 pages

© International Baccalaureate Organization 2014

Blank page

**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 (*ie* the difference between the highest and lowest frequencies) of any set of radio stations. | frequencies six selected | *[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]*