Diploma Programme
Programme du diplôme
Programa del Diploma

Computer science
Standard level
Paper 1

Friday 2 November 2018 (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]**.

8818 – 7014

Section A

Answer **all** questions.

1. Outline what is meant by the term computer network. [2]

2. (a) Outline what is meant by a database management system. [2]

(b) Outline **one** advantage of using beta testing prior to the release of a new product. [2]

3. Direct observation is a technique used by a system analyst to determine user requirements for updating a computer system.

(a) Identify **one** advantage of direct observation. [1]

(b) Identify **one** disadvantage of direct observation. [1]

4. Construct a logic diagram for the following expression.

NOT A OR (A AND B) [3]

5. An international company is in the process of moving its Head Office from Europe to Asia.

(a) Identify **two** possible compatibility issues as a part of data migration. [2]

(b) Outline how a virtual private network (VPN) will allow employees who are in Europe to communicate with the Head Office in Asia. [2]

(c) Outline **one** social issue associated with this process. [2]

6. Describe how data is transmitted by packet switching. [4]

7. Construct a trace table for the following algorithm

```
A = 3
B = 7
loop while B >= A
  A = A + 1
  output(B - A)
  B = B - 1
end loop
```
[4]

Section B

Answer **all** questions.

8. (a) (i) Distinguish between random access memory (RAM) and read only memory (ROM). [3]

(ii) Outline the function of an operating system in managing primary memory. [2]

(b) Explain the roles of the data bus and the address bus in the machine instruction cycle. [4]

(c) (i) State how the data stored in the following byte will be represented in hexadecimal. [1]

0	1	0	1	1	1	1	0

(ii) State how many integers could be represented in this byte. [1]

(iii) Outline why this byte could not be used to represent characters such as those used in Chinese. [2]

(d) Construct a truth table with two input variables. If the input variables are equal the value of the output variable should be True, otherwise it should be False. [2]

9. (a) Outline the need for higher level languages. [2]

(b) Explain **two** benefits of using sub-procedures within a computer program. [4]

(c) Identify **three** characteristics of a collection. [3]

Collection `NUMBERS` already exists and stores real numbers.

(d) Construct in pseudocode an algorithm, using the access methods of a collection, which will iterate through the collection `NUMBERS` and count how many elements stored in the collection are in the interval [–1,1].

The final answer should be output. [6]

10. The following method, `calcBMI()` accepts person's height (H) in metres (m) and weight (W) in kilograms (kg) and returns their Body Mass Index (BMI).

```
calcBMI(H, W)
  X = H * H
  B = W / X
  return B
endcalcBMI
```

Boris weighs 104 kg and is 2.00 m tall. His BMI can be calculated by calling method `calcBMI()` as follows

```
BorisBMI = calcBMI(2.00, 104).
```

(a) State the value of variable `BorisBMI`. [1]

A person can belong to one of the following four weight categories:

BMI	**Weight category**
less than 18.5	underweight
from 18.5 but less than 25.0	normal weight
from 25.0 but less than 30.0	overweight
greater than or equal to 30.0	obese

(b) Use pseudocode to construct an algorithm which accepts a person's BMI and outputs the weight category the person belongs to. [4]

(This question continues on the following page)

(Question 10 continued)

The data about a group of adults and their height measurement (in metres) and weight measurement (in kg) is held in three one-dimensional arrays.

	NAME		**WEIGHT** (kg)		**HEIGHT** (m)
[0]	Annie	[0]	52.40	[0]	1.56
[1]	Boris	[1]	100.00	[1]	2.00
[2]	Hugh	[2]	105.00	[2]	2.03
[3]	Paul	[3]	61.00	[3]	1.75
[4]	Robby	[4]	88.00	[4]	1.80
…	…	…	…	…	…
…	…	…	…	…	…
[29]	Zara	[29]	68.00	[29]	1.71

Where
`NAME` is a one-dimensional array holding names (currently sorted in alphabetical order).
`WEIGHT` is a one-dimensional array holding weight measurement in kilograms.
`HEIGHT` is a one-dimensional array holding height measurement in metres.

For example,
`NAME[0]` is Annie.
Her weight measurement is 52.40 kg and can be found in `WEIGHT[0]`.
`HEIGHT[0]` is 1.56 which represents Annie's height measurement in metres.

(c) State the name of the person whose height is held in `HEIGHT[3]`. [1]

(d) (i) Identify **one** reason why a binary search algorithm cannot be used to find the name of person whose height is given. [1]

(ii) Describe how the name of person whose height is given could be output. [2]

(e) Construct an algorithm which will output the names of all the people whose BMI is greater than this group's average BMI.

You should call method `calcBMI()` in your answer. [6]