Markscheme

November 2017

Computer science

Higher level

Paper 1

Section A

1. *Award up to **[2 max]**.*
Fixed vocabulary;
Unambiguous meaning;
Consistent grammar;
Consistent syntax;
Provide a way to define basic data types and operations on those types (ability to write functions/procedures);
Provide ability of Input and output handling;
Provide some kind of loop that can be stopped / conditional statement / branching (conditional and unconditional branching);
It should have variables that reference computer memory, syntax for basic arithmetic and logical
operations on those memory locations;
It has to run on/be processed by a computer (*ie* it must have a compiler/interpreter);

***Note:** do not accept aspects that address interoperability/portability/standards/ user friendliness* **[2]**

2. (a) A piece of computer hardware or software that accesses a service made available by a server /
The role of a client is to access a service made available by a server by sending a request for service;

***Note**: the term client is to be understood only from the computing perspective, ie this is not a human.* **[1]**

(b) A program/host computer that awaits and fulfills requests from client programs (in the same or other computers) /
The role of a server is to fulfill requests from client programs (which can reside in the same or in other computers)

***Note**: the term server is to be understood only from the computing perspective, ie this is not a human.* **[1]**

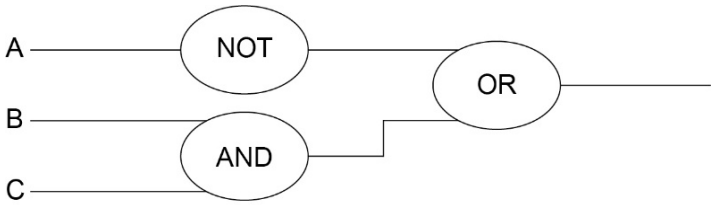
3. *Award up to **[1 max]**.*
Text-to-speech;
Voice recognition;
Braille keyboards;
Touch screen;
Input from scanner; **[1]**

4. *Award **[1]** for all correct input values, **[1]** for a correct A NOR B column and **[1]** for a correct (A NOR B) OR A column.*

A	**B**	**A NOR B**	**(A NOR B) OR A**
FALSE	FALSE	TRUE	TRUE
FALSE	TRUE	FALSE	FALSE
TRUE	FALSE	FALSE	TRUE
TRUE	TRUE	FALSE	TRUE

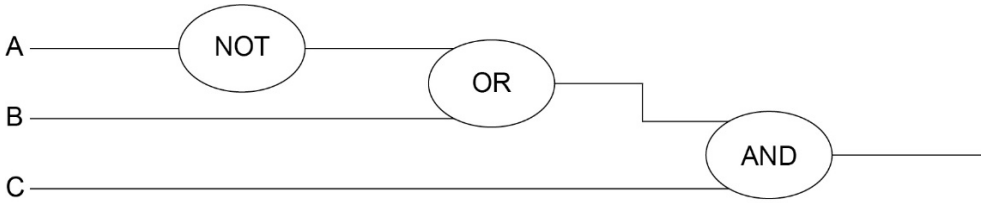
[3]

5. *Award **[1]** for each correctly placed gate, up to **[3 max]**.*



[3]

***Note:** Award only **[1]** for an answer of:*



6. (a) 5; **[1]**

(b) *Award up to **[3]** as follows:*
***[3]** for fully correct response (sequence of output) "0;2;4";*
***[2]** for response (sequence) "4;2;0" (all elements are correct, but they are in inverse order);*
***[1]** for response "0" (only base case is correct);*
OR
"0;2" (incomplete output, but initially correct, and with correct order);
OR
"–2;0;2;4","0;2;4;6" (correct sequence immersed in some unnecessary and incorrect context);

***[0]** in all other cases (eg responses "2", "4", "2;0", "2;4", "4;2");*

0
2
4 **[3]**

(c) ***Example answer 1***
*Award marks as follows up to **[4 max]**. (There are 5 marking points);*
*Award **[1]** for determining whether `N` is odd/even;*
*Award **[1]** for correctly initializing and changing the value of the loop controlling variable (`K`);*
*Award **[1]** for the correct condition in the `while` loop;*
*Award **[1]** for output within the loop for an even `N`;*
*Award **[1]** for output after the loop for an odd `N`;*

```
mystery(N)
  if N mod 2 = 0 then
    K = 0
    loop while K <= N
      output K
      K = K + 2
    end loop
  else
    output N
  end if
end mystery
```

Example answer 2
*Award marks as follows up to **[4 max]**. (There are 5 marking points);*
*Award **[1]** for determining whether `N` is odd/even;*
*Award **[1]** for correctly initializing and changing the value of the loop controlling variable (`K`);*
*Award **[1]** for the correct condition in while loop (note `K < N`);*
*Award **[1]** for output within the loop for an even `N`;*
*Award **[1]** for outputting `N` after the loop;*

```
mystery(N)
  K = 0
  loop while (K < N) AND (N mod 2 = 0)
    output K
    K = K + 2
  end loop
  output N
end mystery
```

Note: *No marks for any attempt of program that contains recursive calls.*

Reminder: *in the Spanish version `mystery()` is called `incognita()`.*

Remark: *A correct program produces in output numbers in an ascending order, only.* **[4]**

7. (a) Primary memory / RAM **[1]**

(b) *Award up to **[2 max]**.*
Note*: there must be explicit reference to both address and data bus.*

Example 1
Buses are used as physical connections to carry information to the CPU;
The data bus transports data from/to CPU, whereas the address bus the memory address where the data is supposed to go/be;

Example 2
Data bus is a physical connection to transport data from-to CPU to be processed;
Address bus is a physical connection to transport an address of memory storage where data (transported in the data bus) should be read/written;

Note: *Award **[1]**, for responses that show some understanding of use of buses in CPU, for address location and data transport without using specialist terminology.* **[2]**

8. Binary digit;
(Minimal) unit of storage that can be set to 0 or 1; **[1]**

9. *Award up to **[2 max]**.*
It involves sending sample software to the intended audience;
(Selected audience does not pay for this software);
To try/use the software product;
And give the feedback to the authors (which help in correcting bugs); **[2]**