2210_w23_qp_23

Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	
CENTRE NUMBER	CANDIDATE NUMBER

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CAMBRIDGE ASSESSMENT INTERNATIONAL EDUCATION

Computer Science (2210)

Paper 2 Theory, Pseudocode and Programming

October/November 2023

2 hours 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer all questions in Section A on the question paper.
- Answer one question from Section B on the question paper.
- Write your name and centre number in the boxes above.
- Write your answers in the spaces provided in this question paper.
- Do not use a pencil or a pen in red or green.
- Calculators may be used.
- Do not use staples, paper clips, glue or correction fluid.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- Section A: Questions 1 to 7 are worth 5 marks each. Question 8 is worth 10 marks.

This document has 16 pages. Any blank pages are intended.

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1 Tick (✓) each of the statements that are true about an LCD display.

Needs no power	☐
Uses less power than an LED display	☐
Uses more power than an LED display	☐
Requires a backlight	☐
Requires a fan	☐

[5]

2 Tick (✓) each of the types of RAM that are volatile. Cross (✗) each of the types of RAM that are non-volatile.

DDR	☐
DDR2	☐
DDR3	☐
DDR4	☐
DDR5	☐

[5]

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3 (a) Match each binary subtraction to the Two's complement result that it will produce.

Draw lines to connect each binary subtraction on the left to the two's complement representation of the result on the right.

Pseudocode Subtraction	Pseudocode Output
Binary value 1 - 1	11111111
Binary value 1 - 2	00000000
Binary value 2 - 1	00000001
Binary value 2 - 2	11111110
Binary value 2 - 3	11111111

[5]

(b) Find the binary of the following:

-(NOT(-Mem[Ptr]) OR 1)

= Mem[Ptr] OR 1

[3]

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4 A programmer is writing a library that will be used by other programmers.

The library will include a function that will return the number of prime numbers in a range of integers.

(a) Give the name of **two** common items that the user expects for this program.

1 Speed

2 Low memory

[2]

(b) Explain the consideration a software user has between speed and memory.

Speed: Speed is important when the user is using a time critical program.

Memory: Memory is important when the user is using a program on a device with limited memory.

Speed: Speed is important when the user is using a time critical program.

Memory: Memory is important when the user is using a program on a device with limited memory.

[4]

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Scale Field

5 (a) Complete the flowchart for the pseudocode algorithm.

```
Scale = 0
Found = FALSE
Ptr = Mem[Root]
Loop
    Left = Mem[Ptr]
    Right = Mem[Ptr + 1]
    IF Left = Value
        Found = TRUE
        Scale = Scale + 1
        Ptr = Right
    ELSE
        IF Right = Value
            Found = TRUE
            Scale = Scale + 1
            Ptr = Left
        ELSE
            Ptr = Mem[Ptr + 2]
    ENDIF
UNTIL Found = TRUE OR Ptr = NULL
IF Found = TRUE
    OUTPUT "Number found"
    OUTPUT Scale
ELSE
    OUTPUT "Number not found"
ENDIF
```

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(b) Complete the pseudocode for the scanning algorithm.

```
Ptr = Mem[Root]
Loop
    IF Ptr = NULL
        OUTPUT "Number not found"
        EXIT
    ENDIF
    IF Mem[Ptr] = Value
        OUTPUT "Number found"
        EXIT
    ELSE
        Ptr = Mem[Ptr + 2]
    ENDIF
ENDLOOP
```

[8]

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6 Tick (✓) the Boolean or logic expression that will cause the output to be 1 when the inputs are 0 and 1.

Tick (✓) the Boolean or logic expression that will cause the output to be 0 when the inputs are 0 and 1.

	Output 1	Output 0
Input pair: 0 0	☐	☐
Input pair: 0 1	☐	☐
Input pair: 1 0	☐	☐
Input pair: 1 1	☐	☐

[4]

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7 (a) The output 1 when both inputs are different.

Truth table: ☐ ☐ ☐ ☐

Complete the truth table for this description.

0	0	0
0	1	1
1	0	1
1	1	0

(b) The output 1 when both inputs are different.

Logic gate: XOR

Complete the truth table for this description.

0	0	0
0	1	1
1	0	1
1	1	0

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8 Consider the logic expression:

X = (((((((