

Please write clearly in block capitals.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL AS

COMPUTER SCIENCE

Unit 2 Concepts and principles of computer science

Tuesday 20 January 2026

07:00 UK Time

Time allowed: 1 hour 30 minutes

Materials

- Standard OxfordAQA assembly language instruction set, provided as an Insert.
- You may use a calculator.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this answer book. Cross through any work you do not want to be marked.

Information

- The marks for each question are shown in brackets.
- The maximum mark for this paper is 75.

For Examiner's Use	
Question	Mark
1–3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
TOTAL	



Answer **all** questions in the spaces provided.

0	1
---	---

Tick **one** box to show the maximum number of values that can be represented in 5 bits.

Tick (✓) **one** box.

[1 mark]

A 5

☐

B 32

☐

C 25

☐

D 16

☐

E 64

☐

0	2
---	---

Tick **one** box to show which translator executes a programming language line by line.

Tick (✓) **one** box.

[1 mark]

A Compiler

☐

B Interpreter

☐

C Assembler

☐

0	3
---	---

Tick **two** boxes to show which of these programs are **utility programs**.

Tick (✓) **two** boxes.

[1 mark]

A Library program

☐

B Word processor

☐

C Virus checker

☐

D Operating system

☐

E Compression program

☐

3

Turn over for the next question

Turn over ►



0 4 . 1

Describe how characters are encoded in the Unicode encoding system.

[2 marks]

0 4 . 2

State **two** reasons why the Unicode encoding system was introduced.**[2 marks]**

Reason 1 _____

Reason 2 _____

0 4 . 3

In the ASCII encoding system, the 7-bit binary representation of '0' is 011 0000

Calculate the 7-bit binary representation of '5' in the ASCII encoding system.

[1 mark]

5

0 5

Show how to perform this binary subtraction:

$$\begin{array}{r} 0100\ 1011 \\ - 0010\ 1010 \\ \hline \end{array}$$

Use two's complement binary.

You **must** show your working **and** your final answer in binary.

Write your answer in the boxes.

[2 marks]

Answer

--	--	--	--	--	--	--	--

2**Turn over for the next question****Turn over ►**

0 6 . 1

Convert the decimal number 54.25 into binary using a fixed point representation with eight bits before the binary point and four bits after the binary point.

Write your answer in the boxes.

[2 marks]

Answer

--	--	--	--	--	--	--	--	--	--	--	--

0 6 . 2

A computer system uses an 8-bit mantissa and a 4-bit exponent to represent **normalised** floating point numbers. Both mantissa and exponent are stored using **two's complement**.

Write the normalised floating point representation of the decimal value 11.375 in the boxes below.

You **must** show your working.

[3 marks]

Answer

--	--	--	--	--	--	--	--

Mantissa

--	--	--	--

Exponent



0 6 . 3

State how the format of the floating point number used in Question 06.2 could be changed to increase precision, without changing the number of bits used overall.

[1 mark]

0 6 . 4

State **one** advantage of using a fixed point representation rather than a floating point representation.

You should assume that both representations use the same number of bits to represent a value.

[1 mark]

0 6 . 5

When representing the numerical results of calculations in a computer, different errors can occur. One of these possible errors is overflow.

Define the term 'overflow'.

[1 mark]

8

Turn over for the next question

Turn over ►



[4 marks]

[illegible]

[2 marks]

Reason 1

Reason 2

6



0 8

State **two** factors that affect processor performance.

For each factor, explain the effect on processor performance.

[4 marks]

Factor 1 _____

Explanation 1 _____

Factor 2 _____

Explanation 2 _____

4

Turn over for the next question

Turn over ►



0 9 . 1

Describe how images are represented as bitmaps.

[3 marks]

0 9 . 2

State **one** reason why a photograph of a person would be stored using a bitmap rather than a vector graphic.

[1 mark]

1 0

A sound file is recorded at a sampling rate of 44 100 samples per second (Hz) using a sample resolution of 16 bits. The duration of the sound recorded is 3 minutes.

Calculate the size of the file in mebibytes (MiB).

State your answer to one decimal place.

You **must** show your working.

[3 marks]

Answer _____ mebibytes (MiB)

4

3



Turn over for the next question

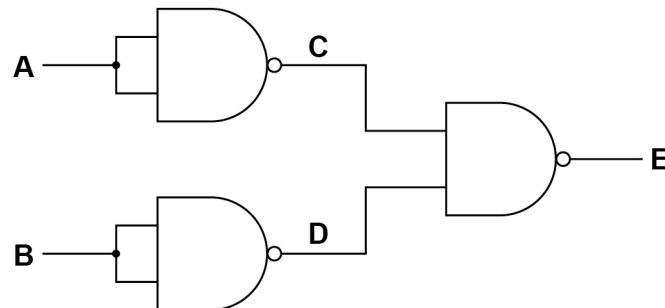
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ANSWER IN THE SPACES PROVIDED**

Turn over ►



1 1 . 1

Figure 1 shows a logic circuit.Complete columns **C**, **D** and **E** in the truth table for the logic circuit shown in **Figure 1**.**[2 marks]****Figure 1**

Inputs				Output
A	B	C	D	E
0	0			
0	1			
1	0			
1	1			

1 1 . 2

Draw a **single** logic gate that produces the same output (**E**) as the circuit shown in **Figure 1**.

Draw the gate in the box provided.

[1 mark]

1 1 . 3

Draw a logic circuit to represent the Boolean algebra expression in the box provided.

$$E = (\bar{A} + B) \cdot (\overline{C + D})$$

Do **not** simplify the expression.**[3 marks]**

6

Turn over for the next question

Turn over ►



1	2
---	---

Use the rules of Boolean algebra to simplify

$$(\overline{A+B}) \cdot \overline{A} \cdot C + \overline{B \cdot C} + B \cdot \overline{C}$$

You **must** show your working.

[4 marks]

Answer

4



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1 3

Table 1 shows an encoding system for characters.

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Table 1

A	I	Q	Y
00000	01000	10000	11000
B	J	R	Z
00001	01001	10001	11001
C	K	S	?
00010	01010	10010	11010
D	L	T	!
00011	01011	11001	11011
E	M	U	@
00100	01100	10100	11100
F	N	V	(
00101	01101	10101	11101
G	O	W	)
00110	01110	10110	11110
H	P	X	.
00111	01111	10111	11111



1 3 . 1 Ciphertext was created by

- using **Table 1** to give each character in the plaintext a code
- and then applying the Vernam cipher with the key 'TIP'.

The resulting ciphertext was 'QGJ'.

Show how to decrypt the ciphertext into plaintext.

You **must** show your working.

[3 marks]

Plaintext _____

1 3 . 2 The Vernam cipher can be perfectly secure.

State what is meant by 'perfect security'.

[1 mark]

4

Turn over for the next question

Turn over ►



1 4 . 1

Describe the **decode** stage of the Fetch-Execute cycle.**[2 marks]**

1 4 . 2

An instruction loads the contents of the memory location with address 500 into the general-purpose register R2

Describe how this instruction is executed.

[4 marks]

1 4 . 3

Describe the effects of interrupts on the Fetch-Execute cycle.

[2 marks]



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For Question **15** use the Standard OxfordAQA assembly language instruction set provided as an Insert.

1 5

Main memory addresses 100 to 199 contain a mixture of positive and negative integers, as shown in **Table 2**.

Table 2

Memory Address (Decimal)	Contents of Memory Address (Decimal)
100	45
101	17
102	–50
103	245
104	–18
105	–231
106	201
107	340
...	...
199	–288

Use the OxfordAQA assembly language instruction set to write a program that adds up all the **positive** integers stored at main memory addresses 100 to 199. Negative integers should be ignored when calculating the total.

The total of the positive integers should then be stored at memory location 200.

[8 marks]



[illegible]

8

1 6 . 1 Bytecode is an example of an intermediate language.

State **two** ways in which intermediate languages are used when they are the final output of a compiler.

[2 marks]

1 _____

2 _____

1 6 . 2 State **two** reasons why intermediate languages are the final output of some compilers. **[2 marks]**

Reason 1 _____

Reason 2 _____

4

1 7 . 1 Describe the stored program concept.

[2 marks]



1 7 . 2 Describe **one** difference between the Von Neumann and Harvard architectures.

[1 mark]

1 7 . 3 **Figure 2** is a diagram of some of the hardware components of a computer.

Most of the components in the diagram have been labelled **A**, **B**, **C**, **D** and **E**.

Complete **Table 3** with the names of the components labelled **A**, **B**, **C**, **D** and **E** in **Figure 2**.

[3 marks]

Figure 2

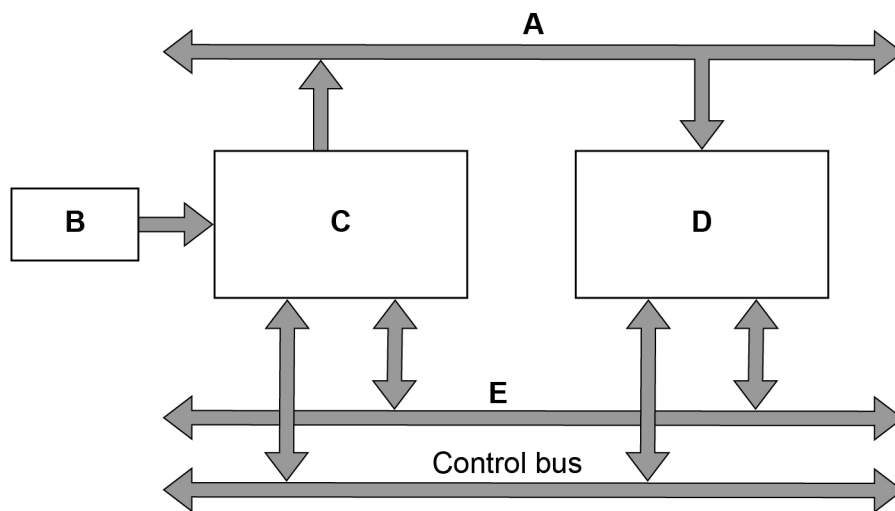


Table 3

Label	Component Name
A	
B	
C	
D	
E	

END OF QUESTIONS



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