

6 (a) The processor uses several registers, including the Accumulator (ACC) and the Current Instruction Register (CIR).

Complete the table by describing the role of each register.

Register	Role
ACC	
CIR	

[2]

(b) Increasing the number of cores in a processor can affect the performance of a computer.

Describe the drawbacks of increasing the number of cores in a processor.

[2]

(c) State **three** differences between Dynamic RAM (DRAM) and Static RAM (SRAM).

1

2

3

[3]

9 Describe the differences between a monitoring system and a control system.

[3]

10 An architect needs a model of a building.

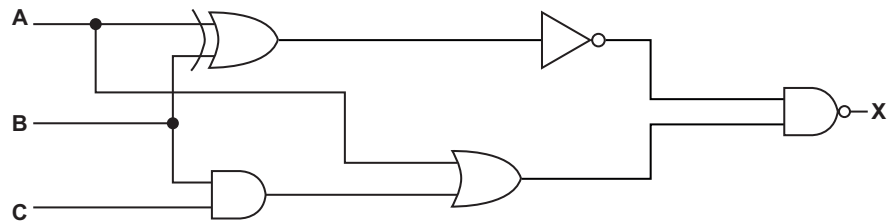
(a) Explain how the model will be printed using a 3D printer.

[3]

(b) State why a 3D printer needs a buffer.

[1]

9 (a) Consider the following logic circuit:



Write the logic expression for the logic circuit. Do **not** simplify the expression.

X = [2]

(b) Consider the following logic expression:

$X = \text{NOT } ((A \text{ NAND } B) \text{ XOR } (\text{NOT } A \text{ OR } \text{NOT } C))$

A truth table for the logic expression is given:

Row number	A	B	C	X
1	0	0	0	1
2	0	0	1	0
3	0	1	0	1
4	0	1	1	0
5	1	0	0	1
6	1	0	1	0
7	1	1	0	1
8	1	1	1	1

There are **three** errors in the truth table.

Identify the **three** errors in the truth table by writing the row numbers with an incorrect output.

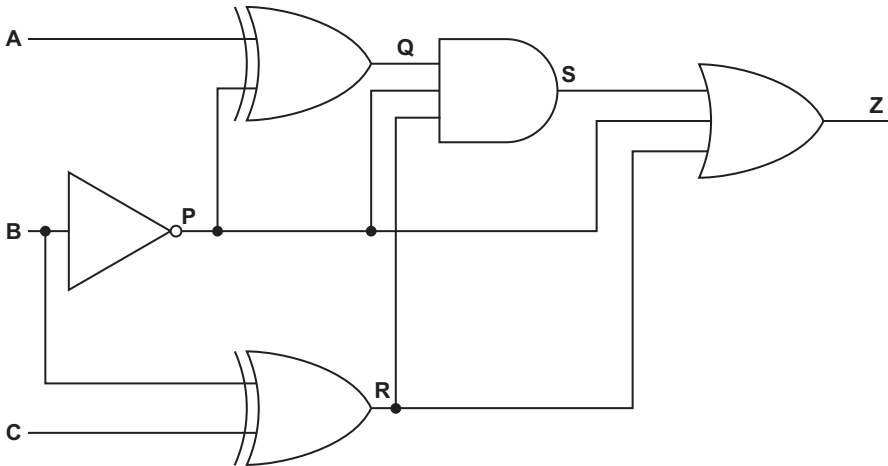
Error 1 Row number

Error 2 Row number

Error 3 Row number

[2]

6 (a) The diagram shows a logic circuit.



Complete the truth table for the given logic circuit.
Show your working.

			Working space				
A	B	C	P	Q	R	S	Z
0	0	0					
0	0	1					
0	1	0					
0	1	1					
1	0	0					
1	0	1					
1	1	0					
1	1	1					

[3]

- (b) (i) Complete the Karnaugh map (K-map) for the Boolean expression:

$$\bar{A}\bar{B}.C + \bar{A}.B.C + A.\bar{B}.C + A.B.\bar{C}$$

		BC			
A		00	01	11	10
	0				
	1				

[2]

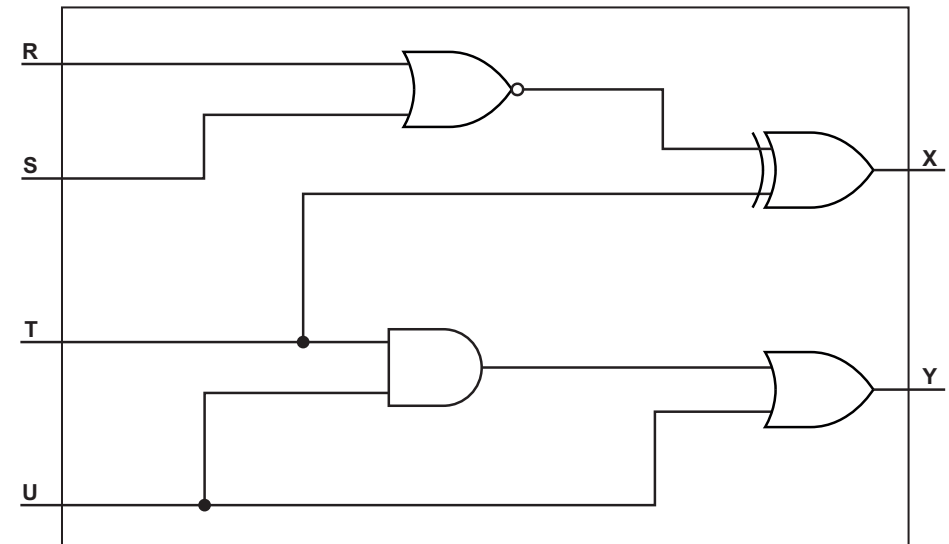
- (ii) Draw loop(s) around appropriate group(s) in the K-map to produce an optimal sum-of-products. [2]

- (iii) Write the Boolean expression from your answer to part **b(ii)** as a simplified sum-of-products. Do **not** carry out any further simplification.

.....

..... [2]

- 4 (a) Write the logic expressions for the following logic circuit.



X =

Y =

[2]

(b) Complete the truth table for the logic expression:

$X = \text{NOT } (A \text{ AND } (B \text{ XOR } C))$

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[2]

1 (a) Tick (✓) **one** box to identify the correct logic statement for this truth table.

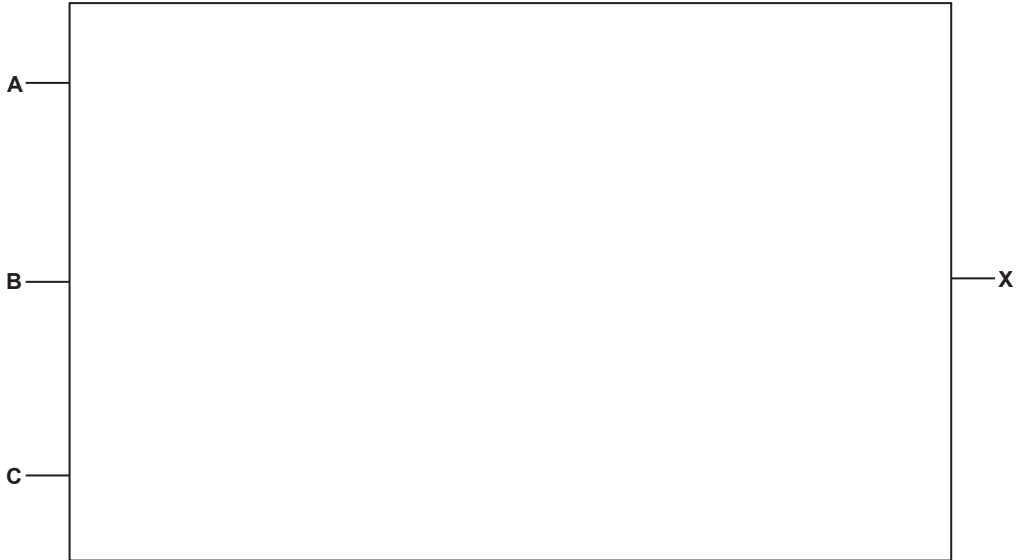
A	B	C	X
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

- ☐ NOT (A AND B AND C)
- ☐ (A XOR B) NOR C
- ☐ (A OR B OR C) NOR C
- ☐ NOT A AND NOT B AND NOT C

[1]

(b) Draw a logic circuit for the logic expression:

$X = \text{NOT } (\text{NOT } A \text{ AND } (\text{NOT } B \text{ XOR } C))$



[2]