GCST

2.4 BOOLEAN LOGIC

TOPIC WISE EXAM QUESTIONS

ANSWERS

GCSE OCR

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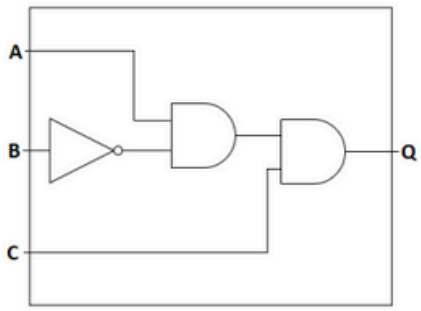
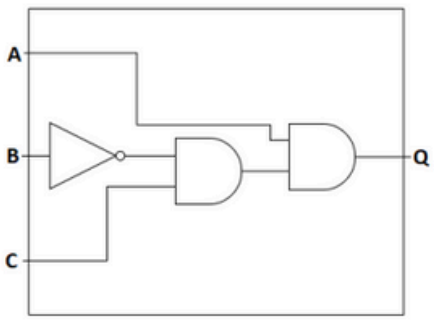
2023

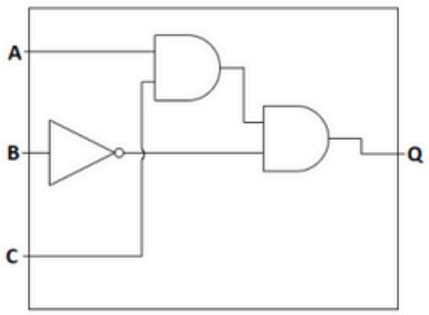
4	(a)	1 mark each, max 2 if not fully correct circuit. • NOT B • AND gate with A / C as one **direct** input… • …Second AND gate with other (unused) A / C as **direct** input **and** output of previous stage as other input Fully correct circuit is any of : • Q = (A AND NOT B) AND C • Q = A AND (NOT B AND C) • Q = (A AND C) AND NOT B See examples below :	3 (AO3 2a)	Shapes of logic gates must be correct. NOT gate must include circle for inversion. No other gates should include circle. AND gates must have two different inputs, NOT gate must have one input. All gates must have one output. Correct system will always have **NOT B** and two other AND gates correctly joined. Accept alternative systems that produce the correct output. Accept (BOD) three input AND gate for BP2 and BP3 if used correctly. OK if inputs/outputs not joined up to A/B/C/Q as long as intention clear. If lines cross on diagram, give BOD. If (A AND C) AND NOT B drawn, allow NOT B as first input for BP3.



Q = (A AND NOT B) AND C



A AND (NOT B AND C)



(A AND C) AND NOT B

	(b)	1 mark each • Logic gate 1: **OR** • Logic gate 2: **AND**	2 (AO2 1a)	Allow **A OR B** // **B OR A** for logic gate 1 Allow **A AND B** // **B AND A** for logic gate 2 If logic statement provided with multiple gates (e.g. A OR B AND C) this is incorrect. Allow use of symbols (e.g. ∨, + for OR, ∧, . for AND) Allow correct drawing of logic gates.

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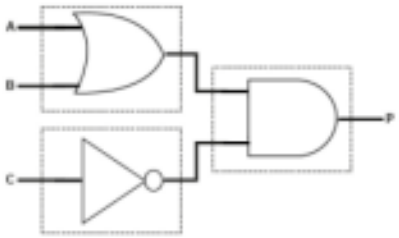
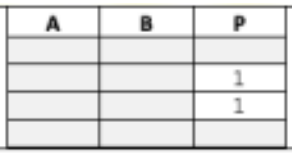
2	(a)	(i)	• A **OR** B • **NOT** C • **AND** gate 	3 (AO2 1b)	1 mark per gate. Correct symbols must be used. NOT gate must have circle for inversion, OR and AND must <u>not</u> have a circle. Mark the **shape** of each gate, not the name written if given. Ignore any writing / notes. Lines do not have to be drawn or joined up, but if they are, gates must have the **correct number of inputs/outputs**. Penalise once then FT.
2	(a)	(ii)	• To show **all possible inputs** (to the logic circuit)… • …and the **associated/dependent** output (for each input)	2 (AO1 1b)	For 2nd BP, must be clear that the output is linked to the input values given. "All possible combinations of inputs and outputs" gains the first mark (all possible inputs) but not the second. "The output **for** each possible input" gains both marks
2	(a)	(iii)	• 8 // eight	1 (AO2 1a)	Accept other answers that equate to 8 (e.g. 2^3)

SAMPLE

1	a			2 (AO1 1b)	1 mark for each correct answer in table 'True' or 'T' are also credit worthy.
	b			1 (AO1 1b)	Correct Answer Only

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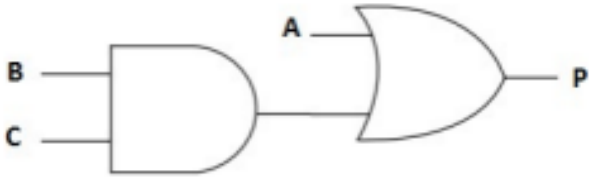
2020

4	f	i	1 mark per bullet point • B AND C • OR gate with two inputs, one of which is A • …correct connection of these two gates with no additional gates / connections	3 AO1 1b(3)	Shape must be accurate 
4	f	ii	1 mark per bullet point • Correct completion of A and B inputs as **1 1** • 0 output for 01 input • 0 output for 10 input • 0 output for 11 input	4 AO1 1b(1) AO2 1b(3)	CAO

A	B	P
0	0	1
0	1	0
1	0	0
1	1	0

2019

5	(e)		1 mark per missing bit	4 AO2 1b (4)	Accept T / True

A	B	Q
0	0	0
0	1	1
1	0	1
1	1	1

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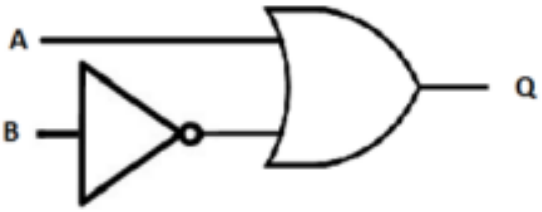
2018

3	(a)	(ii)	<table><tr><th>A</th><th>B</th><th>Q</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>	4	1 mark per row
3	(b)		1 mark per bullet, max 2  • OR gate with **two inputs** // NOT gate **on B input** • Logic system as above with no other gates, with labelled inputs of A and B.	2	First mark can be awarded if candidate has either a NOT gate from B, or an OR gate with two inputs anywhere in their answer. Second mark is only awarded of the logic system as shown is given with no other additional gates. Correct logic diagrams needed for OR and NOT, including circle on NOT. Use professional judgement. Ignore labelling. No need to label Q output.

If you found this useful, drop a follow to help me out!

THANK YOU!

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