

2.4

BOOLEAN

LOGIC

TOPIC WISE EXAM QUESTIONS

GCSE




OCR

2.4.1 Boolean logic

- Simple logic diagrams using the operators AND, OR and NOT
- Truth tables
- Combining Boolean operators using AND, OR and NOT
- Applying logical operators in truth tables to solve problems

Required

- ✓ Knowledge of the truth tables for each logic gate
- ✓ Recognition of each gate symbol
- ✓ Understanding of how to create, complete or edit logic diagrams and truth tables for given scenarios
- ✓ Ability to work with more than one gate in a logic diagram

Boolean Operators	Logic Gate Symbol
AND (Conjunction)	
OR (Disjunction)	
NOT (Negation)	

Truth Tables

AND			OR			NOT	
A	B	A AND B	A	B	A OR B	A	NOT A
0	0	0	0	0	0	0	1
0	1	0	0	1	1	1	0
1	0	0	1	0	1		
1	1	1	1	1	1		

Alternatives

- Use of other valid notation will be accepted within the examination, e.g. Using T/F for 1/0, or V for OR, etc.

2023

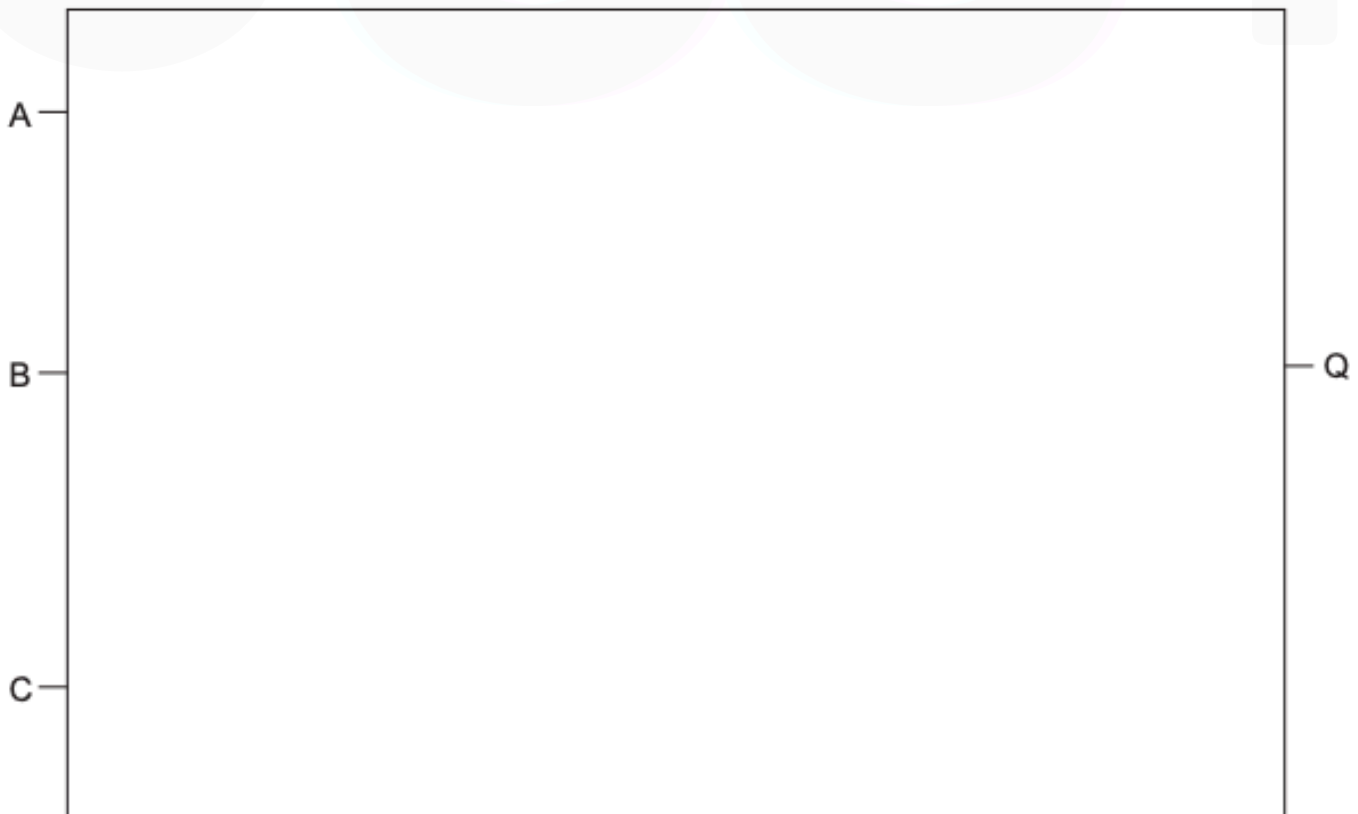
A garden floodlight system uses inputs from sensors and switches to decide whether it should be turned on.

The table shows the inputs into the system and the meaning of each input value:

Letter	Input device	Input of 1	Input of 0
A	Motion sensor	Motion is detected	Motion is not detected
B	Light sensor	Light levels indicate it is daytime	Light levels indicate it is nighttime
C	Light switch	The switch is turned on	The switch is turned off

The floodlight (Q) is designed to be on ($Q = 1$) when the switch is turned on and the motion sensor detects motion at nighttime.

(a) Draw a logic diagram for the floodlight.



[3]

(b) Identify the logic gates for truth table 1 and truth table 2.

Truth table 1:

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1

Logic gate 1:

Truth table 2:

A	B	Output
0	0	0
0	1	0
1	0	0
1	1	1

Logic gate 2:

[2]

2022

A fast food restaurant offers half-price meals if the customer is a student or has a discount card. The offer is not valid on Saturdays.

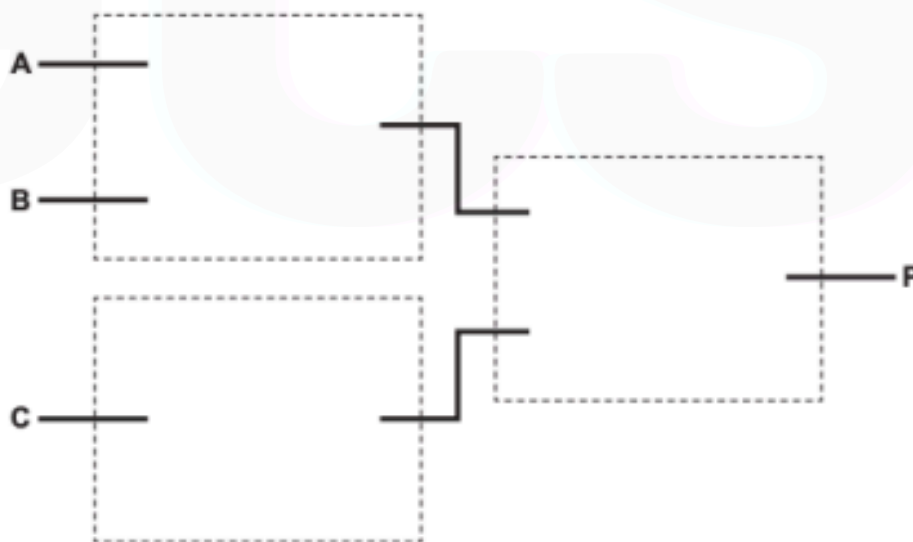
A computer system is used to identify whether the customer can have a half-price meal.

The table identifies the three inputs to the computer system:

Input	Value
A	Is a student
B	Has a discount card
C	The current day is Saturday

(a) The logic system $P = (A \text{ OR } B) \text{ AND NOT } C$ is used.

(i) Complete the following logic diagram for $P = (A \text{ OR } B) \text{ AND NOT } C$ by drawing one logic gate in each box.



[3]

(ii) A truth table can be produced for this logic circuit.

Describe the purpose of a truth table.

.....

.....

.....

..... [2]

(iii) State how many rows (excluding any headings) would be required in a truth table for the logic expression:

$$P = (A \text{ OR } B) \text{ AND NOT } C$$

SAMPLE



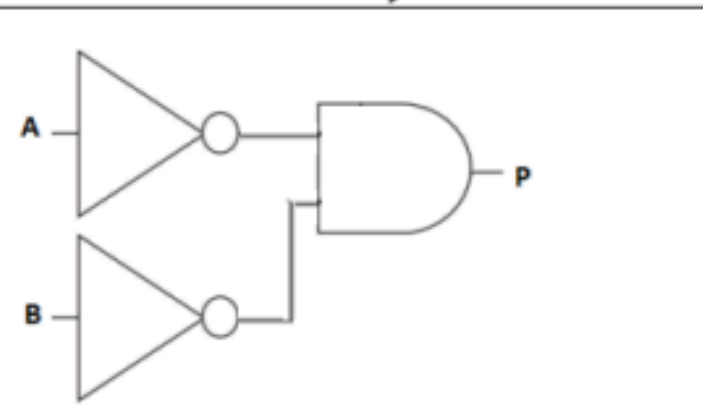
(a) Complete the truth table in Fig. 1 for the Boolean statement $P = \text{NOT } (A \text{ AND } B)$.

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

Fig. 1

[2]

(b) Tick (✓) one box to identify the correct logic diagram for $P = \text{NOT } (A \text{ AND } B)$.

$P = \text{NOT } (A \text{ AND } B)$	Tick (✓) one box
	
	
	

[1]

2020

(f) (i) Draw the logic diagram for the logic system $P = A \text{ OR } (B \text{ AND } C)$



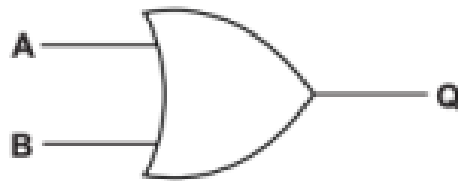
[3]

(ii) Complete the truth table for the logic system $P = \text{NOT } (A \text{ OR } B)$

A	B	P
0	0	1
0	1	
1	0	

[4]

(e) Complete the truth table for the following logic gate.



A	B	Q
0	0	0
0	1	1
	0	
1		

[4]

2018

The logic diagram below (Fig. 2) shows a system made up of two connected logic gates.

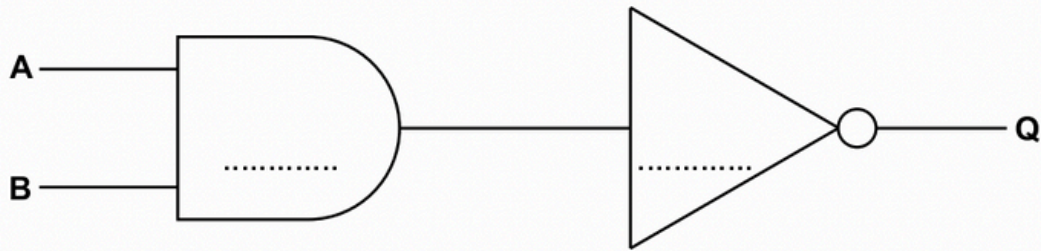


Fig. 2

(a) (i) Label the names of the two gates on the diagram above.

[2]

(ii) Complete the truth table below to show the output from this logic system.

A	B	Q
0	0	
0	1	
1	0	
1	1	

[4]

(b) Draw the logic diagram represented by $Q = A \vee \neg B$

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

THANK YOU!

GCST