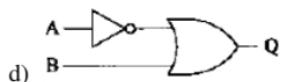
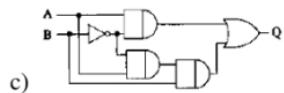
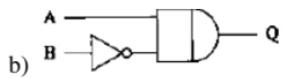
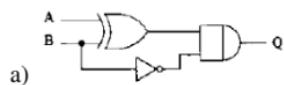


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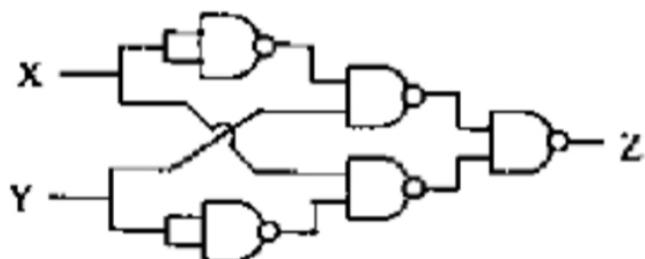
GATE Question No. 41

Question

9



Given Circuits



Question Analysis

The circuits (a), (b), and (c) simplify to:

$$Q = A\bar{B}$$

Circuit (d) simplifies to:

$$Q = \bar{A} + B$$

Since the expressions are different, option (d) is the incorrect circuit.

Truth Table

A	B	$Q = A\bar{B}$
0	0	0
0	1	0
1	0	1
1	1	0

Hardware Implementation

The function implemented is:

$$Q = A\bar{B}$$

Arduino and 7447 are used to display the output.

Required Components

- Arduino UNO
- IC 7447
- Common Anode 7-segment display
- Resistors
- Breadboard
- Jumper wires

Pin Connections

- Arduino Pin 10 → Input A
- Arduino Pin 11 → Input B
- Arduino Pin 9 → 7447 Pin 7
- 7447 Pin 16 → 5V
- 7447 Pin 8 → GND
- 7447 Pins 3,4,5 → 5V
- 7447 Pins 1,2,6 → GND

- 7-segment common pins → 5V

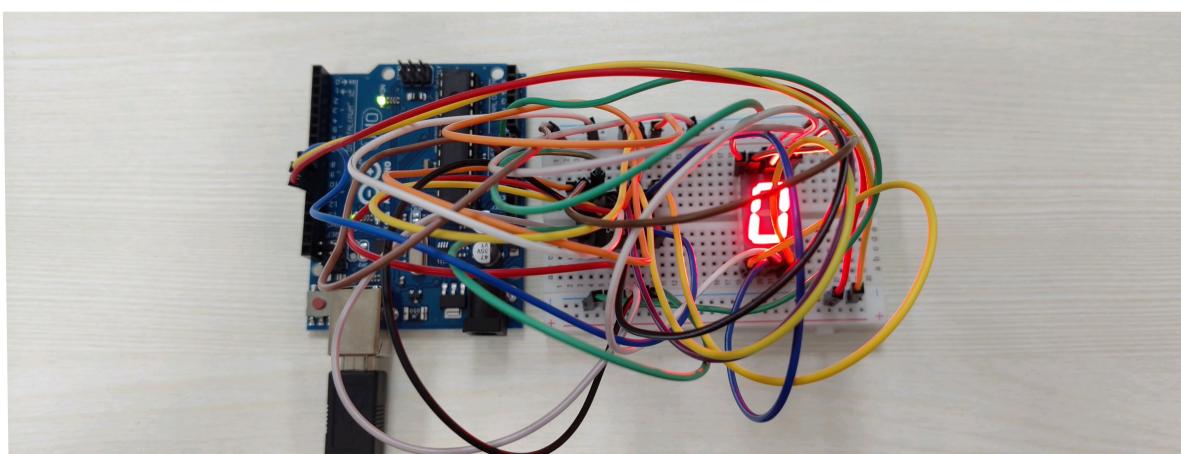
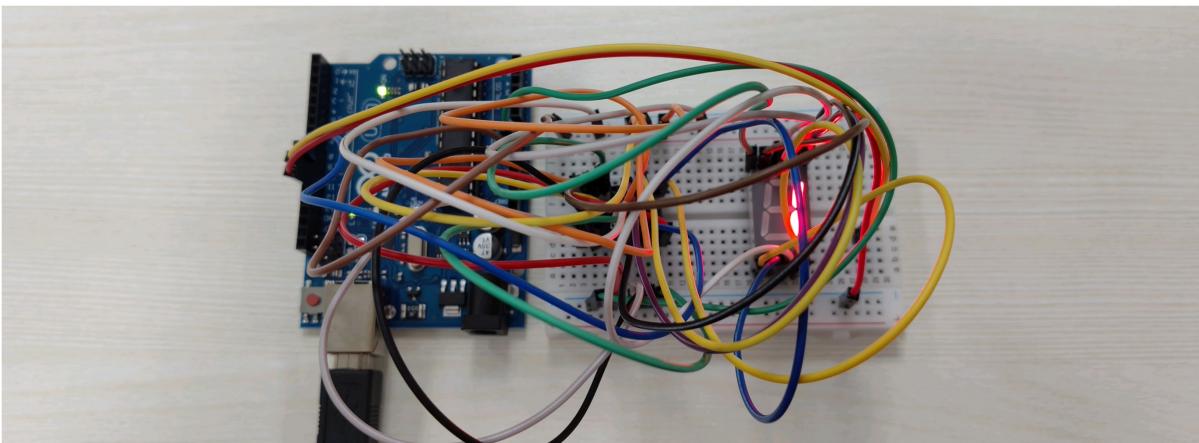
Code Uploading Steps

1. Create a Platform IO project.
2. Write the code in main.cpp inside src folder.
3. Run the command "pio run".
4. Copy the generated .hex file to Arduino Droid folder.
5. Connect Arduino UNO to mobile using OTG cable.
6. Upload the hex file using "upload precompiled" option.
7. Observe the output and verify the expression.

Experimental Truth Table

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

Hardware Setup



Conclusion

From Boolean simplification and hardware verification, circuits (a), (b), and (c) implement $Q = A\bar{B}$.

Circuit (d) implements $Q = \bar{A} + B$.

Therefore, option (d) is the incorrect circuit.