

GATE QUESTION ECE 2009 Q60

Question

Q60) What are the minimum numbers of NOT gates and 2-input OR gates required to design the logic of the driver for this 7-segment display?

- (A) 3 NOT and 4 OR
- (B) 2 NOT and 4 OR
- (C) 1 NOT and 3 OR
- (D) 2 NOT and 3 OR

Answer and Explanation

Answer: (D) 2 NOT and 3 OR

Explanation:

From the previous question (Q59), the simplified logic expressions for the required segments were:

- $g = \overline{P_1} \cdot P_2$
- $d = c + e$
- $e = b + c$

We analyze gate usage:

- To implement $g = \overline{P_1} \cdot P_2$ using only NOT and OR gates, apply DeMorgan's Theorem:

$$g = \overline{P_1} \cdot P_2 = \overline{(\overline{\overline{P_1}} + \overline{P_2})}$$

This form needs **2 NOTs** and **1 OR**.

- $e = b + c$ requires **1 OR** gate.
- $d = c + e$ requires another **1 OR** gate.

Total:

- NOT gates: **2**
- OR gates: **3**

, the correct answer is (D).