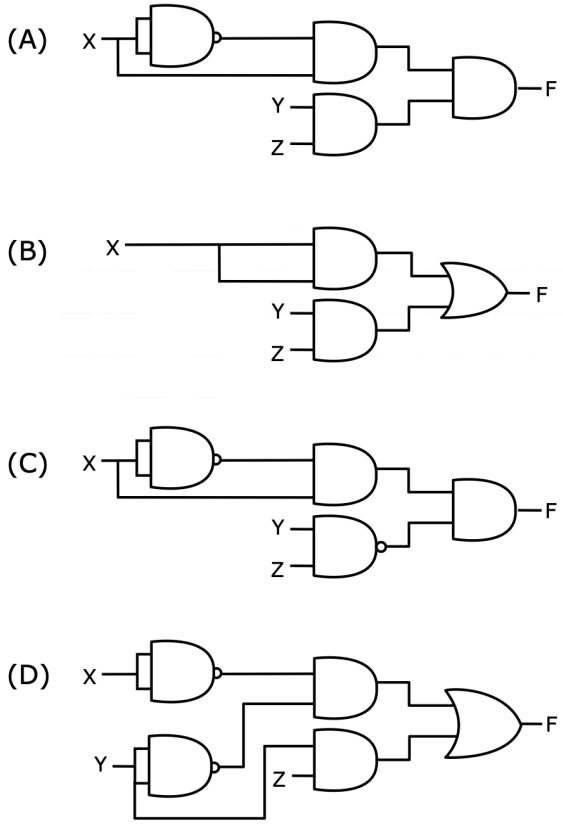
Logic Circuit Analysis

Question Image

53. Which of the following circuits is a realization of the above function F?



Target Boolean Function

$$F = x'y' + yz$$

Option (A)

- Top-left gate: x'
- Top-middle AND gate: $x' \cdot x = 0$ (because $x' \cdot x = 0$)
- Bottom AND gate: $y \cdot z$
- Final AND gate: $0 \cdot yz = 0$

$$F_A = 0$$

Incorrect. Always evaluates to zero due to $x \cdot x'$.

Option (B)

- Top wire: x
- Bottom AND gate: $y \cdot z$
- OR gate: $x + yz$

$$F_B = x + yz$$

Incorrect. No $x'y'$ term present.

Option (C)

- Top-left gate: x'
- Top-middle AND: $x' \cdot x = 0$
- Bottom AND: $y \cdot z$
- Bottom NOT: $(y \cdot z)'$
- Final AND: $0 \cdot (y \cdot z)' = 0$

$$F_C = 0$$

Incorrect. Again cancels due to $x' \cdot x = 0$.

Option (D)

- Top path: $x \to x'$, $y \to y'$, then $x'y'$ via AND gate.
- Bottom path: $y \cdot z$
- Final OR gate: $x'y' + yz$

$$F_D = x'y' + yz$$

Correct! Matches the required Boolean function.