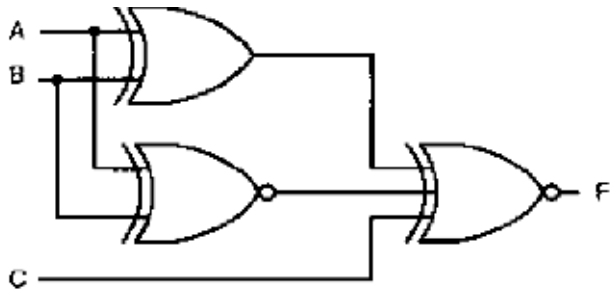
**Q.12 For the output F to be 1 in the logic circuit shown, the the input combination should be:**




**Options:**

(A) $A = 1,\ B = 1,\ C = 0$

(B) $A = 1,\ B = 0,\ C = 0$

(C) $A = 0,\ B = 1,\ C = 0$

(D) $A = 0,\ B = 0,\ C = 1$

**Solution:**

- The circuit contains two logic gates receiving inputs A, B, and C. From the diagram:
  - The first gate is an OR gate taking inputs $A$ and $B$: output = $A + B$
  - The second gate is a NOR gate taking the same inputs $A$ and $B$: output = $\overline{A + B}$
  - These two outputs are fed into an XOR gate: output = $(A + B) \oplus \overline{A + B}$
  - The result of the XOR is then passed into an OR gate with input $C$: output $F = [(A + B) \oplus \overline{A + B}] + C$
- Now simplify:

$$(A + B) \oplus \overline{A + B} = 1 \quad \text{(since any value XOR its complement is 1)}$$

$$F = 1 + C = 1 \quad \text{(since OR with 1 gives 1)}$$

- So, for any values of A and B (as long as the circuit logic is valid), the output of the XOR will be 1, and OR-ing it with any $C$ gives $F = 1$. Hence, **all options result in F = 1**.
- However, the question asks: *"the input combination should be"* — implying one valid combination is sufficient.
- Option (B): $A = 1,\ B = 0,\ C = 0$

$$A + B = 1, \quad \overline{A + B} = 0, \quad \text{XOR} = 1, \quad F = 1 + 0 = 1$$

- So, this is correct.

**Correct answer: (B)** $A = 1,\ B = 0,\ C = 0$