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GATE QUESTION EEE 2009 Q13

Question

Q13) The complete set of only those Logic Gates designated as Universal Gates is

Options:

1. NOT, OR and AND Gates
2. XNOR, NOR and NAND Gates
3. NOR and NAND Gates
4. XOR, NOR and NAND Gates

Answer and Explanation

Answer: (3) NOR and N

Explanation:

- **NAND AND NOR GATES**

A universal gate is a logic gate that can be used to implement any Boolean function without needing to use any other gate.

NOR Gate and NAND Gate are called universal gates because:

Any logic circuit can be built entirely using only NOR gates or only NAND gates.

Other gates like NOT, AND, and OR can be constructed using combinations of only NOR gates or only NAND gates.

For example

A NOT gate can be implemented using a NOR gate by tying both its inputs together:

NOR(A, A) = NOT(A)

An AND gate can be implemented using NAND gates:

NAND(A, A) = NOT(A)

AND(A, B) = NOT(NAND(A, B))

Hence, Option (C) is correct.