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Q1 Discuss the working of NAND gate with the help of circuit diagram and truth table.

Ans A NAND gate ("not AND gate") is a logic gate that produces a low output (0) only if all its inputs are true, and high output (1) otherwise. Hence the NAND gate is the inverse of an AND gate, and its circuit is produced by connecting an AND gate to a NOT gate. Just like an AND gate, a NAND gate may have any number of input probes but only one output probe.

The NAND gate performs the logical NAND operation. NAND gates are known as universal gates (along with NOR gates), which means they are a type of logic gate which can implement

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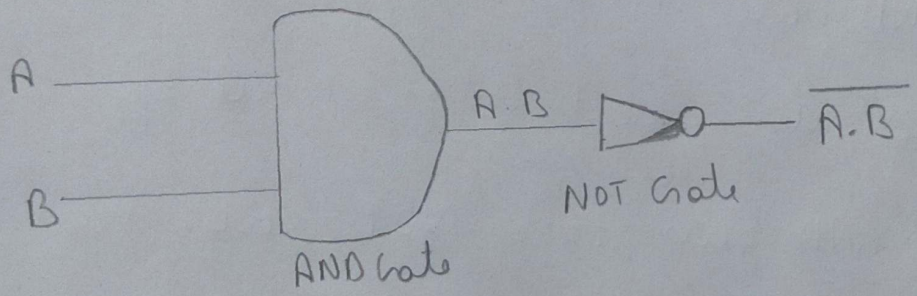
any Boolean function without the need to use any other gate type.

The basic logical construction of the NAND gate is shown below.




NAND gate means "not AND gate", hence the output of this gate is just reverse of that of a similar AND gate. We know that the output of the AND gate is only high or 1 when all the inputs are high or 1. In all other cases, the output is only logical 0 when and only when all inputs of the gate are 1s, and in all other cases, the output of

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the NAND gate is high or 1.

Hence, the truth table of a 2 input NAND gate can be represented as:

| Inputs | | Output |
|---|---|---|
| A | B | $X = \overline{A \cdot B}$ |
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

A NAND gate is also referred to as a universal logic gate as all the binary operations can be realized by using only NAND gates

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