Digital electronics

Lecture - 1

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Digital signal : The signal which have two levels of current or voltage (represents 0 or 1)are called digital signal .

Digital circuits :This circuit operates in a binary manner i.e., only two states 1 or 0.

Digital circuits are much faster and more reliable than analog circuits such as all modern computers are Digital .

Logic gates : Logic gates are the building blocks of a digital system . A digital circuit which either allows a signal through or stop it , it is called **gate** .

These gates is based on certain logical decisions of Boolean algebra so are called **logic gates** .

The basic logic gates are seven types out of which two are universal gates .

1. OR gate 2. AND gate 3. NOT gate 4.NAND 5. NOR 6. XOR 7.XNOR

Universal gate : The NAND gate and the NOR gate are called as universal gates as any Boolean function can be implemented need to use any other gate.

Each logic gate is indicated by a symbol and its function is defined either by a truth table or by **Boolean expression** .

Truth table : It is a table that shows all possible input combinations and the corresponding output combinations for a logic gate .It is also called table of combinations .

Boolean Algebra : Boolean Algebra is used to analyze and simplify the digital logic circuits.. It uses only the binary numbers i..e. 0 and 1. It is also called as **Binary Algebra** or **logical Algebra**. Boolean algebra was invented by **George Boole** an English mathematician in 1854.The basic **Laws of Boolean Algebra** that relate to the Commutative Law allowing a change in position for addition and multiplication, the Associative Law allowing the removal of brackets for addition and multiplication, as well as the Distributive Law allowing the factoring of an expression, are the same as in ordinary algebra.

Each of the Boolean Laws are given with just a single or two variables, but the number of variables defined by a single law is not limited to this as there can be an infinite number of variables as inputs too the expression. These Boolean laws detailed can be used to prove any given Boolean expression as well as for simplifying complicated digital circuits .

A brief description of the various **Laws of Boolean** are given below with a representing a variable input.