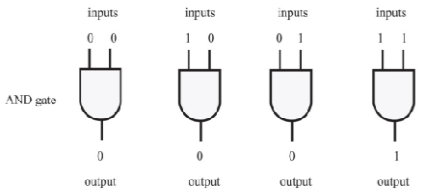
2

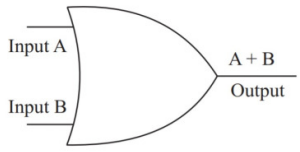
BINARY LOGIC

- **NUMBER SYSTEM** Digital computers internally use the binary (base 2) number system to represent data and perform arithmetic calculations. The binary number system is very efficient for computers, but not for humans.
- **BINARY SYSTEM** Binary numbers are combination of two basic numbers (zero and one). All numbers are generated by combination of only two numbers (0 and 1).
- **OCTAL NUMBERS AND HEXADECIMAL NUMBERS** Octal(base-8) counting starts at 0 and goes: 1, 2, 3, 4, 5, 6, 7. Hexadecimal (base 16) is currently the most popular choice for representing digital circuit numbers in a form that is more compact than binary.
- **DECIMAL TO BINARY CONVERSION** There are two methods, Successive Division and Subtracting Values using a table. Successive division requires dividing continuously by the base we are converting to until the quotient equals 0.
- **DECIMAL TO OCTAL CONVERSION** We can convert decimal to octal and hexadecimal by using the similar conversion method of decimal to binary. i.e., successive division, which requires dividing continuously by the base we are converting to until the QUOTIENT equals 0.
- **DECIMAL TO HEXADECIMAL CONVERSION** Division method can be used for conversion from decimal to hexadecimal.
- **BINARY TO DECIMAL** To find the decimal representation of a binary number simply take the sum of products of binary digits and the powers of 2 which they represent.
- **OCTAL TO DECIMAL** To find the decimal representation of an octal number simply take the sum of products of octal digits and the powers of 8 which they represent.
- **HEXADECIMAL TO DECIMAL** To find the decimal representation of a Hexadecimal number simply takes the sum of products of hex number and the powers of 16 which they represent.
- **ONE'S COMPLEMENT AND TWO'S COMPLEMENT** One's complement of a binary number can be achieved by changing all 0' s to 1' s and 1' s to 0' s. Example: There is a binary number 11001 and its 1's complement would be 00110 after all 0' s to 1' s and 1's to 0's. Two's complement of binary number can be obtained by adding 1 to the LSB (Least Significant Bit) of 1's complement of binary number. 2's complement= 1's complement +1

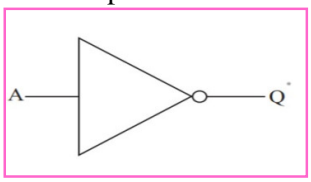
- **CHARACTER CODING SYSTEM (ASCII, ISCII & UNICODE)** Computer works on character data and this data is not only alphabet but numeric values, punctuation; spaces, etc., are also character data.
  ASCIIASCII stands for American Standard Code for Information Interchange.
  Indian Script Code for Information Interchange (ISCII) This coding scheme is used for Indian script and its symbols.
  Unicode Developed in 1987, Unicode provides a unique number for every character of all languages.
- **LOGIC GATES** Logic gates are elementary building block of a digital circuit. Most logic gates have two inputs and only one output. The basic logic gates are AND, OR and NOT, NAND, NOR, XOR and XNOR.
- **AND GATE** This gate acts in the same way as the logical operator 'and' works. An AND operation produces an output of logic-0 if at least one of the inputs is zero.



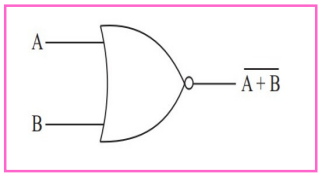
- **OR GATE** This operation is represented by plus (+) sign. The OR gate produces an output of logic-1 if at least one of the inputs is logic-1.



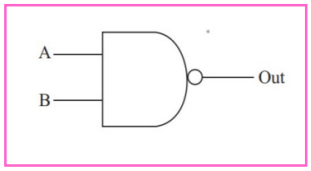
- **NOT OPERATION** The NOT operation represents complement or inverse of inputs. A prime or bar represents this operation.



- **NOR OPERATION** It is the NOT-OR gate. The output is true when neither A nor B is true.

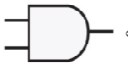


- **NAND OPERATION** The NAND gate represents the complement of the AND operation. The graphic symbol for the NAND gate consists of an AND symbol with a bubble on the output, denoting that a complement operation is performed on the output of the AND gate



CHECK YOURSELF

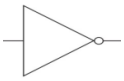
1. Identify the following gate:



A. NAND B. AND

C.OR D.NOR

2. Identify the following gate:



A. NAND B. AND C. OR D. NOT

3. Which of the gate gives high input only when both inputs are high?

A. NAND B. AND C. OR D. NOT

4. Octal equivalent of 100111 is
A. 74 B.47 C. 37 D. 73

5. Binary equivalent of 25 is?
A. 10001 B. 11001 C. 11101D. 00110

STRETCH YOURSELF

1. Convert the following binary number to Octal: i.110001 ii. 10011 iii.1110001
2. What are the different Character Coding Systems?
3. What are the different types of logic gates?

ANSWERS

Answers to Check Yourself:

1. B
2. D
3. B
4. B
5. B