# SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

**An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME : 19EC306 – Digital Circuits

II YEAR / III SEMESTER

Unit I- MINIMIZATION TECHNIQUES AND LOGIC GATES

Topic : Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates

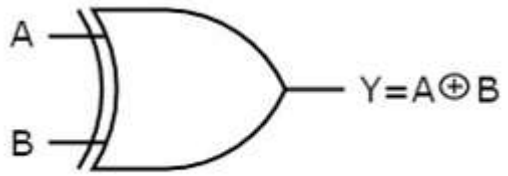
## Special Gates

Ex-OR & Ex-NOR gates are called as special gates. Because, these two gates are special cases of OR & NOR gates.

## Ex-OR gate

The full form of Ex-OR gate is **Exclusive-OR** gate. Its function is same as that of OR gate except for some cases, when the inputs having even number of ones. The following table shows the **truth table** of 2-input Ex-OR gate.

| A | B | Y = A⊕B |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |



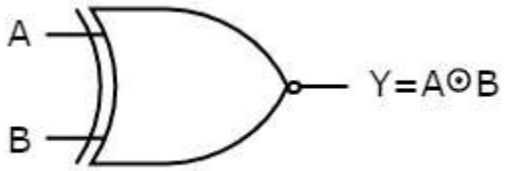

Here A, B are the inputs and Y is the output of two input Ex-OR gate. The truth table of Ex-OR gate is same as that of OR gate for first three rows. The only modification is in the fourth row. That means, the output *Y* is zero instead of one, when both the inputs are one, since the inputs having even number of ones. Therefore, the output of Ex-OR gate is '1', when only one of the two inputs is '1'. And it is zero, when both inputs are same. Below figure shows the **symbol** of Ex-OR gate, which is having two inputs A, B and one output, Y.

## Ex-NOR gate

The full form of Ex-NOR gate is **Exclusive-NOR** gate. Its function is same as that of NOR gate except for some cases, when the inputs having even number of ones.

The following table shows the **truth table** of 2-input Ex-NOR gate.

| A | B | Y = A⊙B |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |



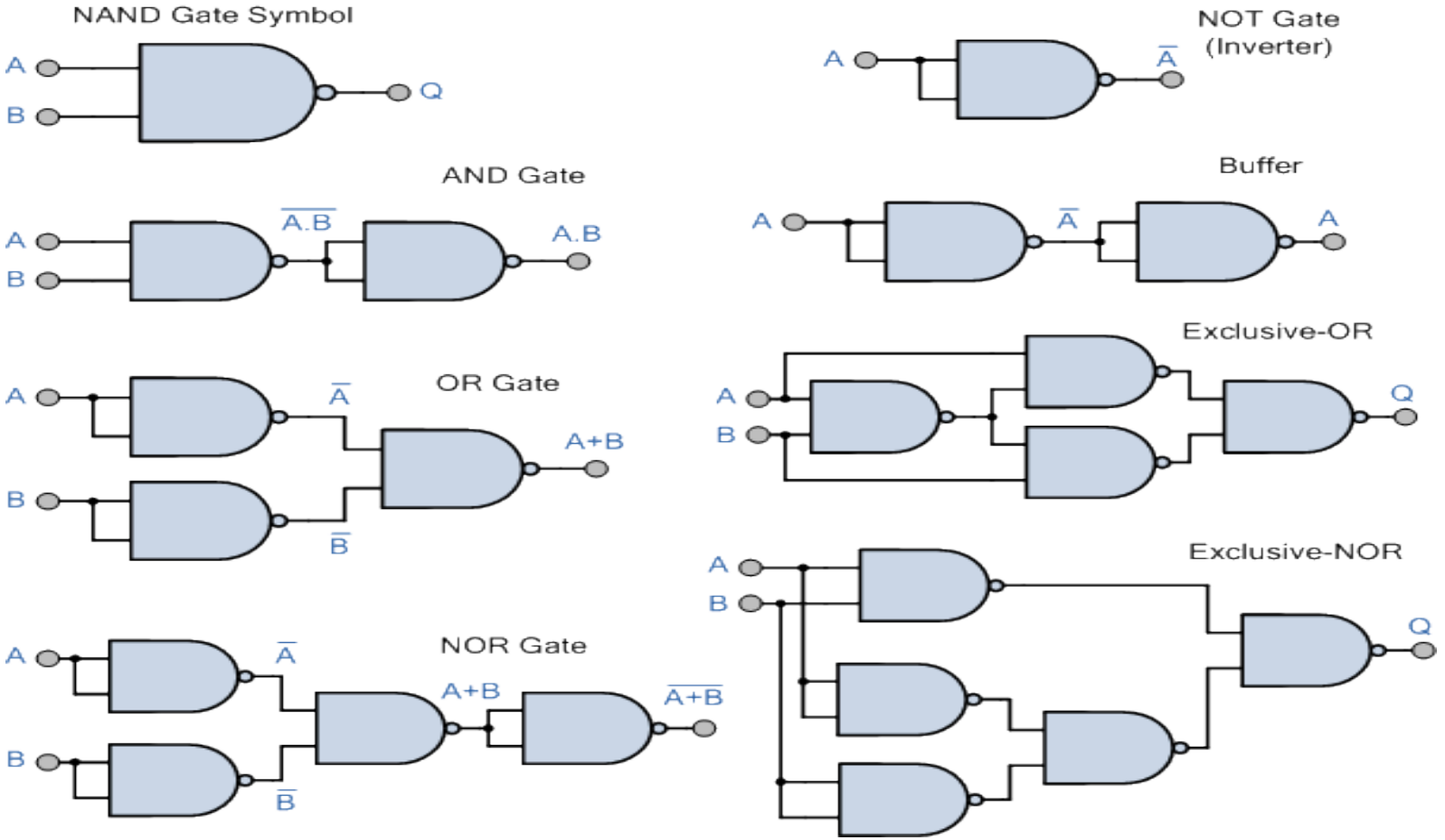

Here A, B are the inputs and Y is the output. The truth table of Ex-NOR gate is same as that of NOR gate for first three rows. The only modification is in the fourth row. That means, the output is one instead of zero, when both the inputs are one.

Therefore, the output of Ex-NOR gate is '1', when both inputs are same. And it is zero, when both the inputs are different.

The following figure shows the **symbol** of Ex-NOR gate, which is having two inputs A, B and one output, Y.

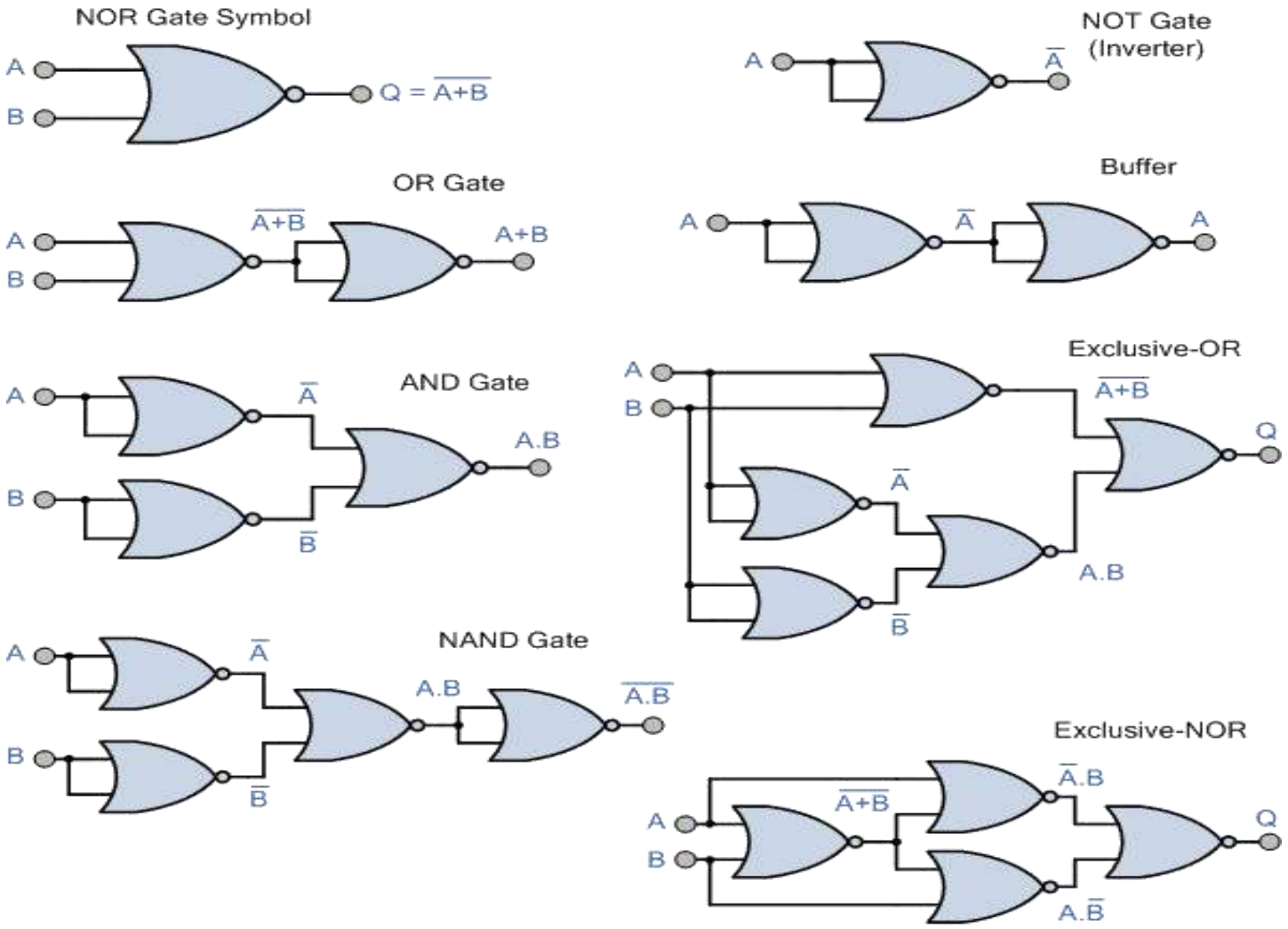
# Implementation of Logic Functions Using Only NAND Gates

## Logic Gates using only NAND Gates



# Implementation of Logic Functions Using Only NOR Gates

## Logic Gates using only NOR Gates



Any Query????

Thank you……