



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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



19ECB231/ Digital Electronics

NAND, NOR gate





THE NAND GATE

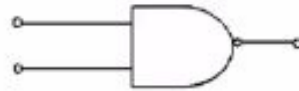
- The NAND gate is the one of the popular logic element because it can be used as a universal gate; that is NAND gate can be used in combination to perform the AND, OR, and inverter operations.
- NAND Gate is constructed by attaching NOT Gate at the output of AND Gate, hence NAND Gate is called NOT- AND Gate.
- NAND Gate has two or more input and only one output.
- The output of NAND gate is low when all inputs are high, otherwise all outputs are high.



OPERATION OF A NAND GATE

- A NAND gate produces a Low output only when all the inputs are High. When any of the inputs is Low, the output will be High.

Logical Symbol



Truth Table

| Inputs | | Output |
|--------|---|--------|
| A | B | X |
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |



- It's logical expression is, $X = (AB)'$

| Inputs | | |
|--------|---|-------------------|
| A | B | |
| 0 | 0 | $(0.0)' = 0' = 1$ |
| 0 | 1 | $(0.1)' = 0' = 1$ |
| 1 | 0 | $(1.0)' = 0' = 1$ |
| 1 | 1 | $(1.1)' = 1' = 0$ |

LOGICAL EXPRESSION OF NAND



THE NOR GATE

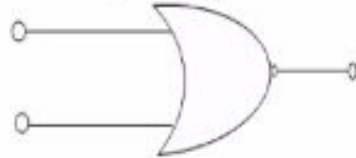
- The NOR gate, like the NAND gate, NOR gate is also useful logical element because it can also be used as a universal gate.
- NOR gate can be used in combination to perform the AND, OR and Inverter operations.
- NOR Gate is the combination of NOT gate at the output of OR gate, hence NOR gate is type of NOT-OR gate.
- NOR gate has two or more input and only one output.
- The Output of NOR gate is high when all inputs are low otherwise the output is low.



OPERATION OF NOR GATE

- A NOR gate produces a Low output when any of its inputs is high. Only when all of its inputs are low is the output high.

Logical Symbol



Truth Table

| Inputs | | Output |
|--------|---|--------|
| A | B | X |
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |



- It's expression is, $X=(A+B)'$

| Inputs | | |
|--------|---|-------------------|
| A | B | |
| 0 | 0 | $(0+0)' = 0' = 1$ |
| 0 | 1 | $(0+1)' = 0' = 0$ |
| 1 | 0 | $(1+0)' = 0' = 0$ |
| 1 | 1 | $(1+1)' = 1' = 0$ |

EXPRESSION OF NOR GATE



RECAP



Thank You!