Logic families represent kind of digital circuit / methodologies for logic expression.

Scheme	# of gates / chip
1) Small - scale integration (SSI)	< 12
2) Medium - scale integration (MSI)	12 - 99
3) Large - scale integration (LSI)	1000
4) Very Large - scale integration (VLSI)	10 K
5) Ultra Large - scale integration (ULSI)	100 K
6) Giga Scale integration (GSI)	1 Meg

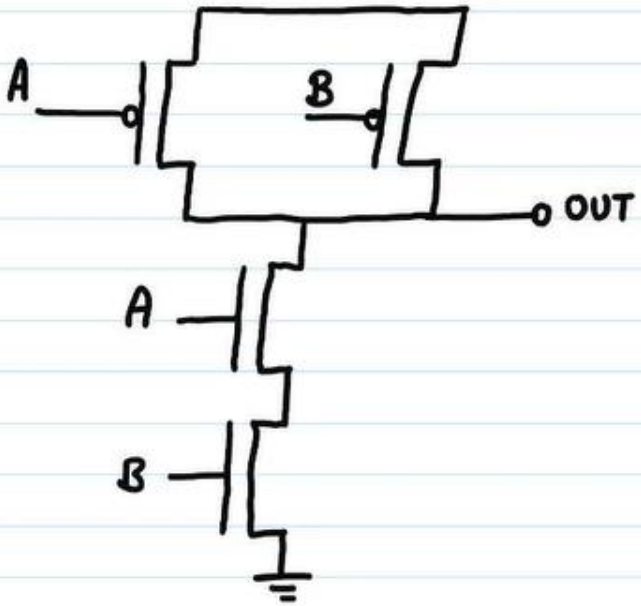
- IC logic gates falls under SSI.
- Combinational logic circuits falls under MSI.
- Microprocessors falls under LSI and VLSI:

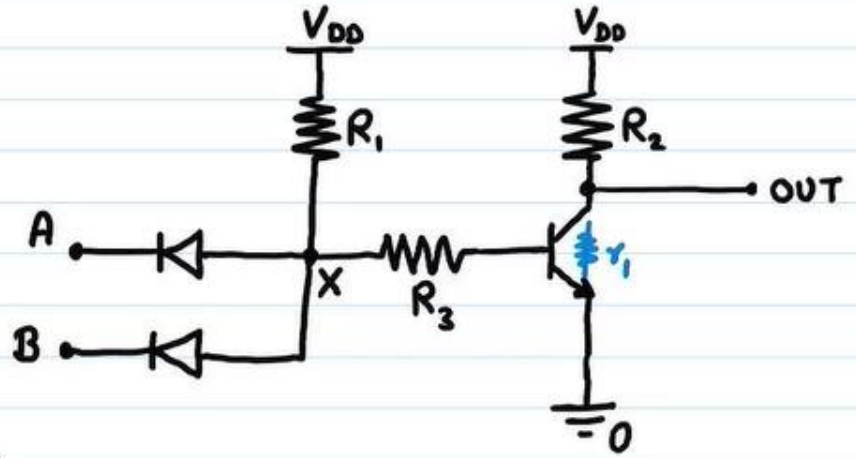
Digital Logic Family :

- Logic families can be classified broadly according to the technology they are built.
- There are various logic families
  - Diode Logic (DL)
  - Resistor Transistor Logic (RTL)
  - Diode Transistor Logic (DTL)
  - Emitter Coupled Logic (ECL)
  - Transistor - Transistor Logic (TTL)
  - CMOS Logic

- TTL and CMOS logic families are most widely used in IC technologies.
- Each family has its own rating for speed, power consumption, temp. range, voltage levels and current levels.

CMOS Logic Gate :





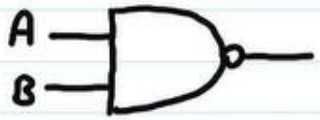
NAND gate.

A	B	OUT
0	0	1 ✓
0	1	1 ✓
1	0	1 ✓
1	1	0 ✓

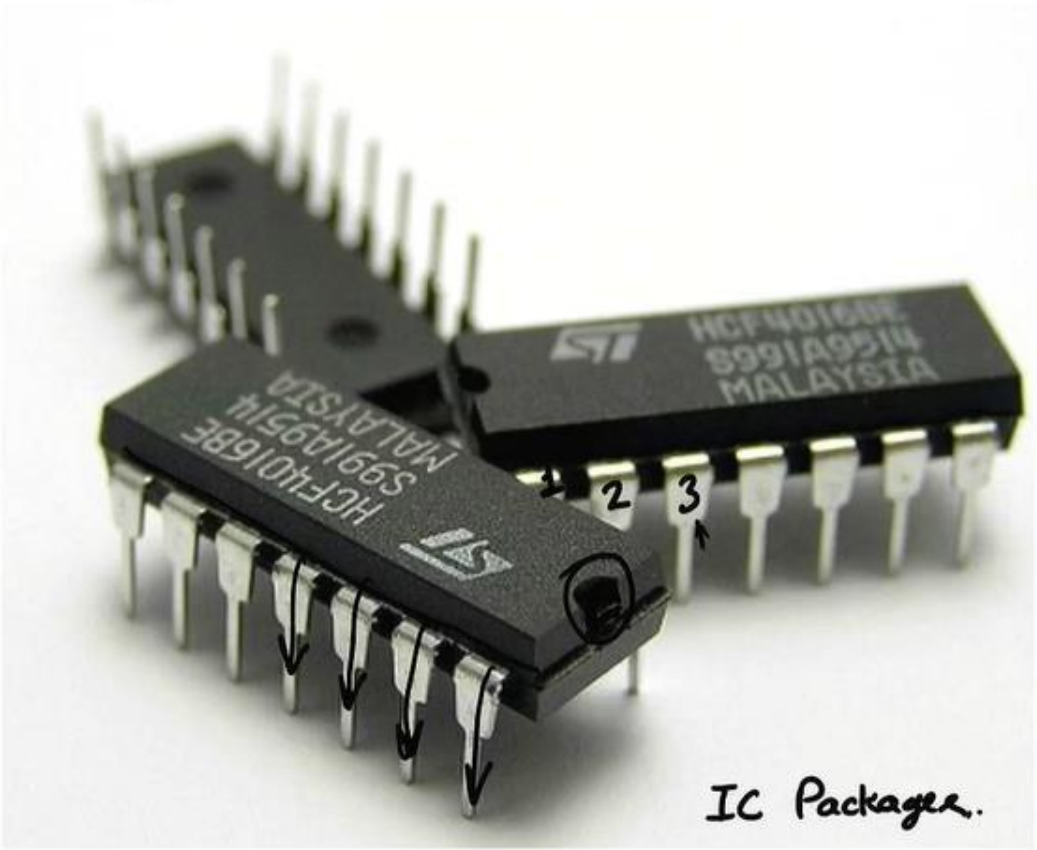
VDD
VDD
VDD
$\left(\frac{r_1}{r_1+R_2}\right) V_{DD}$.

$OUT = \left(\frac{r_1}{r_1+R_2}\right) V_{DD}$

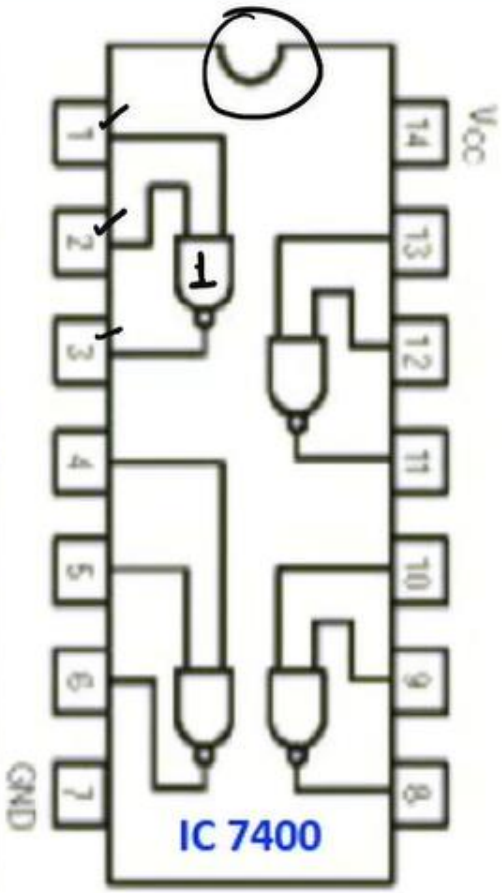
$\simeq 0\ V.$



IC Packages :



IC Packages.



DIP : Dual In Line package.

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