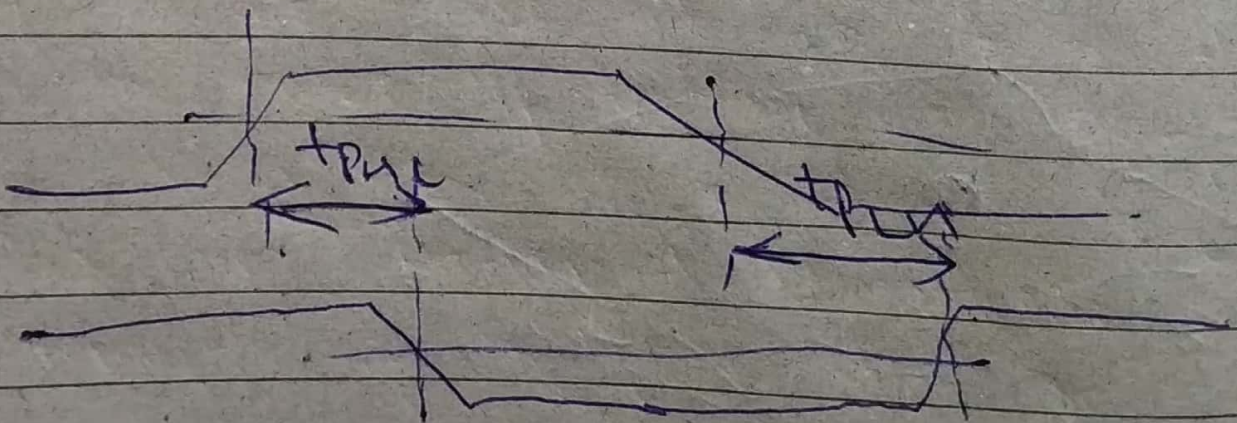


• Characteristics of Logic Families
There are various logic families & the selectⁿ of family for an applicatⁿ depend upon its characteristics.

Following parameters are used to compare the performance of digital IC:

- ① Speed of operation
- ② Power Dissipation
- ③ Figure of Merit
- ④ Fan Out
- ⑤ Fan in
- ⑥ V & I parameters
- ⑦ Noise Immunity
- ⑧ Power Supply Requirement
- ⑨ Operating Temp.

- Speed of Operatⁿ
- (i) Speed of operatⁿ of an IC should be high
 - (ii) Specified in terms of propagatⁿ delay time
 - (iii) It's the avg. of t_{pd} from high to low state & low to high state.



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(iv) Delay times are measured Hw 50% voltage levels of i/p & o/p
 (v) Propagatⁿ delay b/w i/p & o/p should be ~~as~~ min. s.t. speed of operatⁿ is high

• Power Dissipation

(i) Expressed in mW

(ii) Wastage of power across the ckt. components & devices. Usually, less power is reqd.

• Figure of merit
 speed of operatⁿ \times power dissipatⁿ

\therefore Power dissipatⁿ should be less which will reduce the speed of operatⁿ.

So, figure of merit is a parameter considered for comparison instead of SOA & PD

Figure of merit = propagatⁿ delay \times power dissipatⁿ

• V & I Parameter

Defines min. & max. limit of current & voltage for i/p & o/p of a logic family.

V_{IH}, V_{IL}	V_{OH}, V_{OL}	I_{IH}, I_{IL}	I_{OH}, I_{OL}
High/Low level i/p voltage	High/Low level o/p voltage	High/Low level i/p current	High/Low level o/p current

High level - Min i/p voltage / current to logic '1' state.

Low level - Max i/p voltage / current to logic '0' state.

• Fan-Out.

Capability of a logic gate to drive the max. no. of similar gates. High fan-out is advantageous because it reduces the need of additional gates to drive more gates.

$$\text{Fan-out} = \min. \left\{ \begin{array}{cc} I_{OH} & I_{OI} \\ I_{IH} & I_{IL} \end{array} \right\}$$

• Fan-In

Fan-in is the no. of i/p gates.

• Noise Immunity

Unwanted signal are known as noise. \vec{E} & \vec{B} may induce noise at an i/p of digital signal. Due to noise i/p voltage may drop ~~up~~ rise below V_{IH} or rise above V_{IL} which results in undesired operations. Noise immunity of a digital ckt. is ability to

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tolerate noise signal. Quantitative measure of noise immunity is noise margin.

Logic 1 state noise margin $\Delta 1 = V_{OH} - V_{IH}$.

Logic 0 $\Delta 0 = V_{IL} - V_{OL}$.

• Power Supply Req.

Every electronic ckt. requires supply voltage to operate. The required supply voltage & power by the IC should be min.

• Operating Temp.

Range of temp. in which IC functⁿ properly. It's in order of -55°C to 125°C