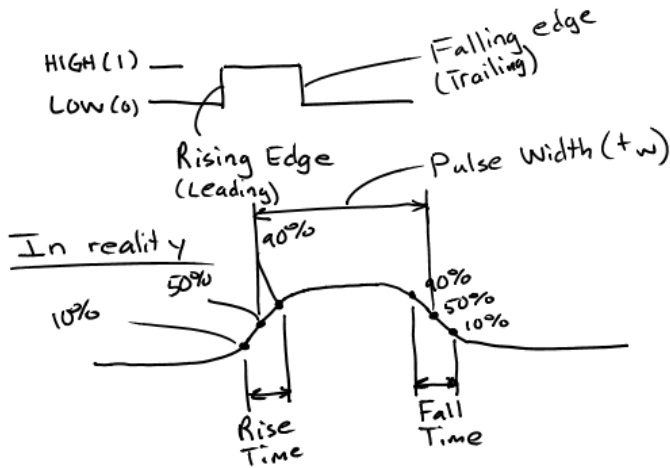


Digital Waveforms

- Voltage levels change back and forth between the HIGH and LOW voltage states
- Made up of a series of pulses



Waveforms

- Made up of a series of pulses

Periodic Waveform

- Repeats itself at the same time interval



$T = \text{Period} \Rightarrow$ Time interval between rising edges or falling edges

Frequency \Rightarrow Time rate at which a waveform repeats itself

Frequency $f = \frac{1}{T}$, $T = \frac{1}{f}$

Duty Cycle = $\frac{\text{Pulse width}}{\text{Period}} \times 100\%$

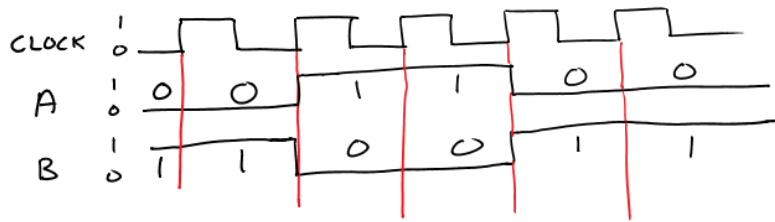
Non-Periodic Waveform



ENGR 2218 – Digital Logic
Digital Waveforms

Clock Waveform

- Timing waveform that synchronizes all other waveforms
- Periodic Waveform



Serial versus Parallel Data Transfer

- Serial: Data is sent one bit at a time over a single line
- Parallel: All bits are sent simultaneously over multiple lines

Integrated Circuits

- Utilize Bipolar Junction Transistors (BJT's) or Metal Oxide Semiconductor Field Effect Transistors (MOSFET's)

BJT's

- Used in TTL (Transistor Transistor Logic) chips
- Supply Voltage is 5 Volts
- Not susceptible to static discharge

MOSFET's

- Used in CMOS (Complementary Metal Oxide Semiconductor) chips
- Supply voltage is 3.3 Volts
- More susceptible to static discharge

Fixed Function Logic Circuits

- Logic functions are set and can't be changed

Programmable Logic Circuits

Logic functions can be programmed and sometimes reprogrammed