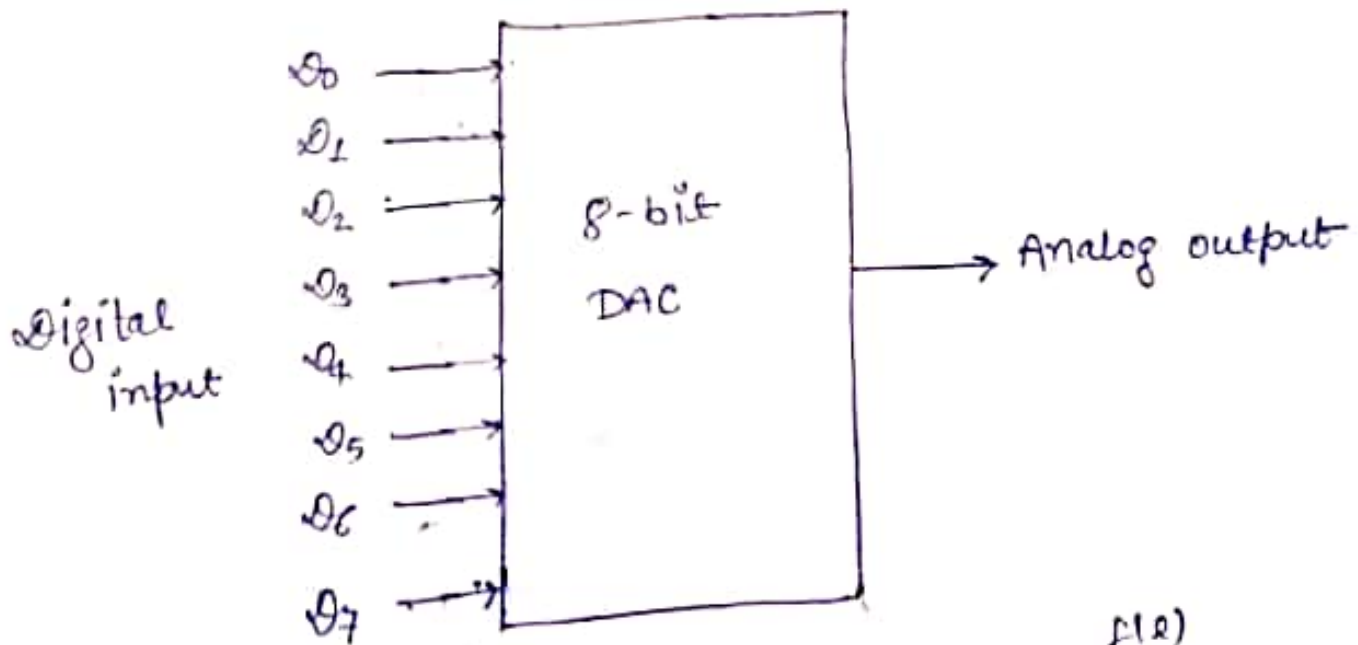# Unit IV [Digital to analog converters]

A DAC converts m abstract finite-precision number (usually a fixed point binary number) into a physical quantity (e.g a voltage or a pressure etc) in particular.
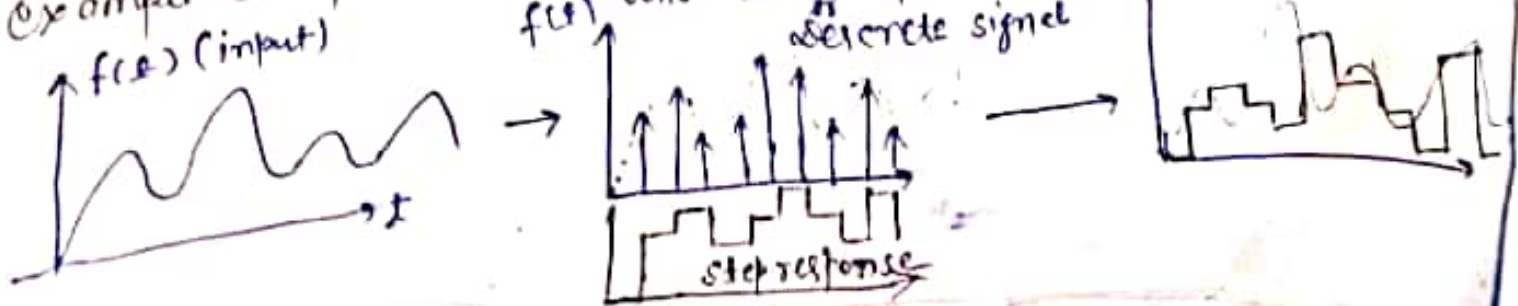
DACs are often used to convert finite-precision time series data to a continuous varying physical signal.

An idial DAC converts the abstract numbers into a conceptual concept sequence of impulse that are then processed by a reconstruction filter (it is used to construct a smooth analog signal from a digital input)

functional diagram of 8-bit DAC.

Digital input: D_0, D_1, D_2, D_3, D_4, D_5, D_6, D_7 → 8-bit DAC → Analog output

Example with process -

$f(t)$ (input) → $f(t)$ Converted in impulse descrete signal → $f(t)$
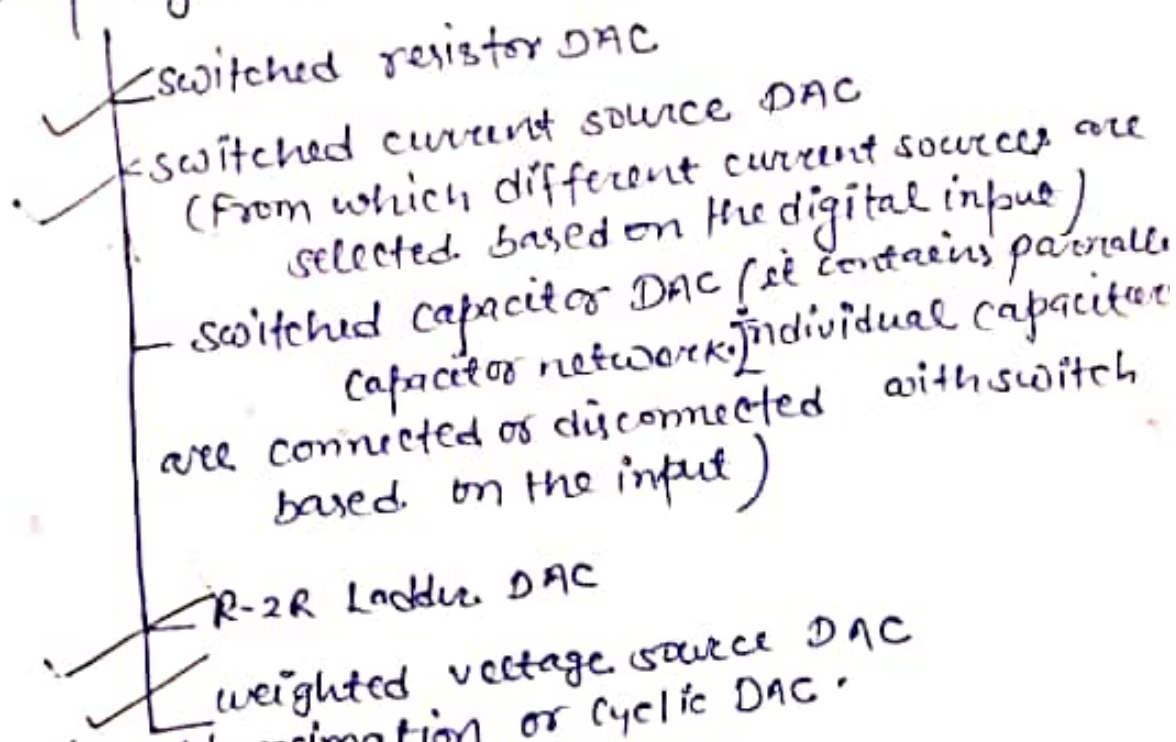
step response

A digital to analog converter converts digital input signal into an analog output signal.

The digital signal is represented with a binary code which is 0 and 1

in general, the nuber number of binary input will be a power of two.

Common Types of DACs

① Binary weighted resistor DAC

② R-2R Ladder DAC

other types of DACs

② * Pulse width modulator

③ * oversampling DACS or interpelating DACs

* Binary weighted DACs

 ↳ switched resistor DAC
 ↳ switched current source DAC
   (From which different current sources are selected based on the digital input)
 ↳ switched capacitor DAC (it contains parallel capacitor network. individual capacitor are connected or disconnected with switch based on the input)

 ↳ R-2R Ladder DAC
 ↳ weighted voltage source DAC

④ Successive approximation or cyclic DAC.

⑤ Thermocoded DAC

⑥ Hybrid DACs ----- many