FACULTY OF ENGINEERING & TECHNOLOGY

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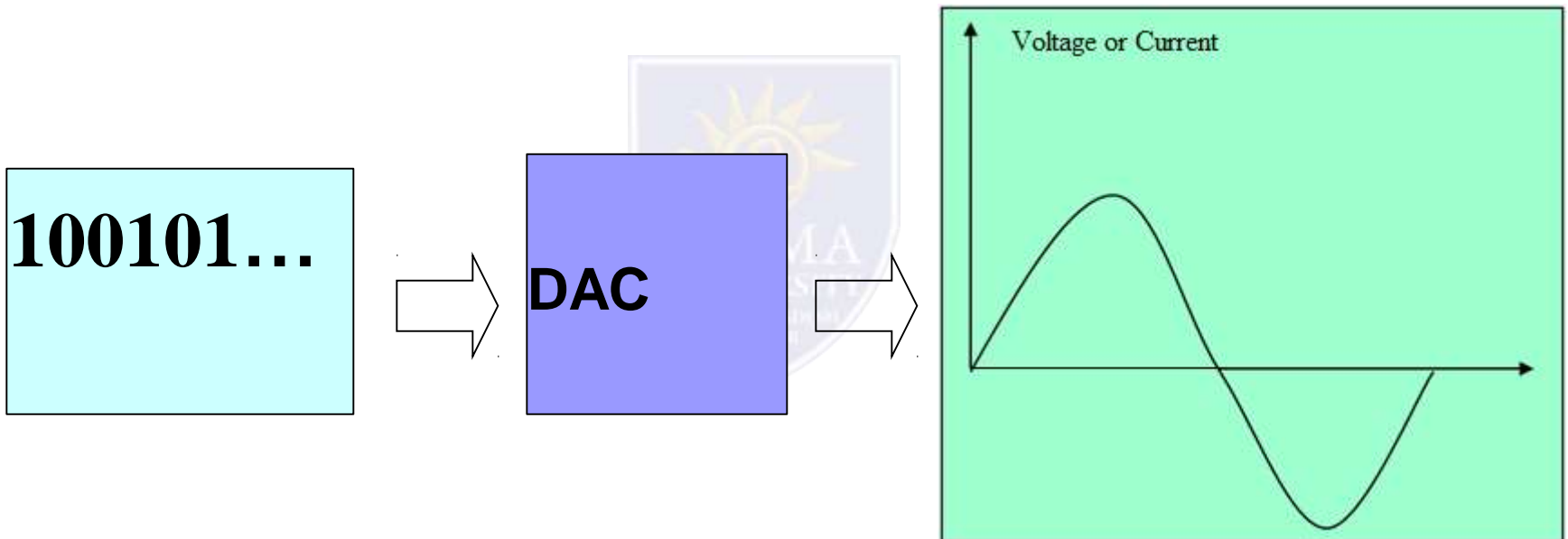Assistant Prof. EE Deptt

Digital to Analog Conversion (DAC)

What is a DAC?

A digital-to-analog converter (DAC) takes a digital code(generally binary number) as its input and produces an analog voltage or current as its output. This analog output is proportional to the digital input.

100101… ⟹ **DAC** ⟹ Voltage or Current

The input may be of n-bit long having different voltage levels. So in the D/A converters some method is to be used which can convert this voltage level of n-bits to its equivalent analog form.

Following two types of resistive networks are basically used for this purpose:

i.   Resistive Divider Network or weighted resistor network
ii. Binary Ladder Network or R-2R network

The converter which comprises the resistive divider network is known as Resistive divider D/A converter and the D/A converter which comprises the binary ladder network is known as binary ladder D/A converter.

Converting discrete signals into discrete analog values that represent the magnitude of the input signal compared to a standard or reference voltage

- The output of the DAC is discrete analog steps.
- By increasing the resolution (number of bits), the step size is reduced, and the output approximates a continuous analog signal.

Analysis of a Ladder Network

- A resistive ladder network is a special type of series-parallel circuit.
- One form of ladder network is commonly used to scale down voltages to certain weighted values for digital-to-analog conversion
  Called R/2R Ladder Network
- To find total resistance of a ladder network, start at the point farthest from the source and reduce the resistance in steps.
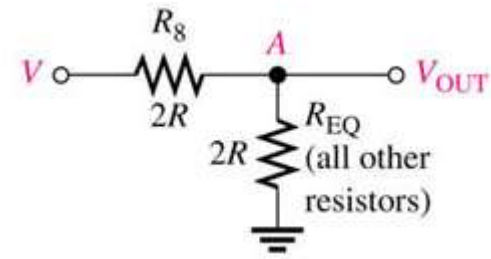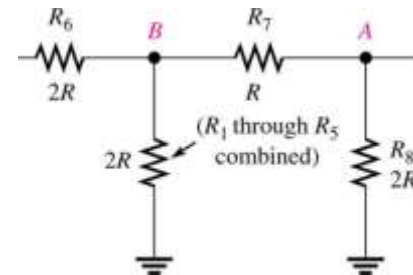
The R/R2 Ladder Network
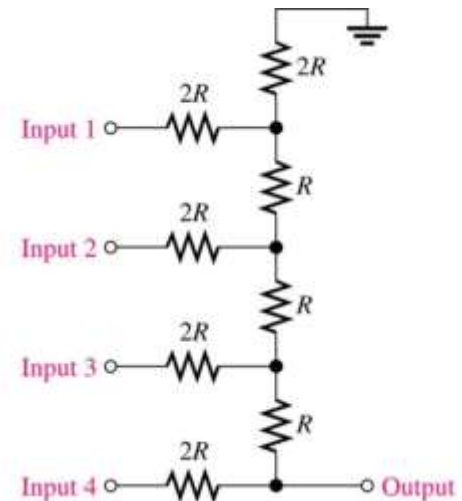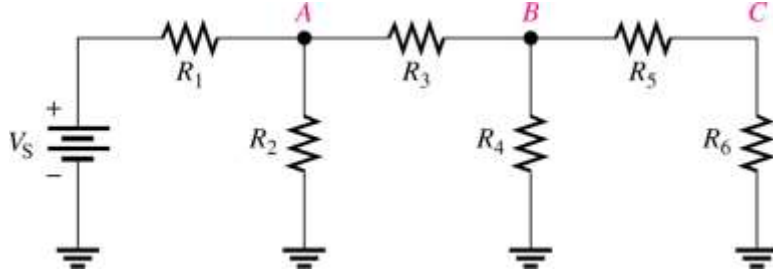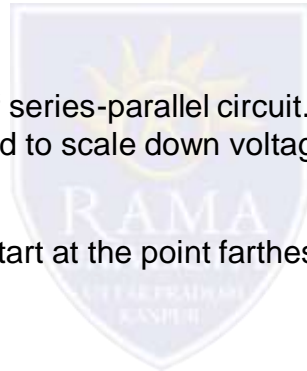
Used for Digital-to-analog converter
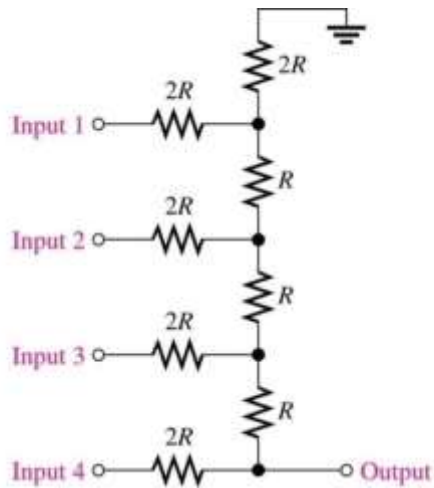
Only Input 4 is HIGH

Only Input 3 is HIGH