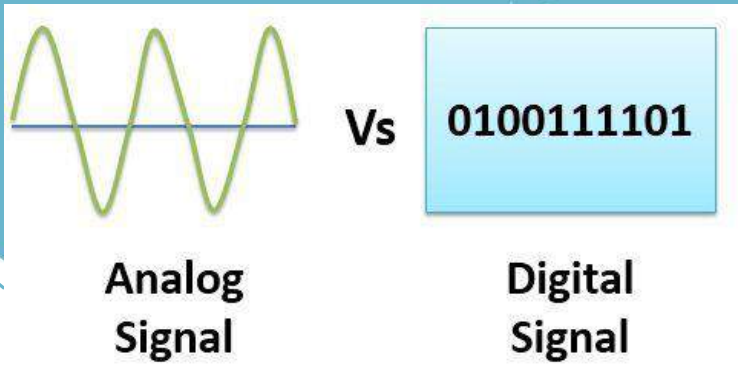
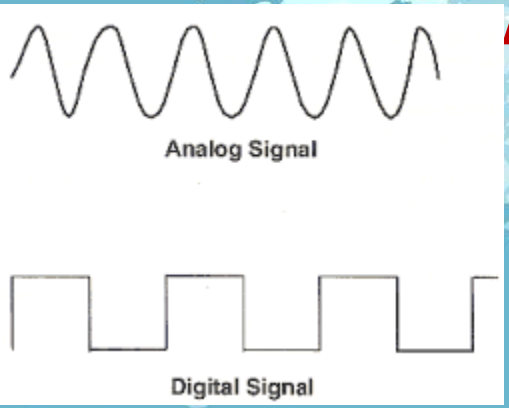


Subject -ADIC

ANALOG AND DIGITAL INTEGRATED CIRCUIT

(SEM-4)



ANALOG???

- Analog signal is a continuous signal which represents physical measurements.
- Denoted by sine waves.
- Uses continuous range of values to represent information.
- Human voice in air, analog electronic devices are the examples of the analog signal.
- Subjected to deterioration by noise during transmission and write/read cycle.
- Low cost and portable.
- Analog instrument draws large power.
- Can be used in analog devices only, Best suited for audio and video transmission.

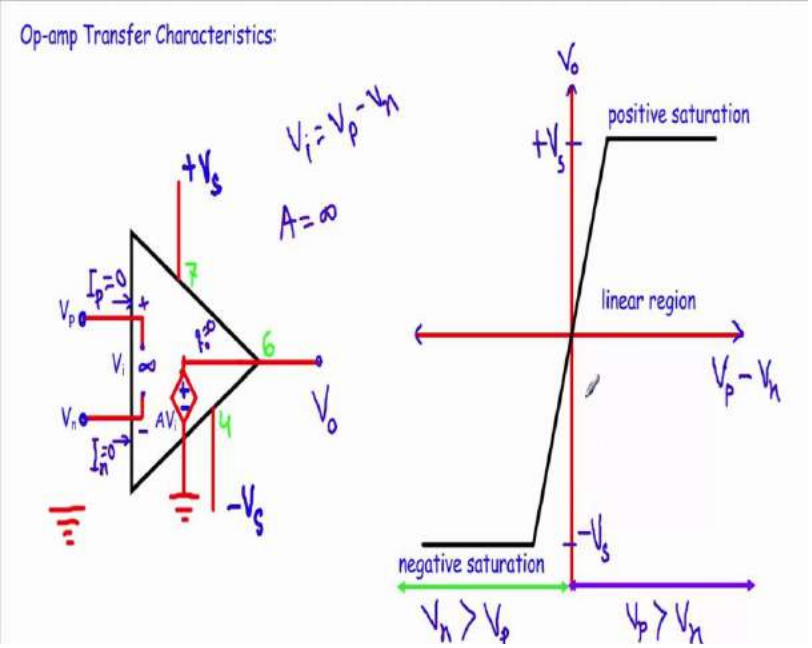
DIGITAL???

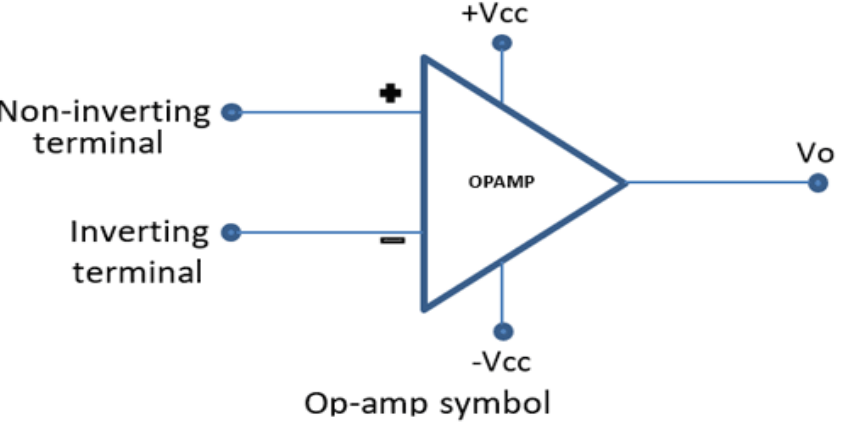
- Digital signals are discrete time signals generated by digital modulation.
- Denoted by square waves.
- Uses discrete or discontinuous values to represent information.
- Computers, CDs, DVDs, and other digital electronic devices.
- Can be noise-immune without deterioration during transmission and write/read cycle.
- Cost is high and not easily portable.
- Digital instrument draws only negligible power.
- Best suited for Computing and digital electronics.

INTEGRATED CIRCUIT ???

INTEGRATED CIRCUIT

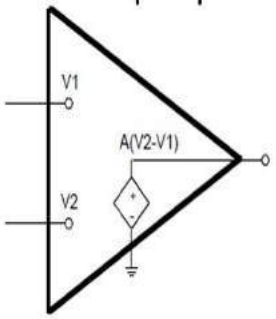
Integrated circuit (IC), also called microelectronic circuit, microchip, or chip, an assembly of electronic compo nents, fabricated as a single unit, in which miniaturized active devices (e.g., transistor and diodes) and passive devices (e.g., capacitors and resistors) and their interconnections are built up on a thin substrate of Semiconduc tor material (typically Silicon). The resulting circuit is thus a small "chip," which may be as small as a few squ are centimeters or only a few square millimeters. The individual circuit components are generally microscopic in size.



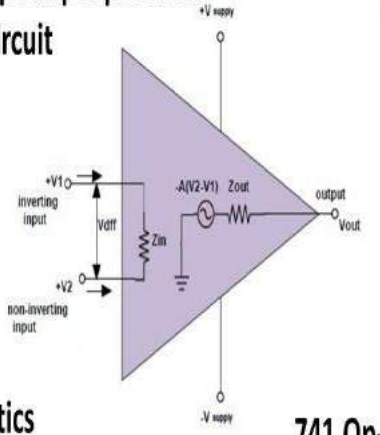


Op-Amp Ideal, Equivalent Circuit, Characteristics and Features

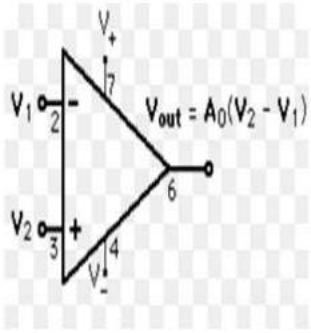
Ideal Op-Amp



Op-Amp Equivalent Circuit



Op-Amp Symbol

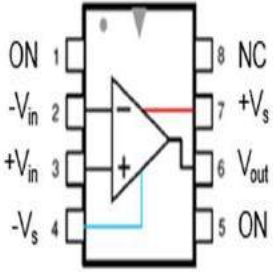


Op-Amp Characteristics

Parameter	Ideal Op-Amp	Typical Op-Amp
G_{OL}	∞	10^5 - 10^9
Common Mode Gain	0	10^{-5}
Bandwidth	∞	1-20 MHz
Input Impedance	∞	$10^6\ \Omega$ (bipolar) 10^9-$10^{12}\ \Omega$ (FET)
Output Impedance	0	100-1000 Ω

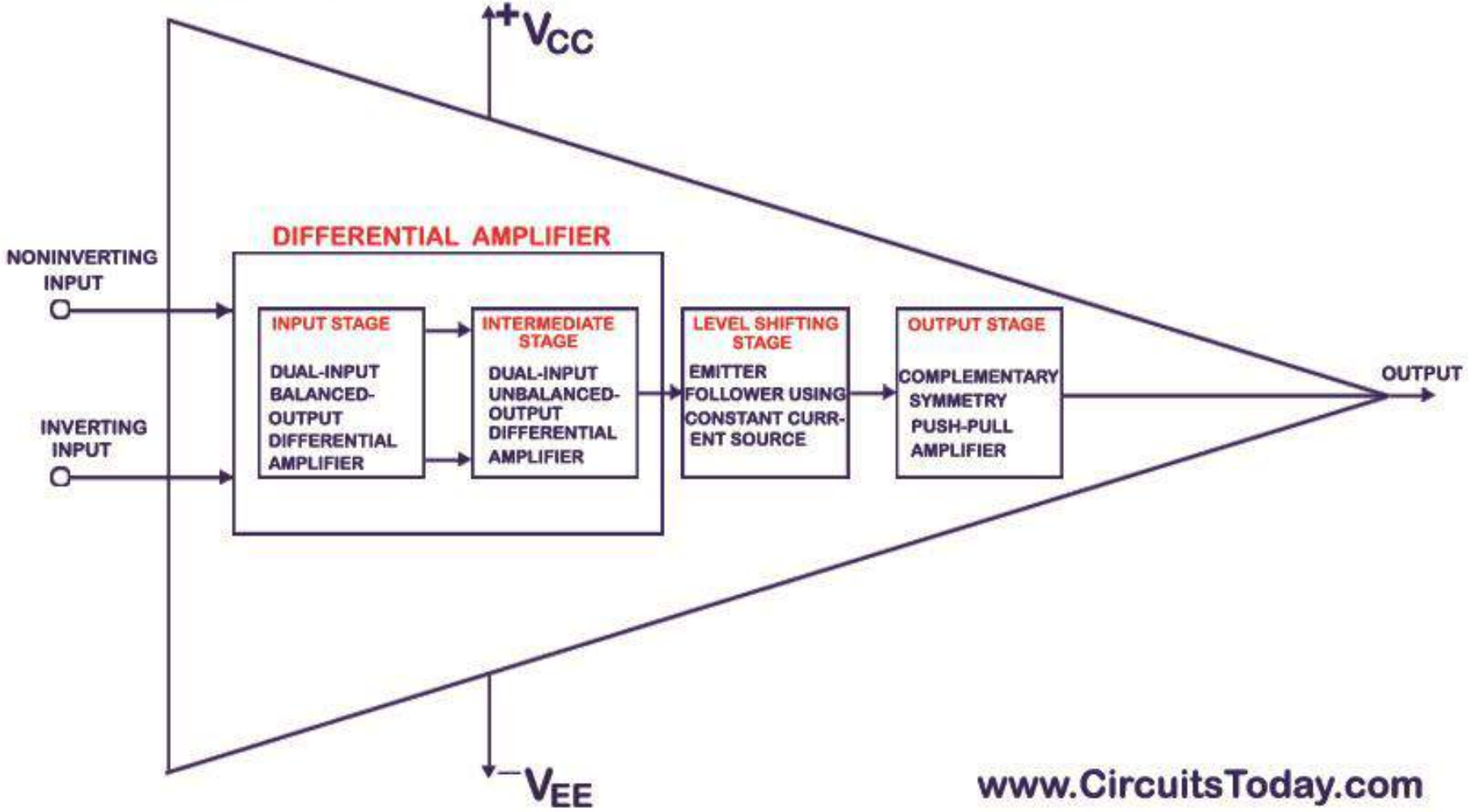
741 Op-Amp Features

741 in 8-pin DIL (Dual In Line) pack



$+V_2$: Non-inverting input
$-V_1$: Inverting input
$+V_s$: Positive source PS
$-V_s$: Negative source PS
V_{out}: Output voltage
ON: Offset Null
NC: Not Connected

BLOCK DIAGRAM OF OPERATIONAL AMPLIFIER



Frequency Response of Op-amp

- The voltage or current gain of an amplifier expressed in dB is $20 \log_{10} |A|$, where $A = V_{out}/V_{in}$.
- The frequency response of an op-amp has a low-pass characteristic (passing low-frequency signals, attenuating high-frequency signals).