# SNS COLLEGE OF TECHNOLOGY

**Coimbatore-35**
**An Autonomous Institution**

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# DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## 23ECB202 – LINEAR INTEGERATED CIRCUITS

II YEAR/ III SEMESTER



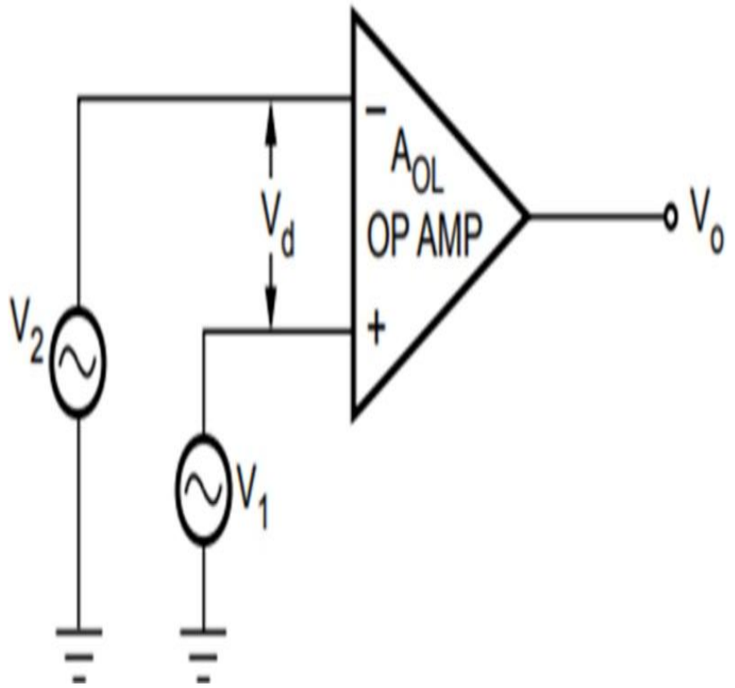
UNIT 1 – **OPAMP CHARACTERISTICS**

TOPIC 1- 3 – Open and closed loop configurations

# Op Amp - Open Loop Configurations

The simplest possible way to use an op-amp is in the open loop mode

- the d.c. supply voltages applied to the op-amp are VCC and -VEE and the output varies linearity only between VCC and – VEE
- Since gain is very large in open loop condition, the output voltage Vo is either at its positive saturation voltage (+ Vsat) or negative saturation voltage (- Vsat) as V1 > V2 or V2 > V1 respectively



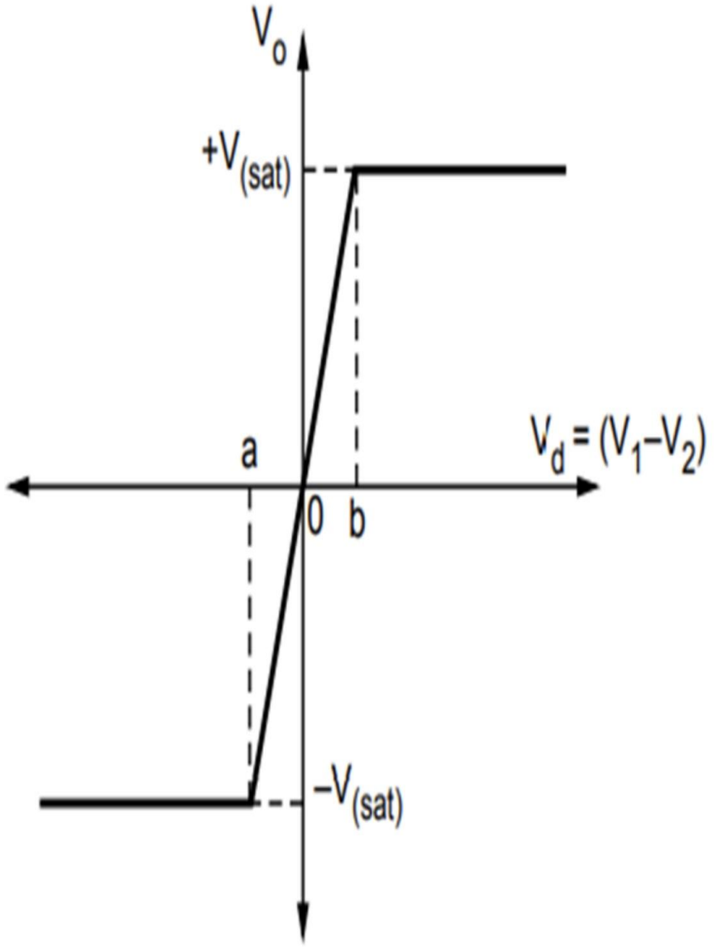
# Op Amp - Open Loop Configurations

- Thus very small noise voltage present at the input also gets amplified due to its high open loop gain and op-amp gets saturated only for small range of input signal (from point a to b), it behaves linearity

- This range is very small and practically due to high open loop gain, op-amp either shows + Vsat or -Vsat level

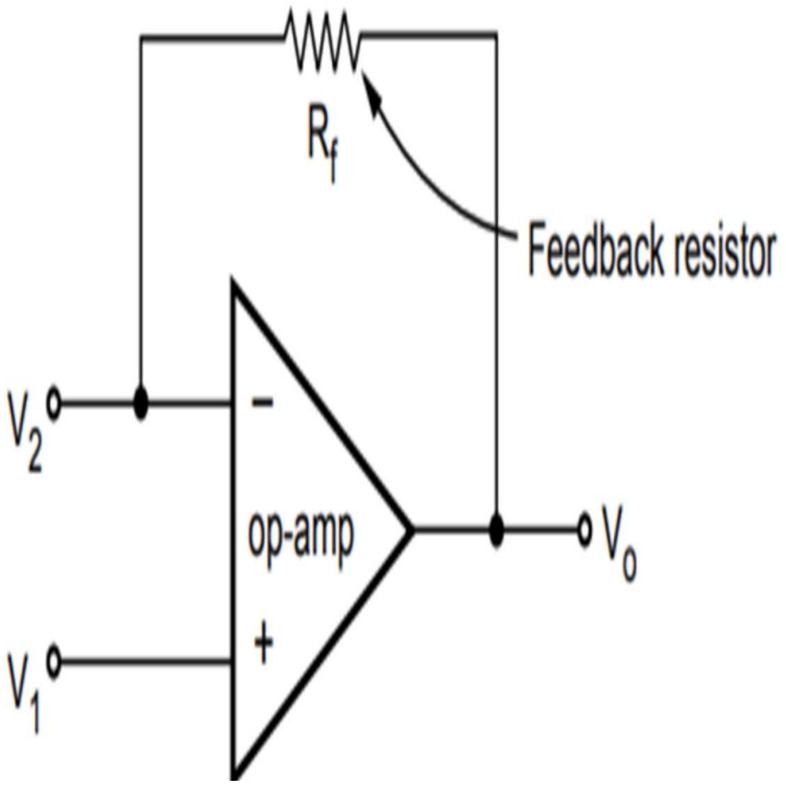
- This indicates the inability of op-amp to work as a linear small signal amplifier in the open loop mode

- Hence, the op-amp is generally not used in the open loop configuration.



# Op Amp – Closed Loop Configurations

- The utility of op-amp increases considerably if it is used in a closed loop mode.
- The closed loop mode is possible using feedback
- The feedback allows to feed some part of the output back to the input.
- In linear applications the op-amp is always used with negative feedback. The feedback helps to into saturation
- The negative feedback is possible by adding a resistor is called feedback resistor.
- The feedback is said to be negative as the feedback resistor connects the output to the inverting input terminal.



# Op Amp – Closed Loop Configurations

- The gain resulting with feedback is called closed loop gain of the op-amp
- Due to feedback resistance there is reduction in the gain. The closed loop gain is much less than the open loop gain and is independent of it
- Most of the linear circuits use op-amp in a closed loop mode with negative feedback with Rf. This is because, due to reduced gain, the output is not driven into the saturation and the circuit behaves in a linear manner

**The advantages of negative feedback are,**

i) It reduces the gain and makes it controllable.
ii) It reduces the possibility of distortion.
iii) It increases the bandwidth i.e. frequency range.
iv) It increases the input resistance of the op-amp.
v) It decreases the output resistance of the op-amp.
vi) It reduces the effects of temperature, power supply on the gain of the circuit.

# THANK YOU