



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

23ECB202 – LINEAR INTEGRATED CIRCUITS

II YEAR/ III SEMESTER
1

UNIT 1 – OPAMP CHARACTERISTICS

TOPIC 1- 3 – Open and closed loop configurations

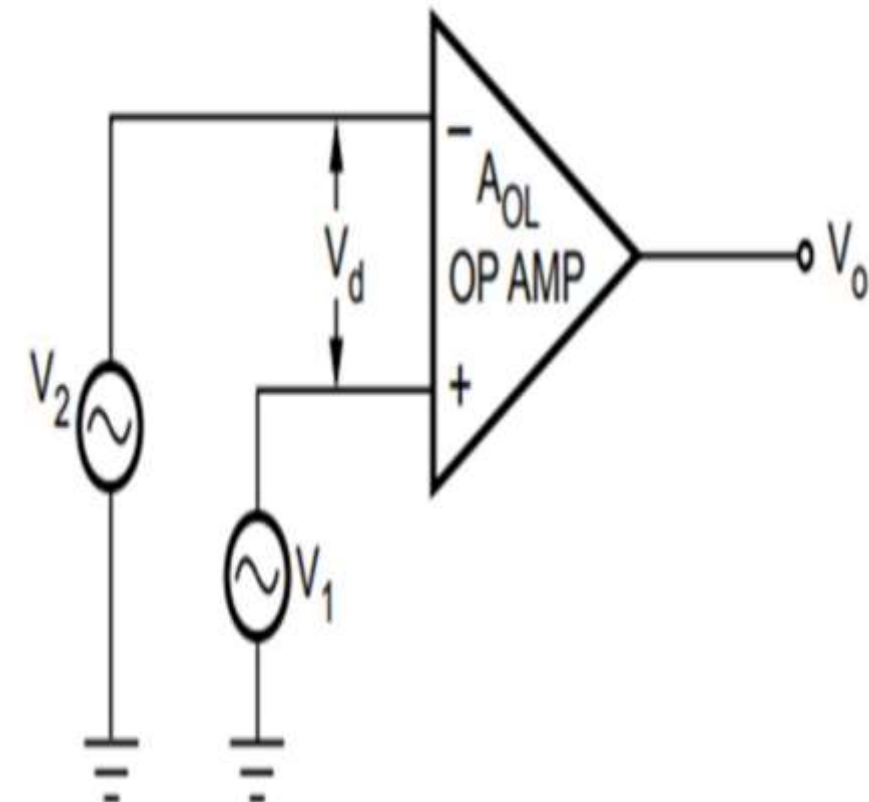


Op Amp - Open Loop Configurations



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 V_{CC} and $-V_{EE}$ and the output varies linearly only between V_{CC} and $-V_{EE}$
- Since gain is very large in open loop condition, the output voltage V_o is either at its positive saturation voltage ($+V_{sat}$) or negative saturation voltage ($-V_{sat}$) as $V_1 > V_2$ or $V_2 > V_1$ respectively

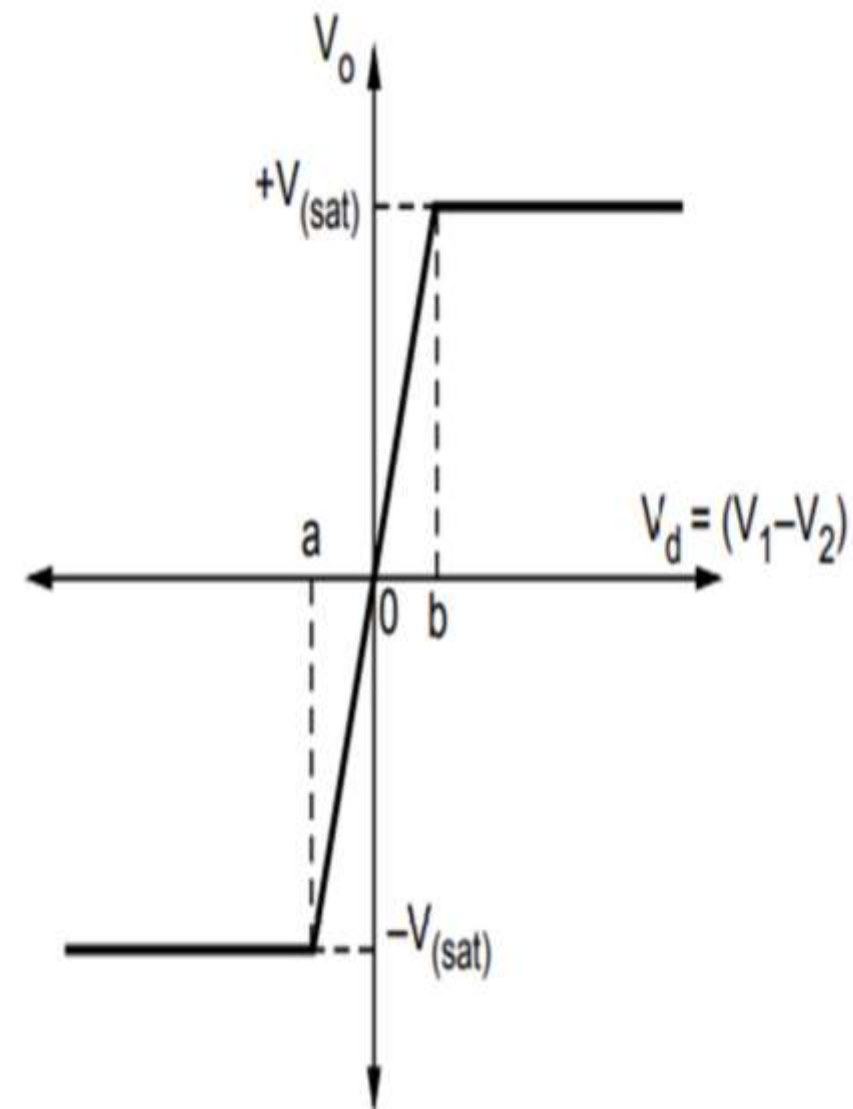




Op Amp - Open Loop Configurations



- 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 $+V_{sat}$ or $-V_{sat}$ 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.

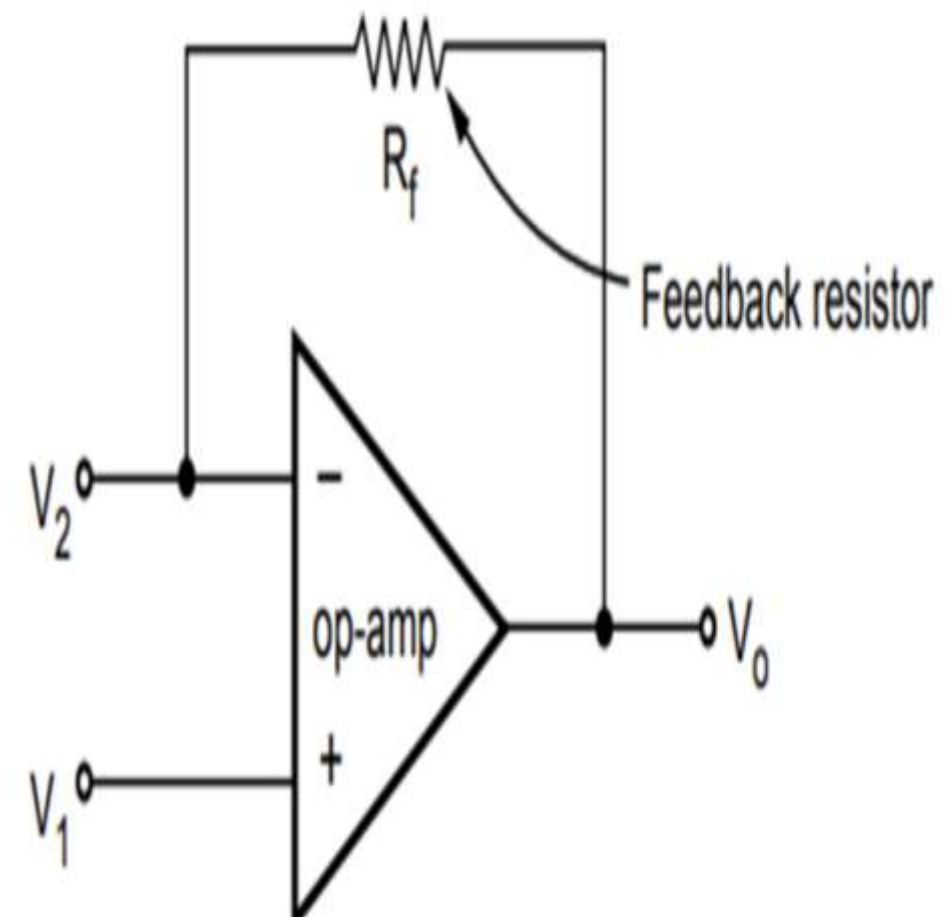




Op Amp – Closed Loop Configurations



- 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 R_f . 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