



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade (III Cycle)
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

23ECB202 – LINEAR INTEGRATED CIRCUITS

II YEAR/ IV SEMESTER
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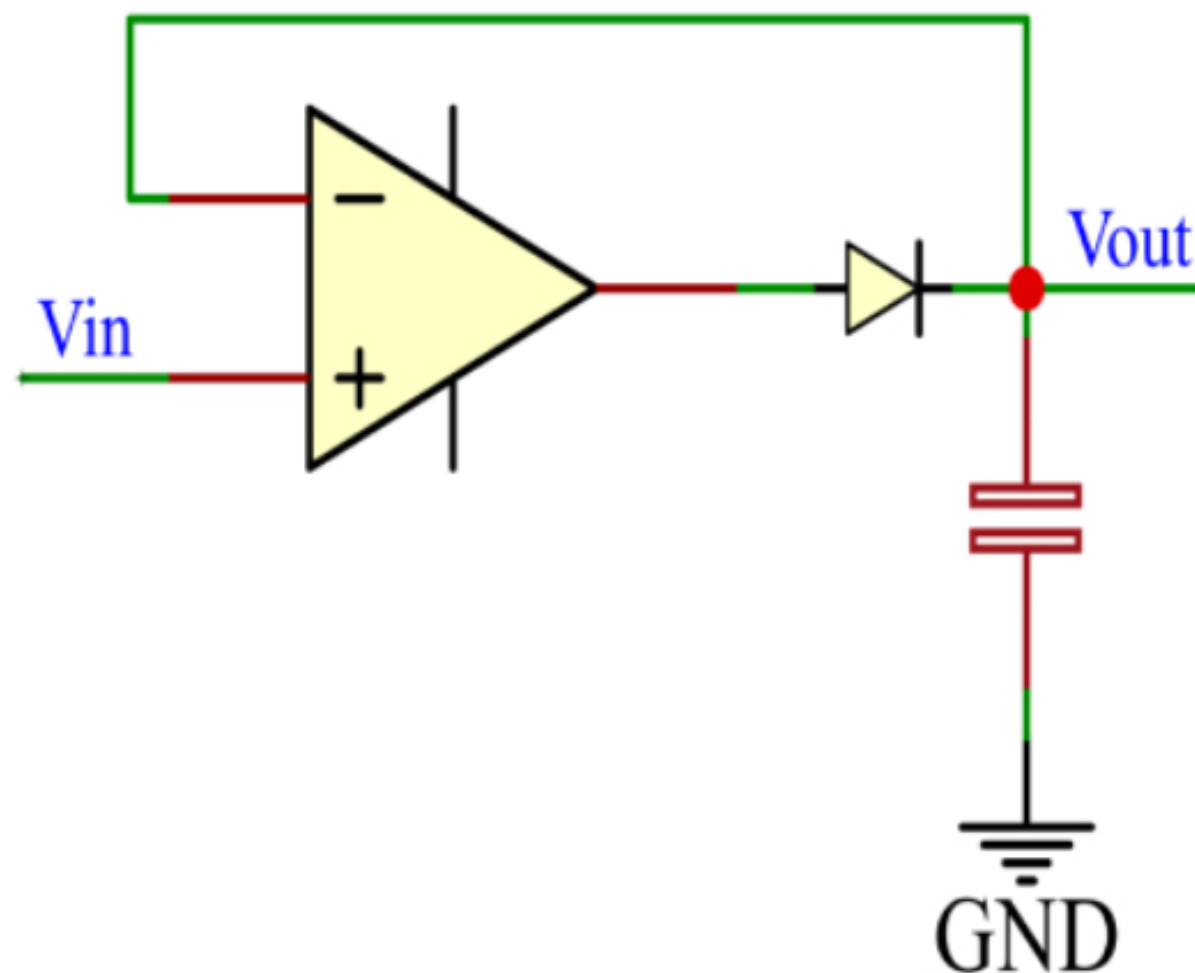
UNIT 2 – APPLICATIONS OF OPERATIONAL AMPLIFIERS

TOPIC – Peak Detector



Peak Detector

- Peak detector is a circuit which is used to determine the maximum peak or the maximum peak of a signal.





Working



- A typical peak detector circuit consists of key components such as **diodes, resistors and capacitors**.
- **Input Signal:** The peak detector starts by receiving an input signal, which could be any time-varying waveform.
- **Charging Phase:** During the charging phase, the input signal passes through a diode, allowing it to charge a capacitor through a resistor. The capacitor gradually charges up to the peak voltage of the input signal.
- **Holding Phase:** Once the capacitor reaches the peak voltage, it holds this voltage level, effectively "memorizing" the peak value.
- **Output:** The voltage across the capacitor is the peak detector output. It retains the highest voltage level reached by the input signal during the charging phase.



TYPES



- Depending on the polarity of the detected peak, there are different types of peak detectors:
- **Positive Peak Detector:** Captures the positive peak of the input signal.
- **Negative Peak Detector:** Captures the negative peak of the input signal.
- **Peak-to-Peak Detector:** Captures both the positive and negative peaks of the input signal.



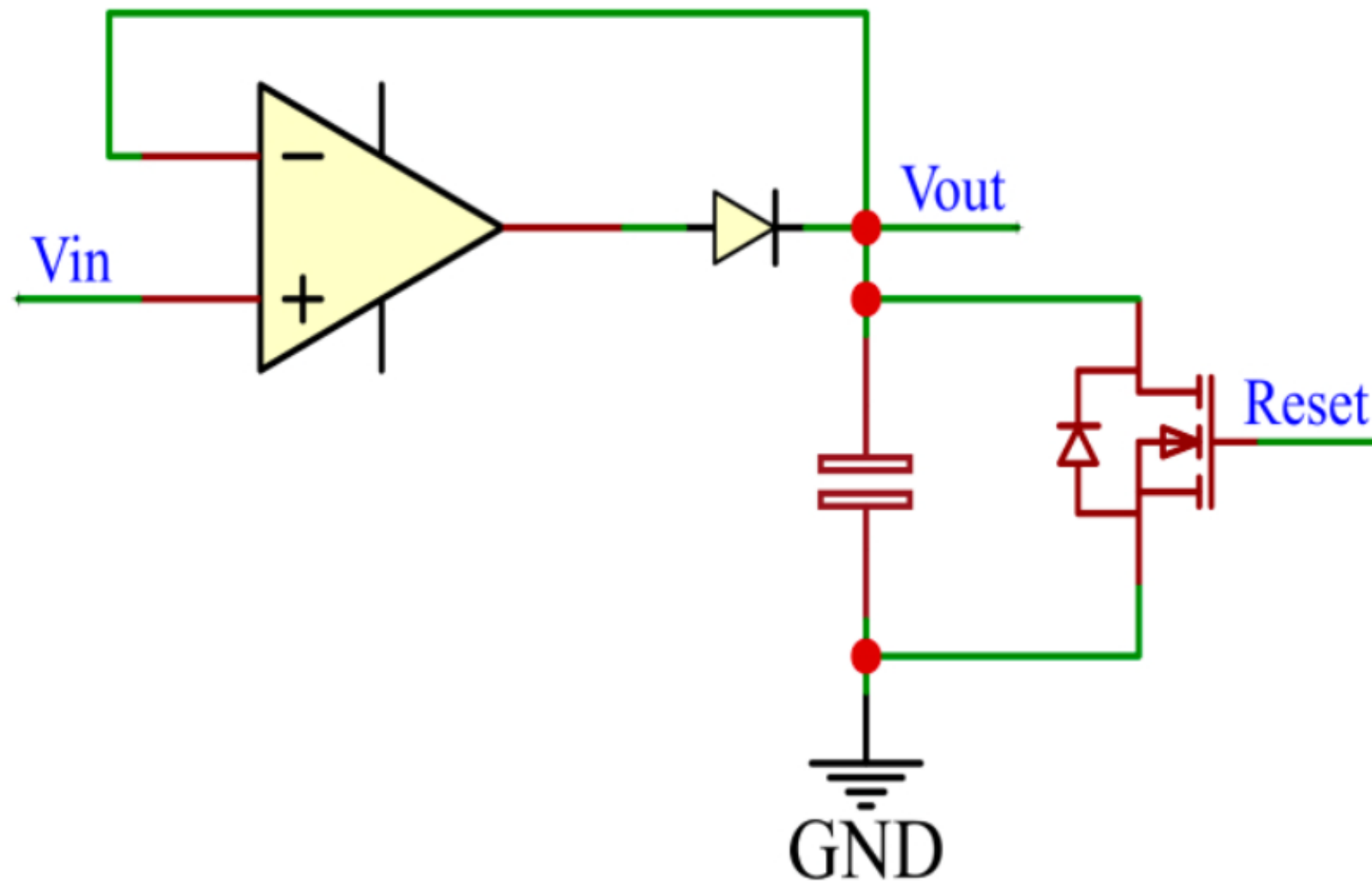
How it works?



- When an input signal is applied to the circuit, the capacitor gets charged through the diode, until it reaches the peak voltage.
- The new peak value is stored in the capacitor until it is discharged.
- The diode in the circuit gets forward-biased when the applied input voltage V_{in} exceeds the capacitor voltage V_{out} .
- Thereby allowing the circuit to behave as a voltage follower.
- The output voltage follows the applied input voltage until V_{in} is more than V_{out} .
- As the input voltage V_{in} reduces below the value of capacitive voltage V_{out} , it causes the diode to get reverse biased.
- In such a condition, the capacitor retains the value until the input again exceeds the value stored in the capacitor.
- Whenever the input voltage V_{in} exceeds the current peak voltage V_{out} , the diode will again get forward biased and the capacitor gets charged to the new peak voltage.
- Effectively setting the output voltage to the Peak.



Resetting Peak Detector





Output





Applications

- **Audio Processing** - In audio applications, peak detectors help measure the peak amplitudes of audio signals, which is crucial for maintaining signal quality and preventing distortion.
- **RF Communication** - Peak detectors are used in radio frequency (RF) communication systems to capture and maintain the peak envelope of amplitude-modulated signals, ensuring efficient data transmission.
- **Radar Systems** - In radar technology, peak detectors assist in processing and extracting critical information from radar return signals, improving target detection accuracy.
- **Medical Instruments** - Peak detectors play a role in medical instruments, where they help analyze physiological signals such as ECG and EEG waveforms to detect abnormal peaks and patterns.



Assessment



1. What is the alternate method to measure the peak value of non-sinusoidal waveform other than ac voltmeter?

- a) Clipper
- b) Clamper
- c) Peak detector**
- d) Comparator



2. The resistor in the peak detector are used to

- a) To maintain proper operation
- b) Protect op-amp from damage**
- c) To get shaped non-sinusoidal waveform
- d) None of the mentioned



THANK YOU