SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

23ECB202 – LINEAR INTEGRATED CIRCUITS

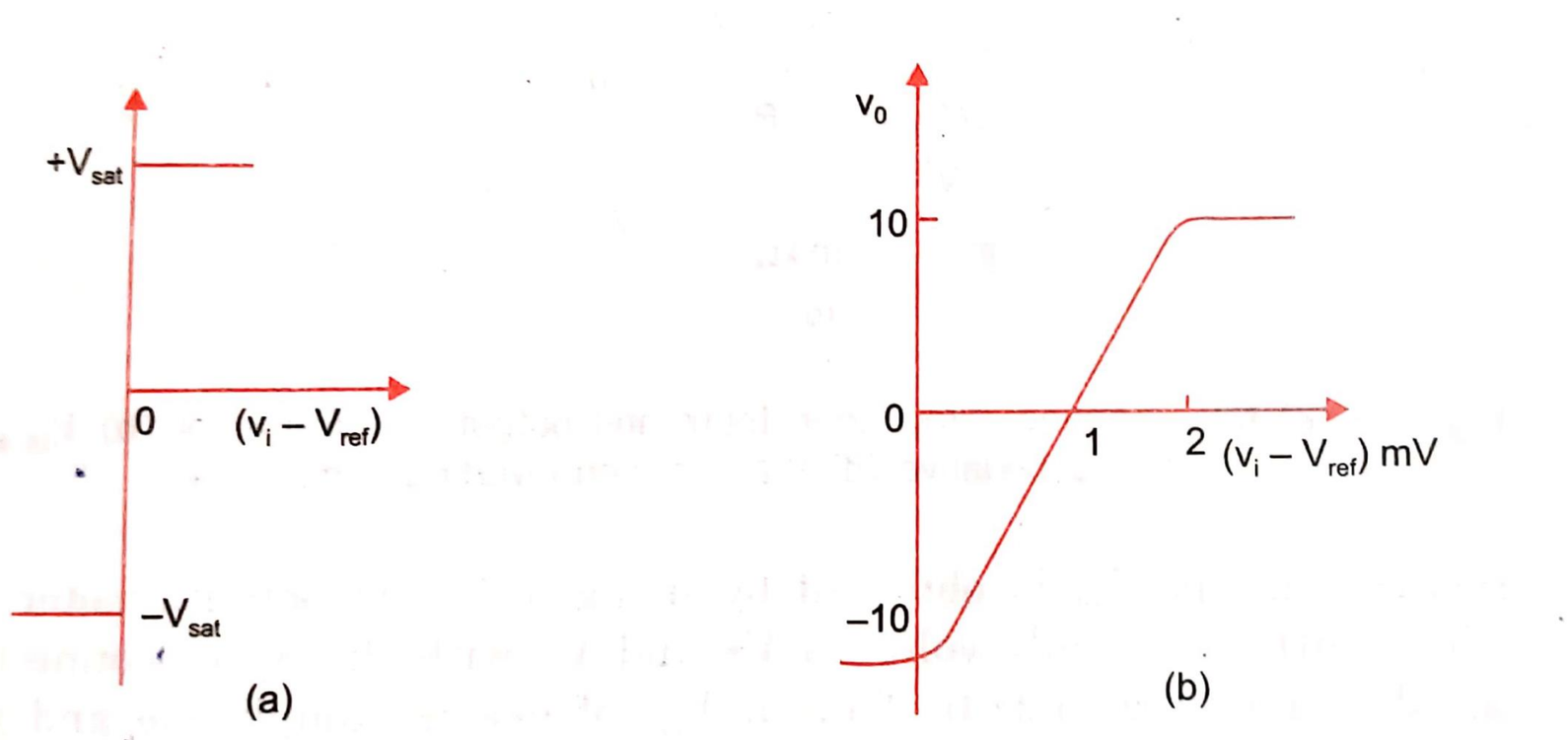
II YEAR/ IV SEMESTER

UNIT 3 – **WAVEFORM GENERATORS AND VOLTAGE REGULATORS**

TOPIC – Comparator

Comparator

- A comparator is a circuit which compares a signal voltage applied at one input of an op-amp with a known reference voltage at the other input.
- It is basically an open loop op amp with output +Vsat or –Vsat as shown in ideal characteristics.



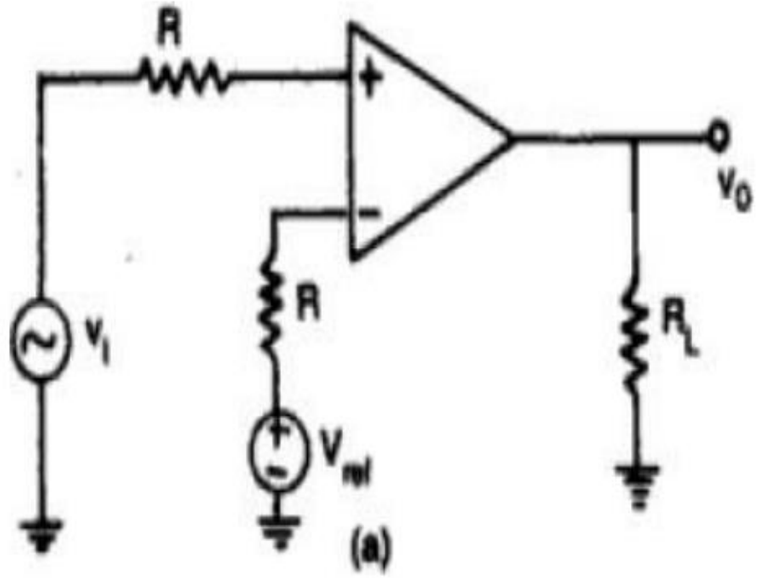
TYPES

There are basically two types of comparators.

1. Non-inverting comparator

2. Inverting comparator

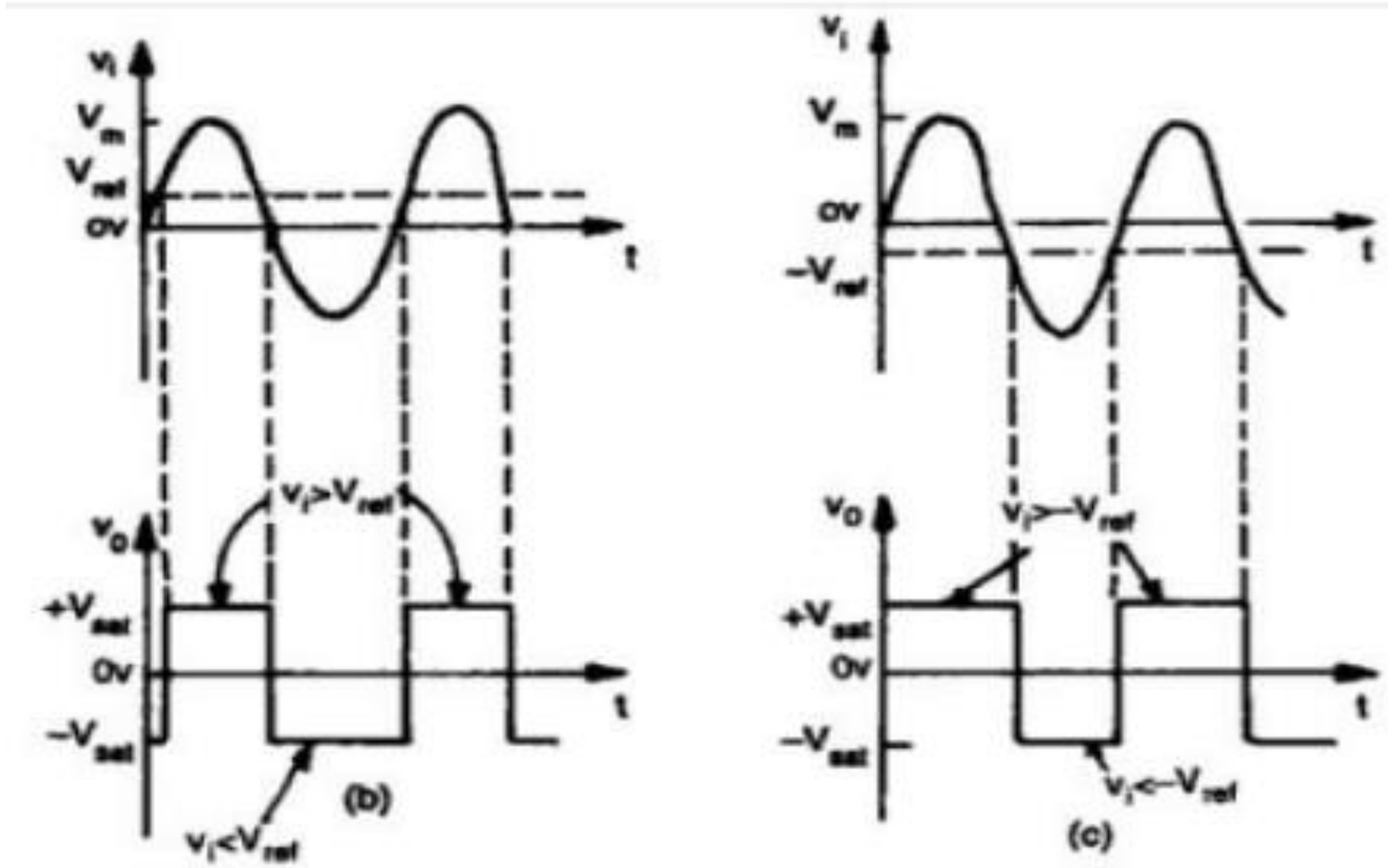
Non-inverting comparator



- A fixed reference voltage Vref is applied to (–) input and a time varying signal Vi is applied to (+) input.
- There are 3 conditions for a comparator.
- Vi < Vref , Vo = -Vsat
- Vi > Vref , Vo = +Vsat
- Vi = Vref - changes the state of op-amp

Non-inverting comparator

The output waveform for a sinusoidal input signal applied to the +ve input is shown in figure for +ve and –ve Vref respectively



Inverting comparator

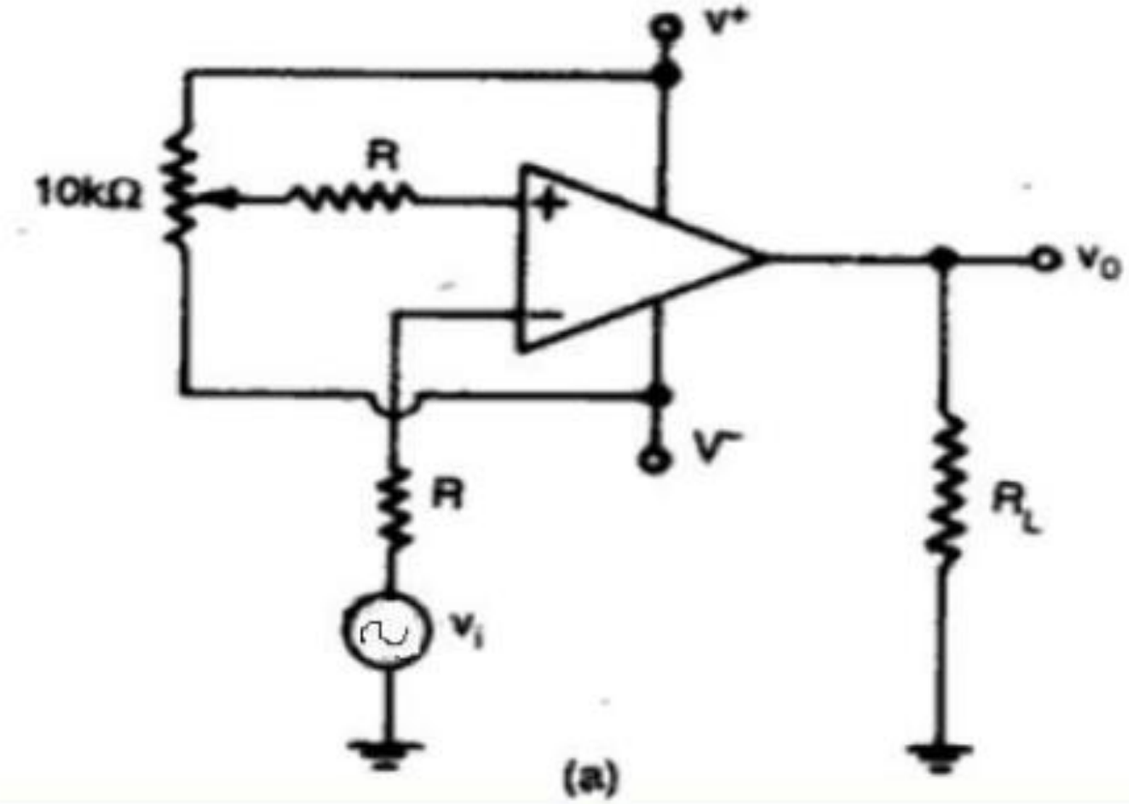


Figure shows a practical inverting comparator in which the reference voltage Vref is applied to the (+) input and Vi is applied to the – ve input.

Inverting comparator

For a sinusoidal input signal, the output waveform is shown in figure for Vref +ve and –ve respectively.

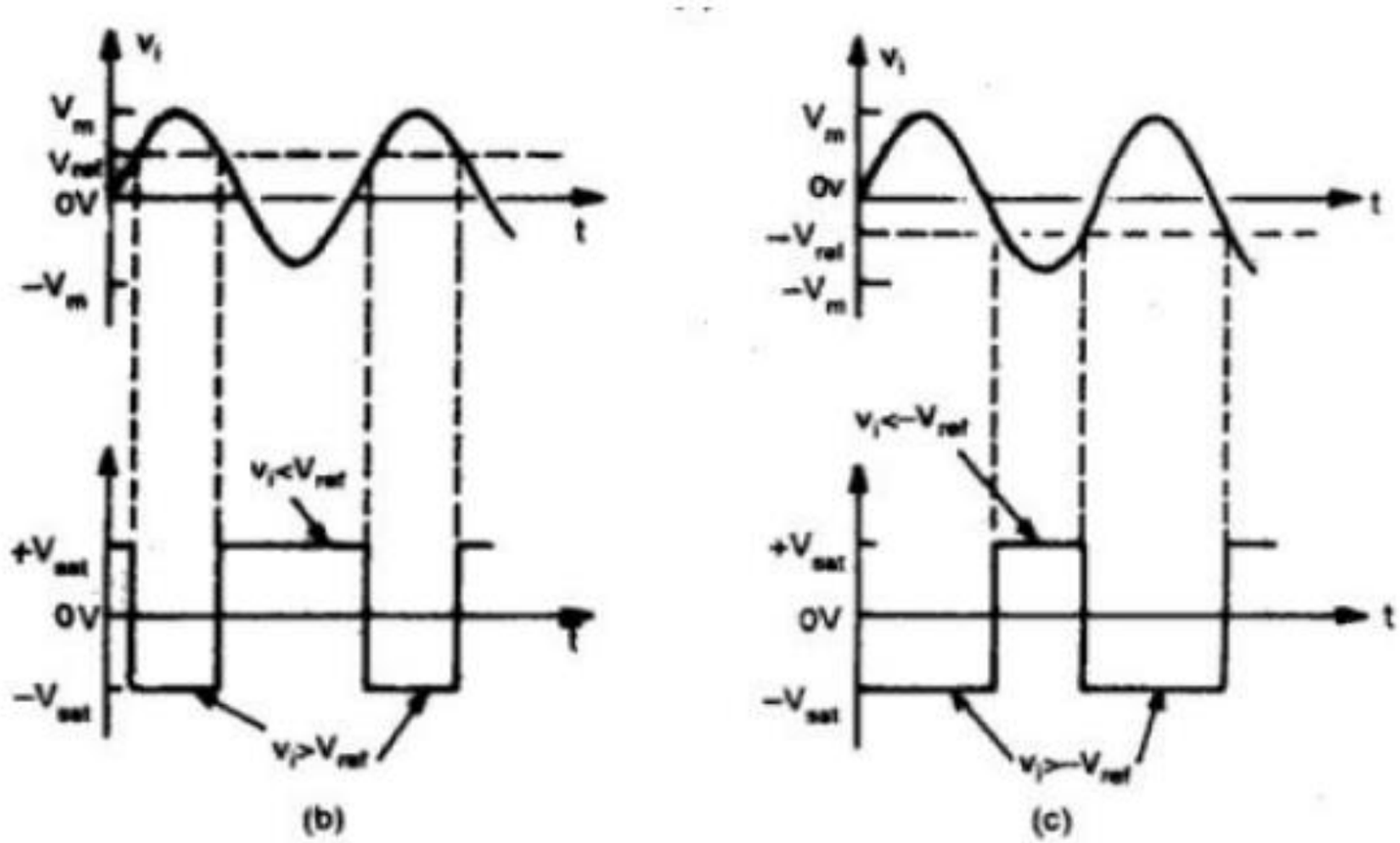


Fig. 5.3 (a) Inverting comparator. Input and output waveforms (b) $V_{ref} > 0$ (c) $V_{ref} < 0$

Applications

Some important applications of comparator are

- Zero crossing detector
- Window detector
- Time marker generator
- Phase meter.

Zero crossing detector

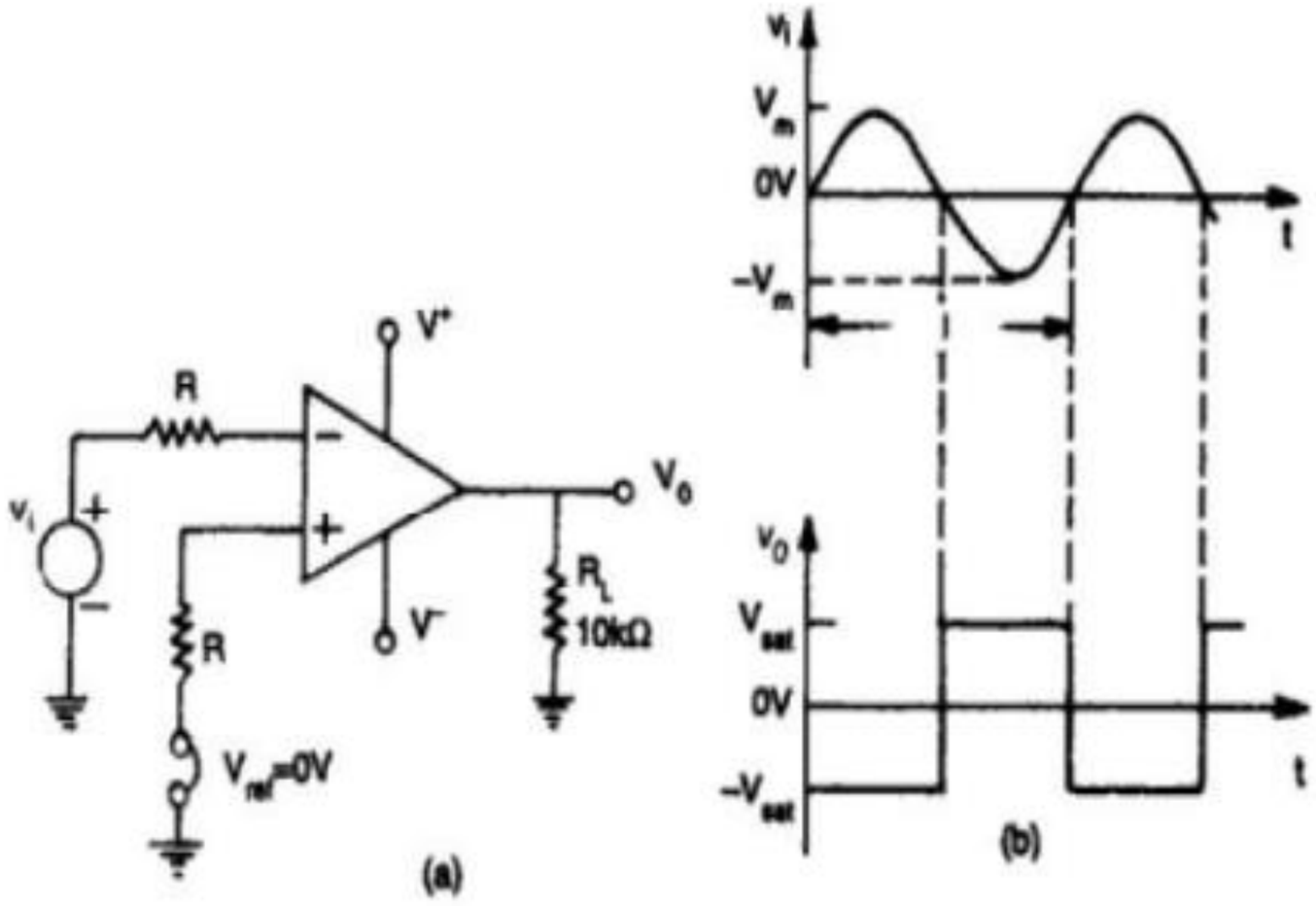


Fig. 5.4 (a) Zero crossing detector (b) Input and output waveforms

The circuit is also called as a sine to square wave generator.

Assessment

1. Depending on the value of input and reference voltage a comparator can be named as

a) Voltage follower

b) Digital to analog converter

c) Schmitt trigger

d) Voltage level detector

2. Zero crossing detectors is also called as

a) Square to sine wave generator

b) Sine to square wave generator

c) Sine to triangular wave generator

d) All of the mentioned

THANK YOU