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 – Schmitt Trigger

Schmitt Trigger

- If positive feedback is added to the comparator circuit, gain can be increased greatly.

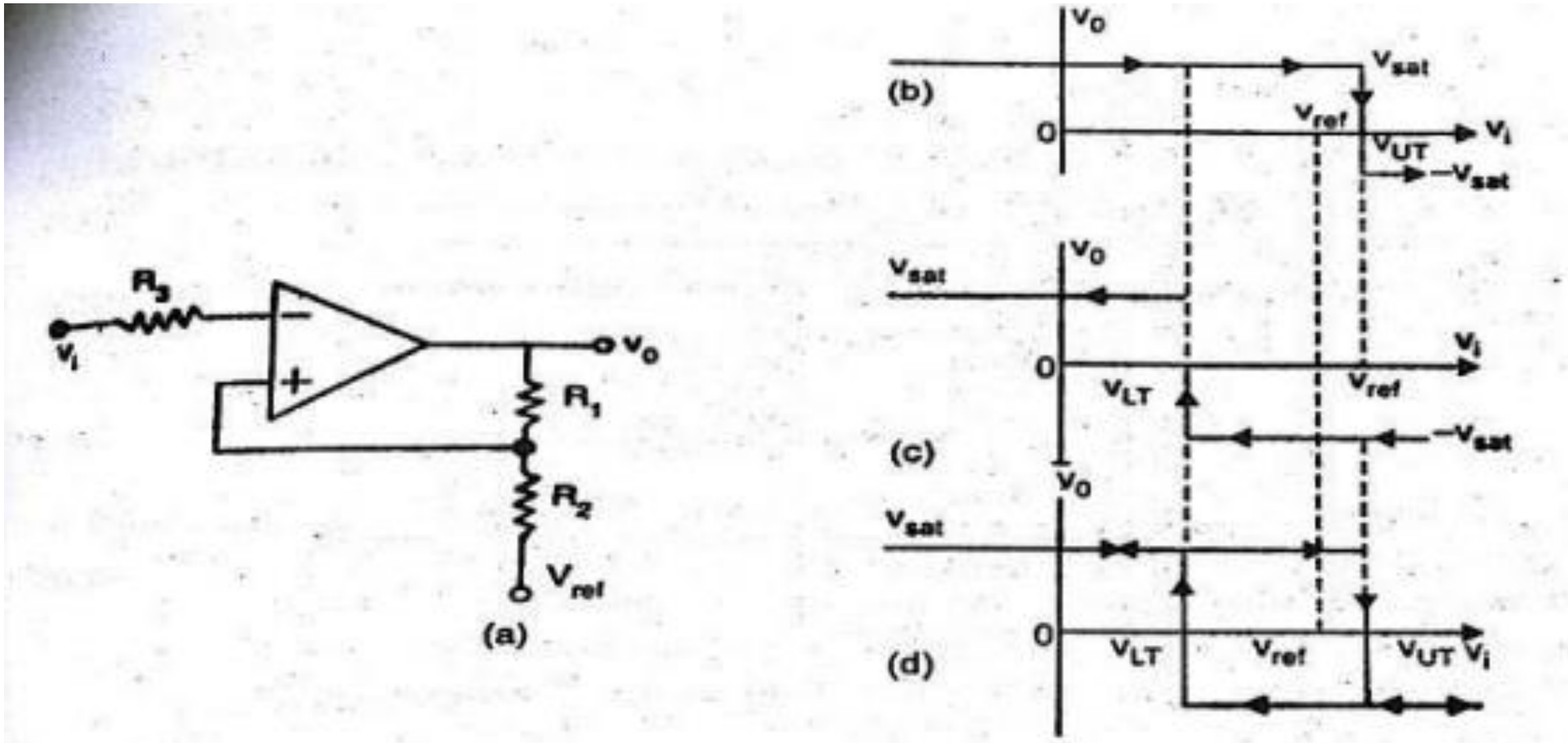


Fig. 5.8 (a) An inverting Schmitt trigger (b, c) Transfer characteristics for V_i increasing and V_i decreasing (d) composite input-output curve

Working

- The input voltage Vi triggers the output Vo every time it crosses certain voltage levels.
- These voltage levels are called Upper threshold voltage (Vut) and Lower threshold voltage (Vlt).
- The hysteresis width is the difference between these two threshold voltages ie Vut – Vlt.
- These threshold voltages are calculated as follows.
- Suppose that the output voltage Vo is +Vsat.
- The voltage at +ve input terminal will be

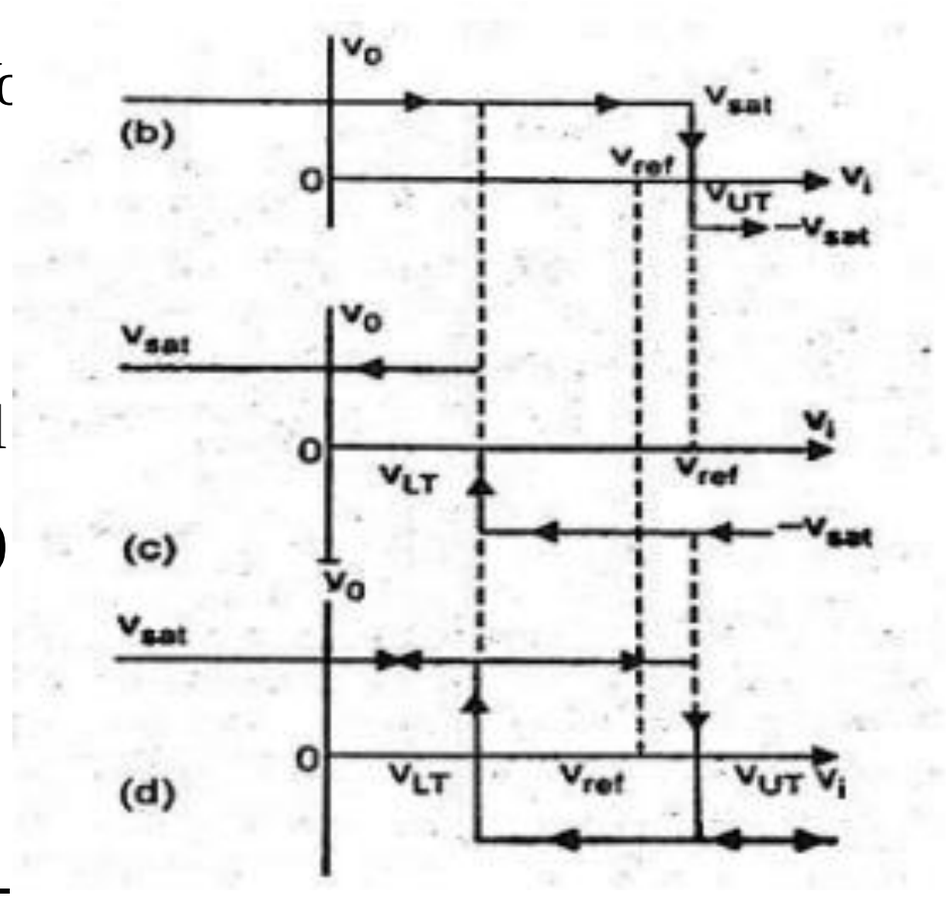
  Vref + (R2/(R1+R2)) (Vsat – Vref) = Vut
- This voltage is called as Upper threshold voltage Vut

Working (Contd..)

- As long as Vi is less than Vut, the output Vc remains constant at +Vsat. When Vi is just greater than Vut, the output regeneratively switches to – Vsat and remains at this level long as Vi > Vut as shown in Figure 5.8 (b)
- • For Vo = -Vsat, the voltage at +ve input terminal is

Vref + (R2/R1+R2) (-Vsat – Vref) = Vlt Vref - (R2/R1+R2) (Vsat + Vref) = Vlt

- this voltage is referred to as lower threshold voltage Vlt



Working (Contd..)

- The input voltage Vi must become lesser than Vlt in order to cause Vo to switch from – Vsat to +Vsat. A regenerative transition takes place as shown in Figure 5.8(c) and the output Vo returns from –Vsat to +Vsat almost instantaneously.
- Note that Vlt < Vut and the difference between these two voltages is the hysteresis width Vh and can be written as Vh = Vut – Vlt = 2R2 Vsat/(R1+R2)
- The resistor R3 in figure 5.8(a) is chosen equal toR1||R2 to compensate for the input bias current.
- A non-inverting Schmitt trigger is obtained if Vi and Vref are interchanged in figure

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