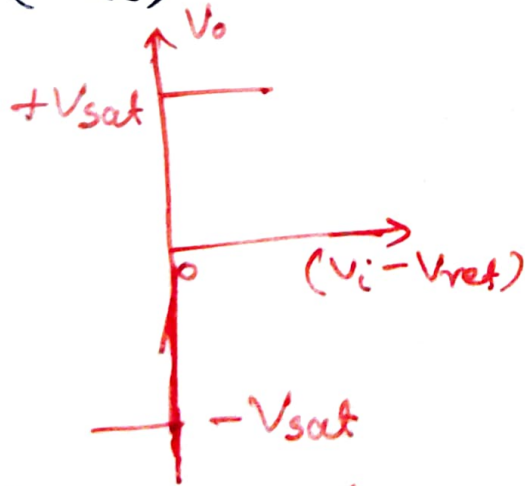
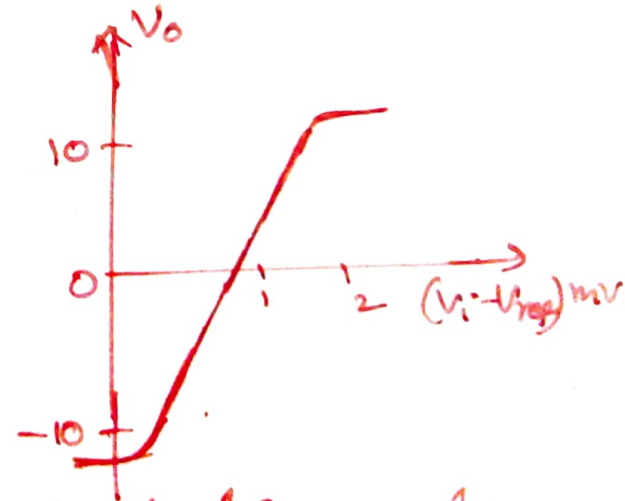


# Comparators

- A comparator is a device which compares a signal voltage applied at one i/p of an op-amp with a known reference voltage at the other i/p.
- It is basically an open-loop op-amp with o/p  $\pm V_{sat} (= V_{cc})$



Ideal comparator transfer characteristics

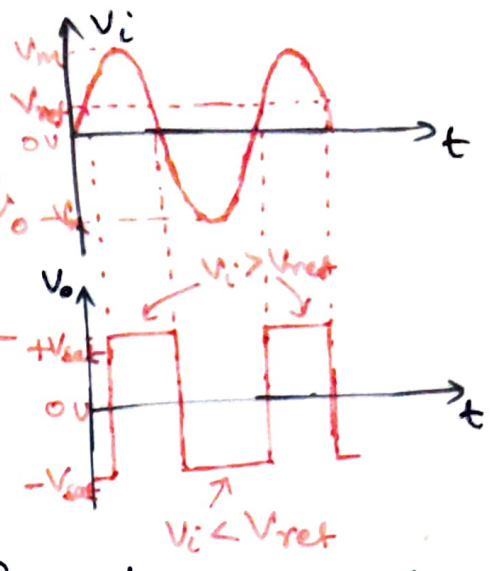
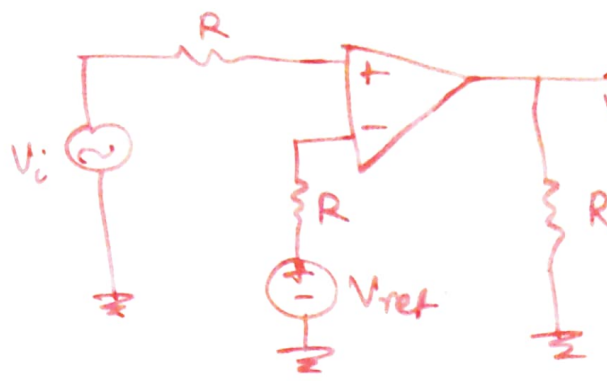


Practical Comparator transfer characteristics

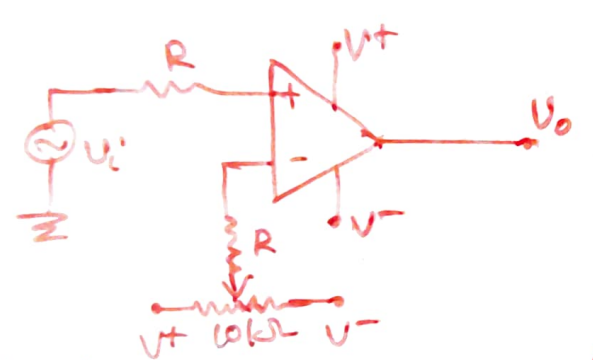
→ Two types

- i) Non-inverting comparator
- ii) Inverting comparator

Non-inverting Comparator



- A fixed reference voltage  $V_{ref}$  is applied to (-) i/p & a time varying signal  $V_i$  is applied to (+) i/p
- The o/p voltage is at  $-V_{sat}$  for  $V_i < V_{ref}$  &  $V_o$  goes to  $+V_{sat}$  for  $V_i > V_{ref}$

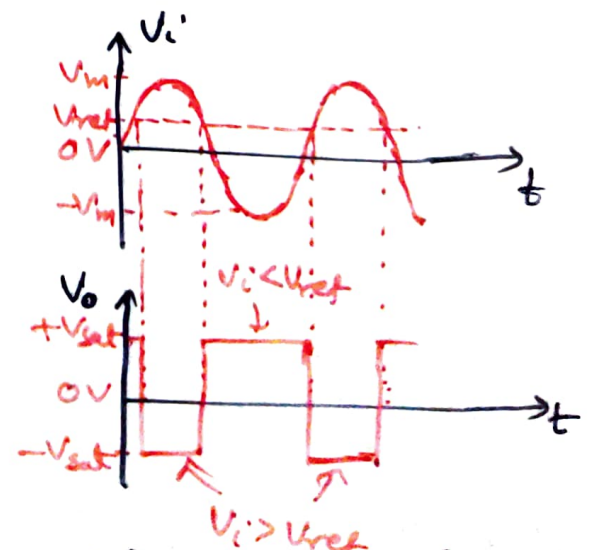
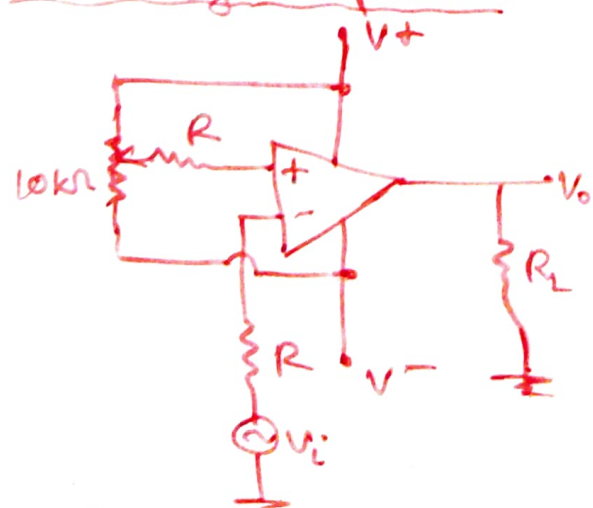


Practical non-inverting comparator

→ In a practical ckt  $V_{ref}$  is obtained by using a  $10k\Omega$  potentiometer which forms a voltage divider with supply voltages  $V^+$  &  $V^-$  with wiper connected to (-) i/p terminal.

→ Thus a  $V_{ref}$  of desired amplitude & polarity can be obtained by simply adjusting the  $10k\Omega$  potentiometer

Inverting Comparator



- Practical Inverting comparator
- (ii) Window detector
  - (iii) Time marker generator
- Applications of comparators are
- (i) Zero crossing detector
  - (iv) Phase meter.