

M.Sc. Sem III

MPHYC - ~~11~~ 12

Electronics II

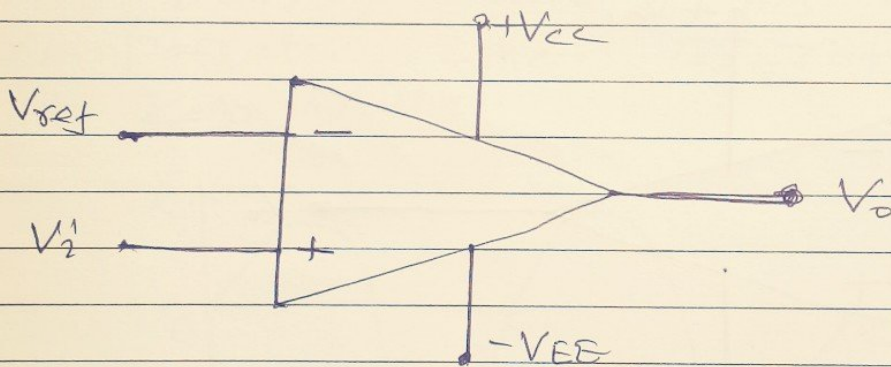
OP-amp

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A non-inverting Comparator is an OP-amp based Comparator for which a reference voltage is applied to its inverting terminal and the input voltage is applied to its non-inverting terminal. This OP-amp based Comparator is called as non-inverting Comparator because the input voltage, which has to be compared is applied to the non-inverting terminal of the OP-amp.

The Circuit diagram of a non-inverting Comparator is shown in the following figure.



The operation of a non-inverting Comparator is very simple. It produces one of the two values, $+V_{sat}$ & $-V_{sat}$ at the output based on the values of input voltage V_i and the reference voltage $+V_{ref}$.

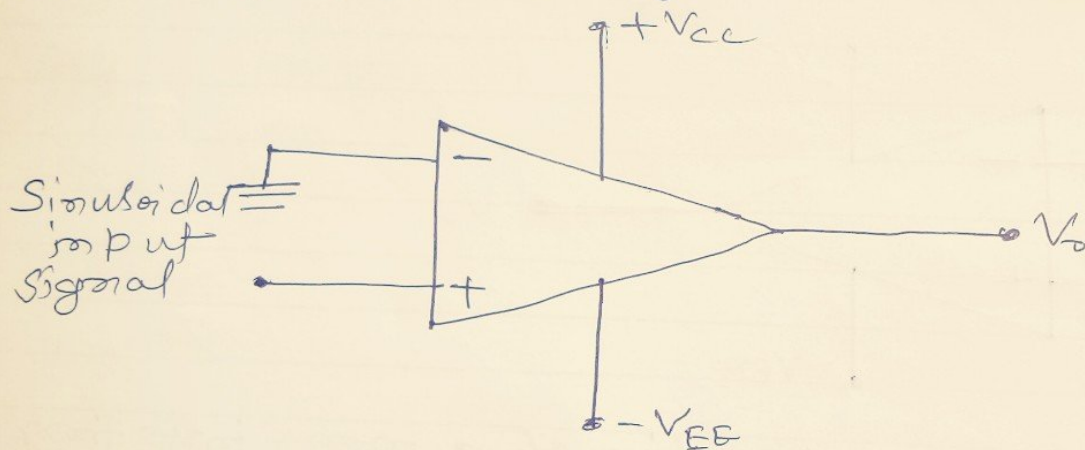
The output value of a non-inverting Comparator will be $+V_{sat}$, for which the input voltage V_i is greater than the

reference voltage $+V_{ref}$.

* The output value of a non-inverting comparator will be $-V_{sat}$, for which the input voltage V_i is less than ~~input~~ the reference voltage $+V_{ref}$.

Example -

Let us draw the output wave for of a non-inverting comparator, when a ~~st~~ sinusoidal input signal and reference voltage of zero volts are applied to the non-inverting and inverting terminals of the op-amp respectively.



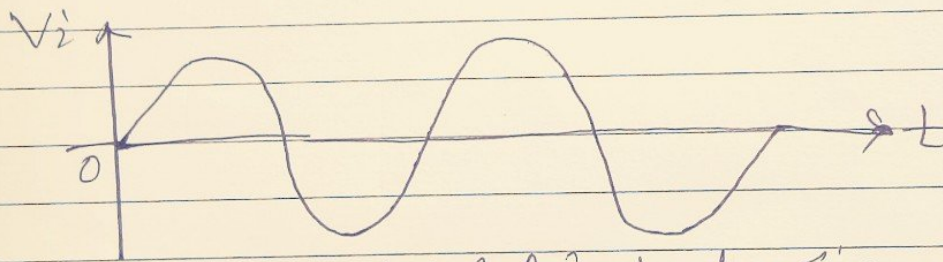
The operation of a non-inverting comparator is explained below -

* During the +ve half cycle of the sinusoidal input signal, the voltage present at the non-inverting terminal of op-amp is greater than zero volts. Hence, the output value of a non-inverting comparator will be

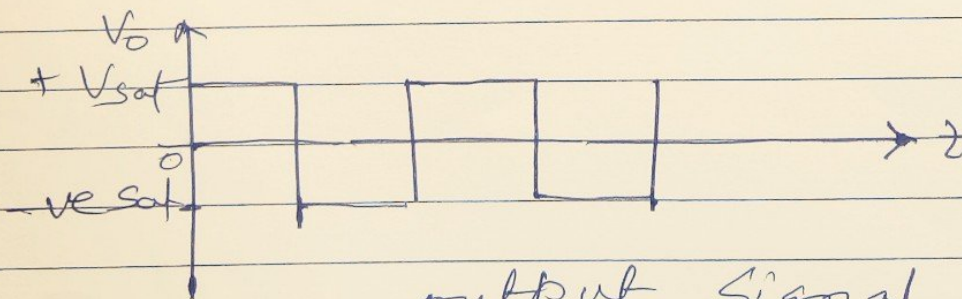
equal to $+V_{sat}$ during the +ve half cycle of the sinusoidal input signal.

Similarly, during the -ve half cycle of the sinusoidal input signal, the voltage present at the non-inverting terminal of op-amp is less than zero volts. Hence, the output value of non-inverting comparator will be equal to $-V_{sat}$ during the -ve half cycle of the sinusoidal input signal.

The following figure shows the input and output wave forms of a non-inverting comparator, when the reference voltage is zero volts.



Sinusoidal input signal



output signal

From the figure shown above, we can observe that the output transitions either from $+V_{sat}$ to $-V_{sat}$ or from $-V_{sat}$ to $+V_{sat}$ whenever the sinusoidal input signal crosses zero volts. That means, the output changes its value when the input is crossing zero volts. Hence, the above circuit is also called as non-inverting zero crossing detector.
