Name: **Brinda Temkar** Roll No: **31** Class : **SE-ET2** Batch: **C**
Date of performance : Date of submission:

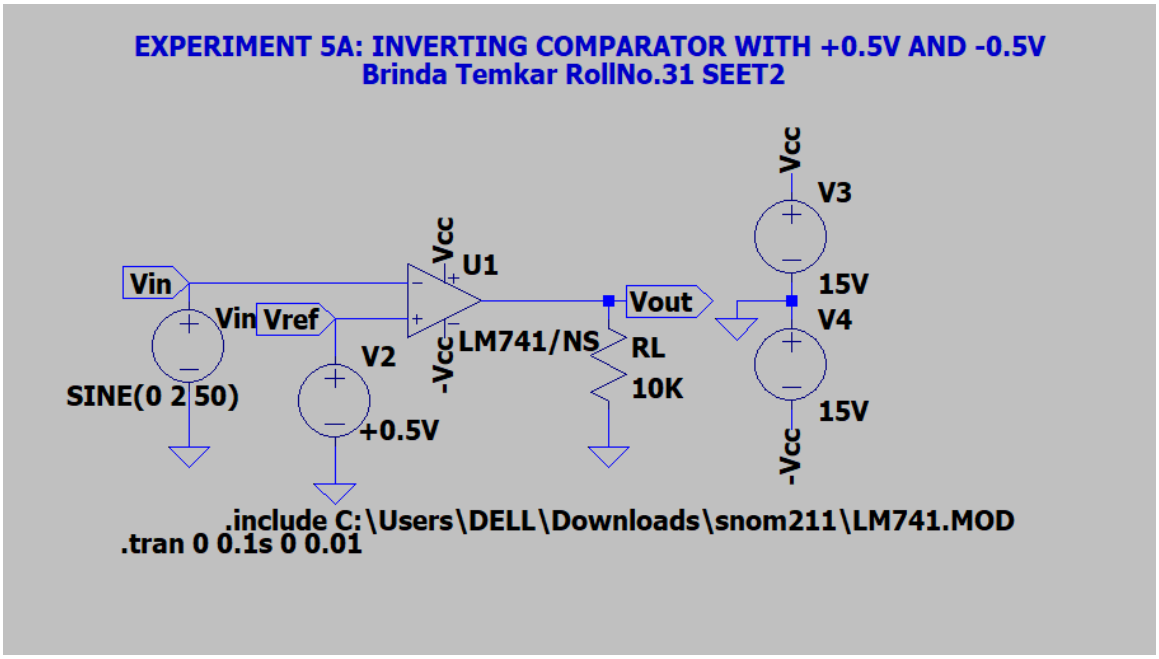
EXPERIMENT NO.5

Aim:
a) To study and simulate inverting comparator with positive & negative reference voltage & plot its input output waveforms. Observe the results & explain the working
b) To study & simulate a zero crossing detector and study the waveforms & explain working of zero crossing detector as per the results.

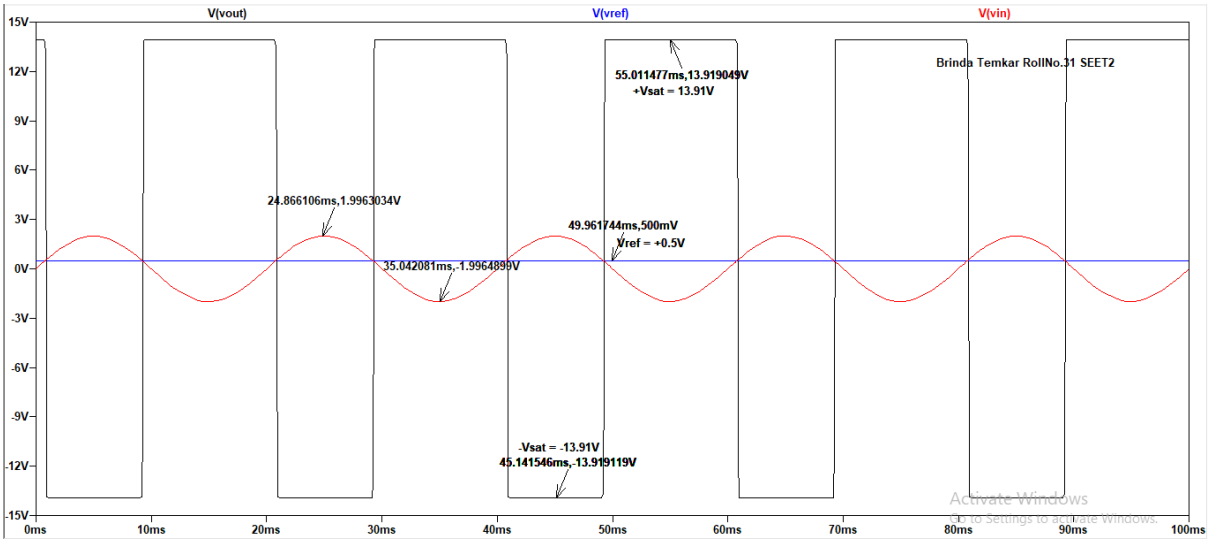
Software Used: LTSpice

Circuit Schematics:5A(Inverting Comparator)

1. Circuit diagram of inverting comparator with positive reference voltage +0.5 V



Output Waveform:



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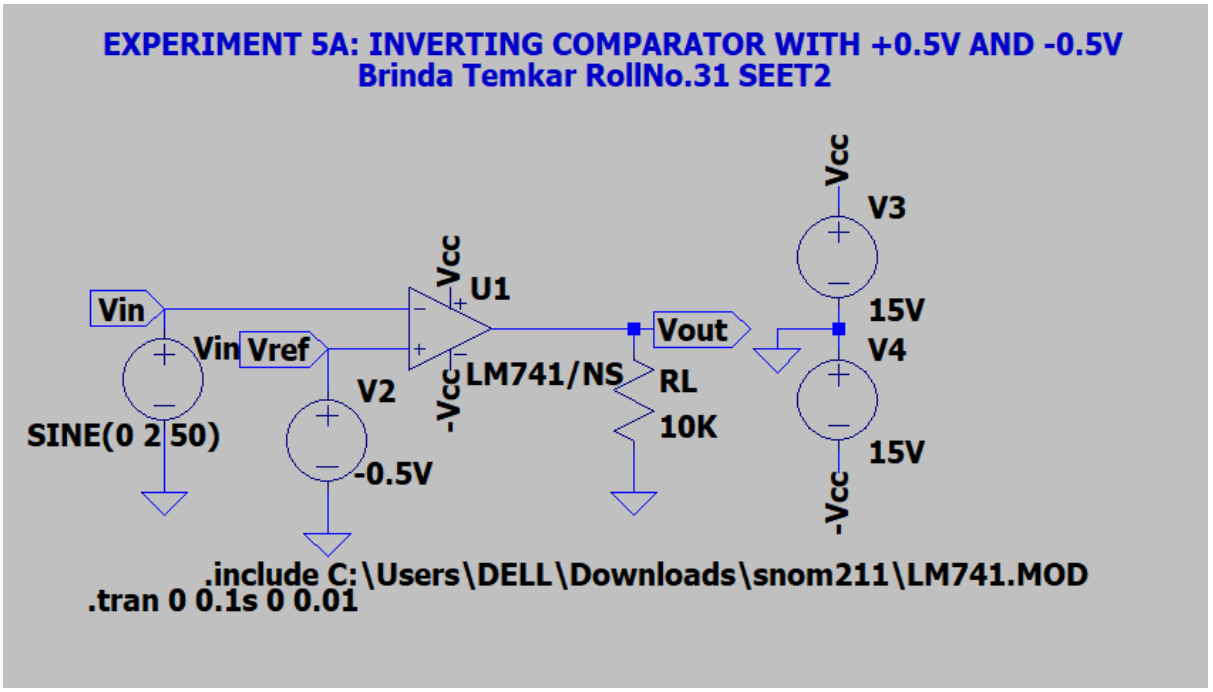
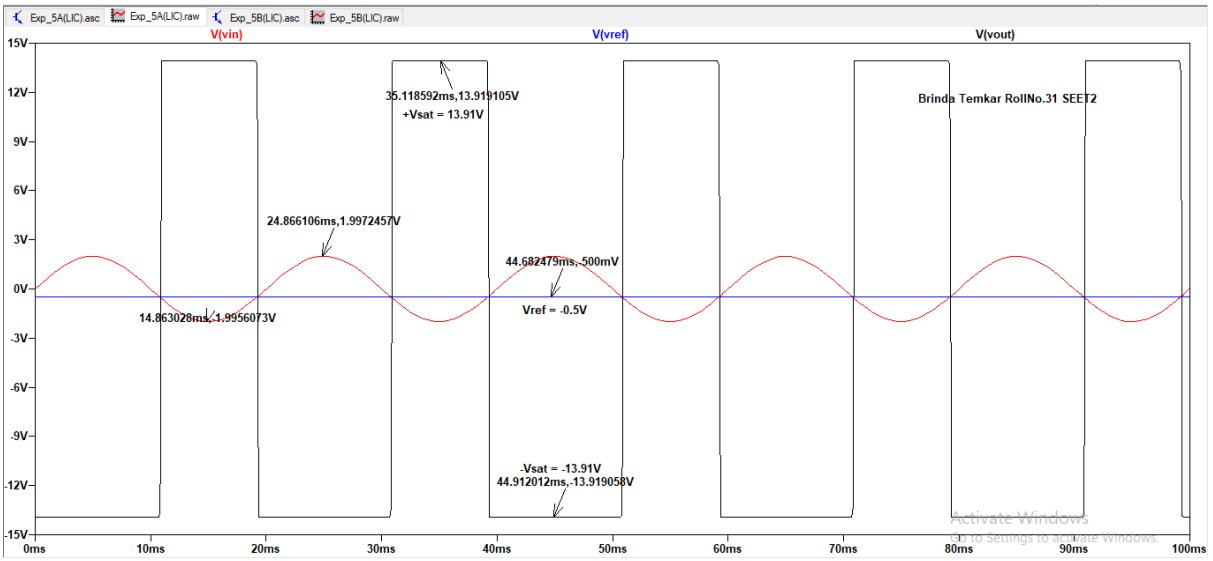
2. Circuit diagram of inverting comparator with Negative reference voltage -0.5 V



Output Waveform:



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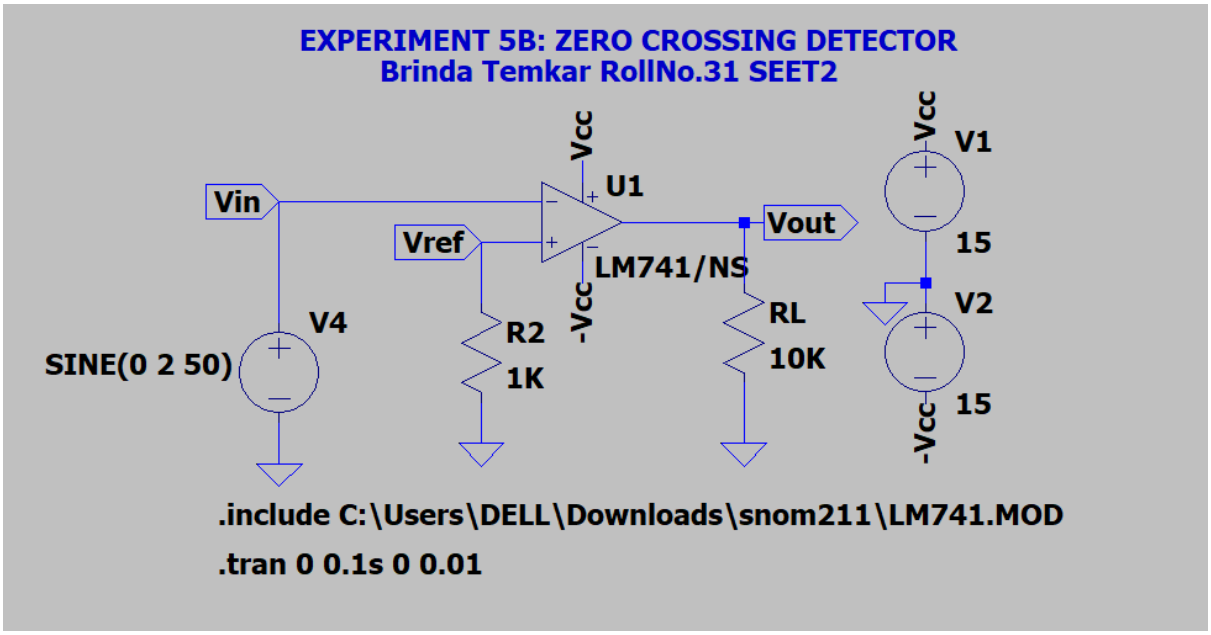
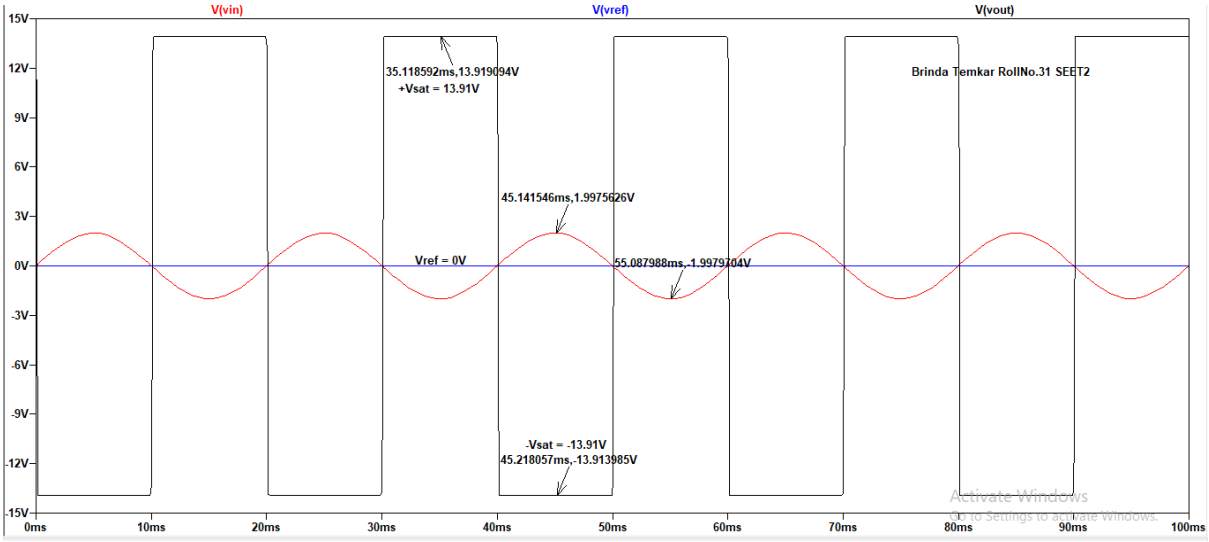
Part B:

Circuit Schematics:5B(Zero Crossing Detector)



Output Waveform:



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OBSERVATION & RESULTS:
A) Inverting comparator

	Inverting comparator with Vref = +0.5V Vin = 2Vpeak to peak		**Inverting comparator with Vref = -0.5V Vin = 2Vpeak to peak or**	
	+Vsat	**-Vsat**	**+Vsat**	**-Vsat**
Theoretical	15V	-15V	15V	-15V
Practical	13.91V	-13.91V	13.91V	-13.91V

For inverting comparator: When Vin < Vref, comparator swings to +Vsat state and when Vin > Vref, the comparator swings to –Vsat state. Change of state occurs when input sine wave crosses Vref level either +ve vref or -vref

B) Zero crossing detector

	Zero crossing detector Vref = 0V Vin = 2Vpeak	
	+Vsat	**-Vsat**
Theoretical	**15V**	**-15V**
Practical	13.91V	-13.91V

For zero crossing detector: When Vin > 0, zero cross detector is in –Vsat state and when Vin < 0, the zero cross detector is in the +Vsat state. Change of state occurs when the input sine wave crosses zero level.

Conclusion:

1. Hence we have studied and simulated an inverting comparator with positive and negative reference voltage and also plotted ints input-output waveforms.
    a. A comparator is an electronic circuit which compares the two inputs applied at it's inverting and non-inverting terminals.
    b. In an inverting comparator the input ac signal is applied at the inverting terminal and the reference voltage is applied at the non-inverting terminal.

   c. When Vin > Vref the output voltage Vo = -Vsat and when Vin < Vref then the o/p voltage Vo = +Vsat.

2. We have also simulated a zero crossing detector and plotted the waveforms for the same.
   a. A Zero Crossing Detector(ZCD) is an electronic circuit whose o/p voltage Vo swings from +Vsat to -Vsat everytime the input crosses the zero crossing point.
   b. In ac signals the zero crossing point is nothing but Vin=0V.
   c. These circuits are also known as sine wave to square wave converters.