

Lab Assignment 3

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Year – IInd year

We have, $\text{mod}(19116040, 4) + 1 = 1$

Thus, Problem Set 1 was chosen corresponding to the CSE group.

Part 2)

To design a free running Multi-Vibrator of 1KHz frequency and 30% duty cycle. Standard values of Resistor and Capacitor are chosen which are:

$$1) R1 = 2.4 \text{ k}\Omega = 2400 \text{ }\Omega$$

$$2) R2 = 5.6 \text{ k}\Omega = 5600 \text{ }\Omega$$

$$3) C1 = 0.18 \text{ }\mu\text{F} = 0.00000018 \text{ F}$$

Thus, following calculations were made:

$$1) \text{ Time Period (T)} = \ln(2) * (R1 + R2) * C1$$

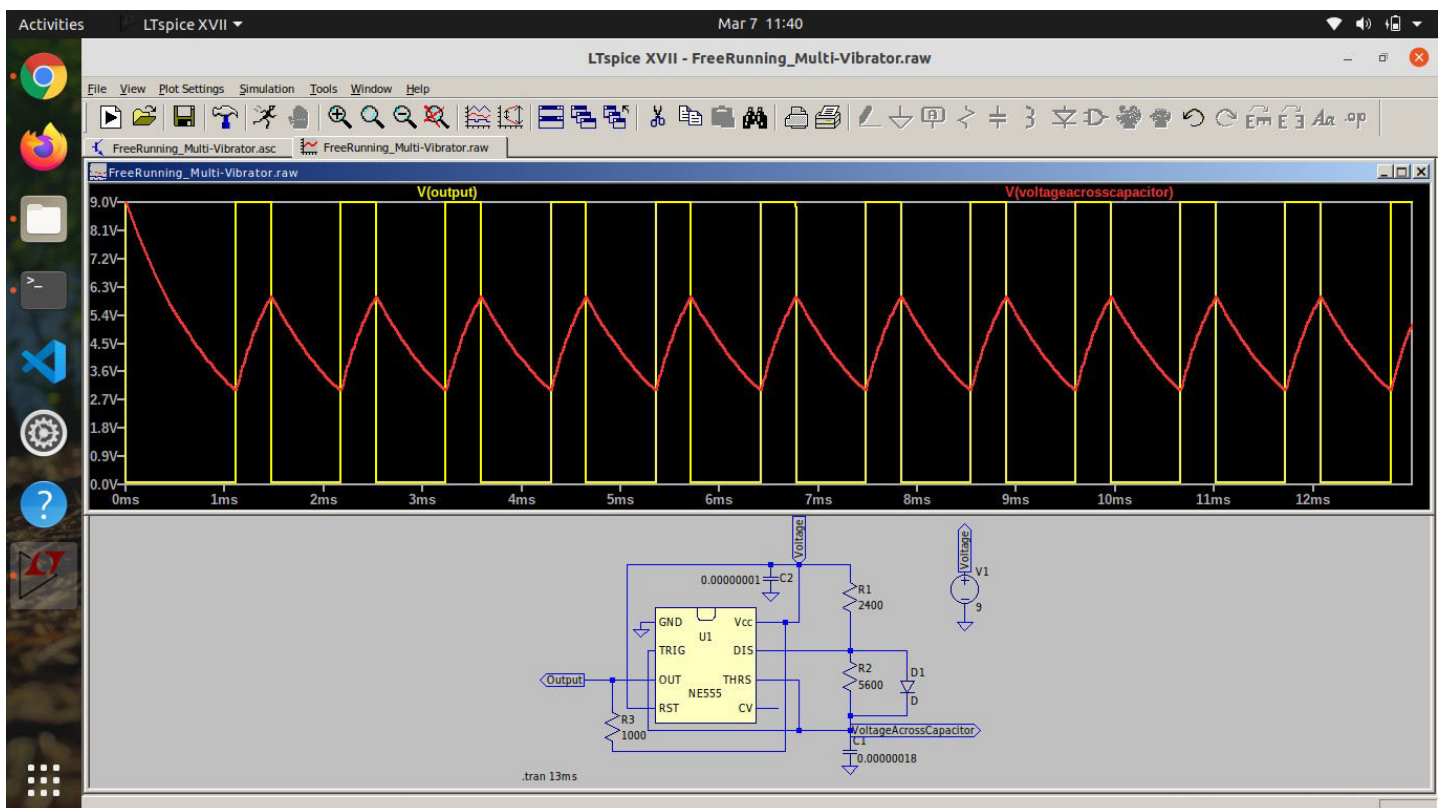
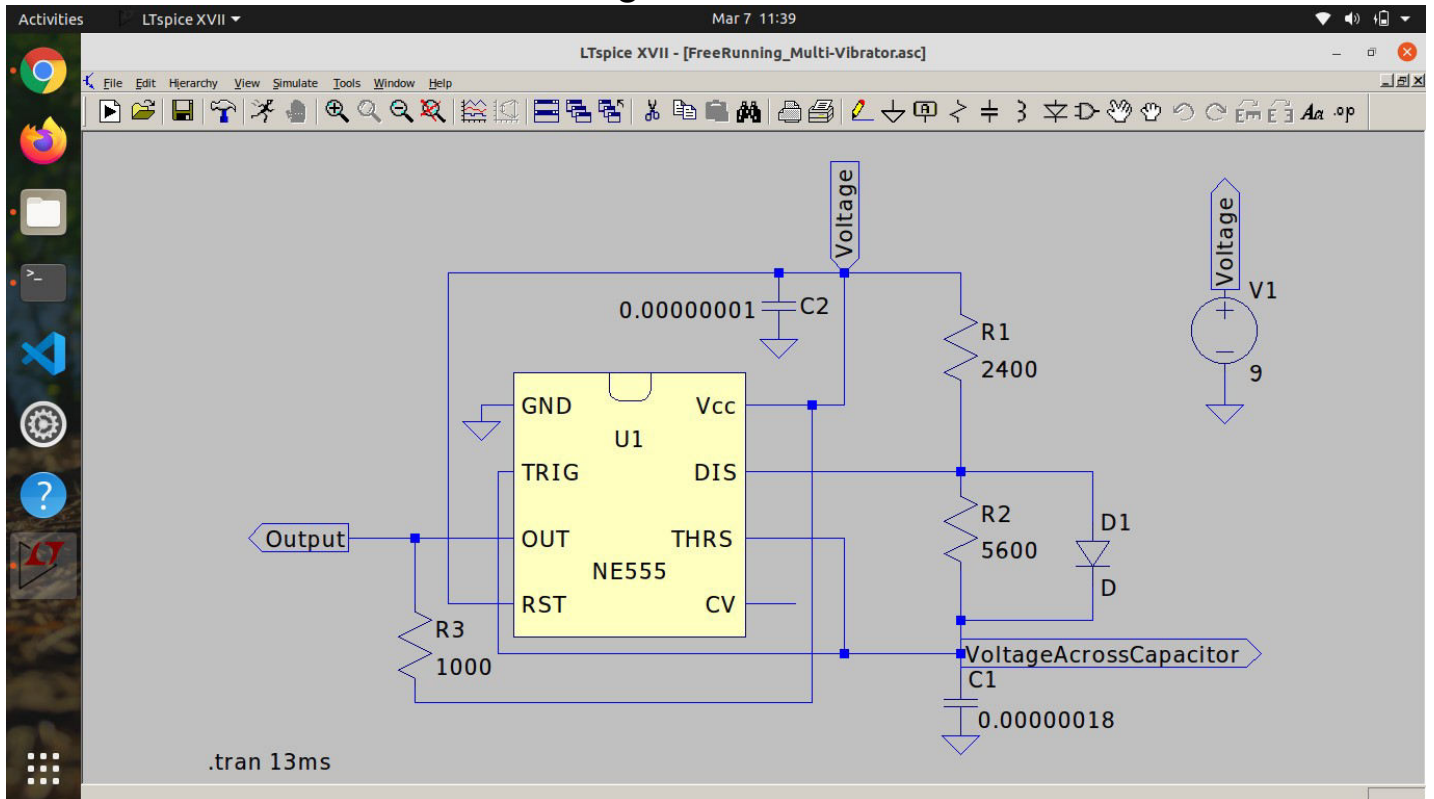
$$T = 0.693 * (2400 + 5600) * 0.00000018 = 0.00099 \text{ s} \approx 1 \text{ ms}$$

$$2) \text{ Frequency (f)} = (1/T) = 0.001 \text{ Hz} = 1 \text{ kHz}$$

$$3) \text{ Duty Cycle} = R1/(R1 + R2) = 2400/8000 = 0.3$$

$$\text{Duty Cycle(\%)} = 30\%$$

Screenshot of the Circuit Diagram and Simulation result is:



The above simulation was carried out for 13ms. Following is the colour convention :

- 1) Yellow Colour – Output voltage obtained for the Free Running Multi-Vibrator with given specifications
- 2) Red Colour – Voltage variation across the capacitor

Part 3)

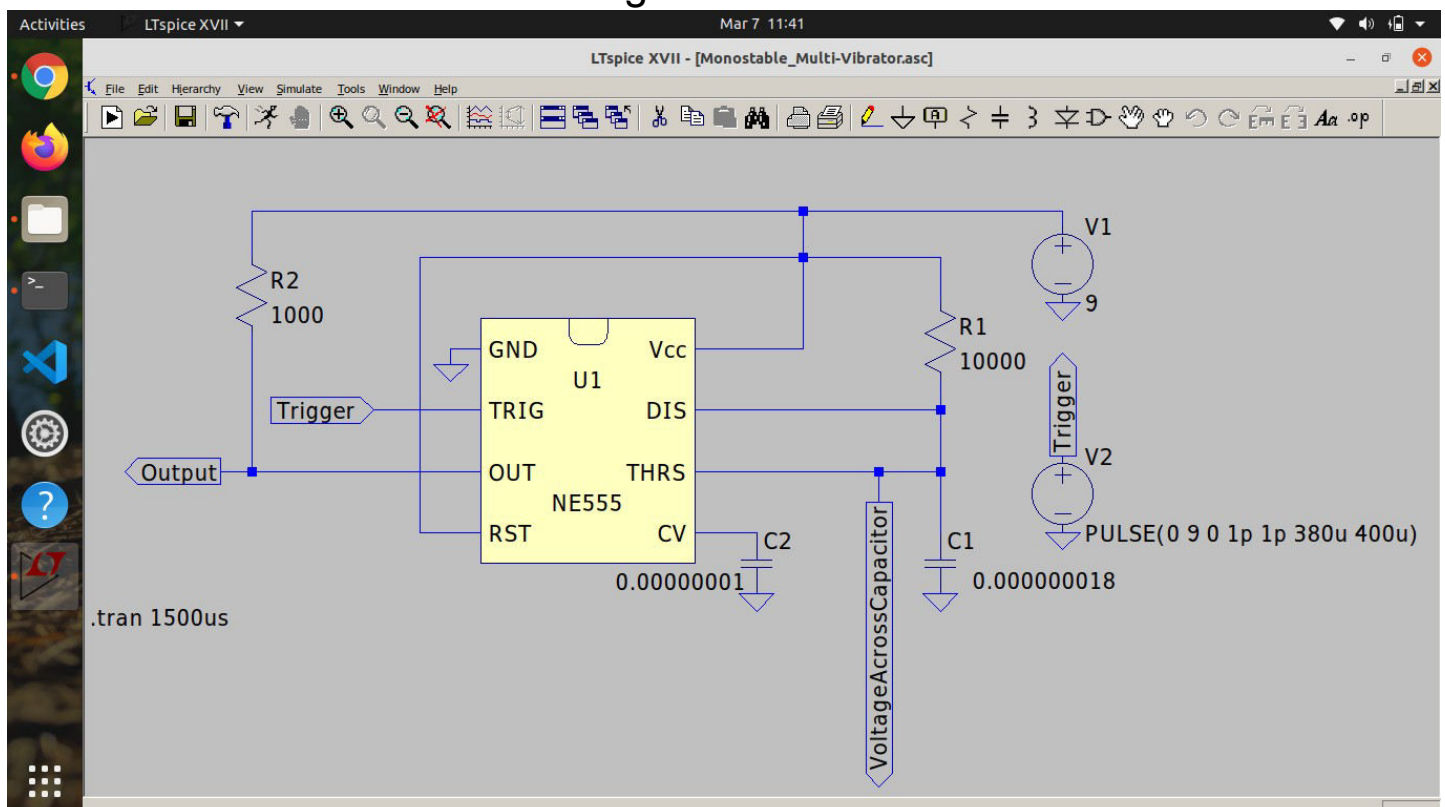
To design a Negative-edge triggered Monostable Multi-Vibrator of 200 μ s pulse width. Standard values of Resistor and Capacitor are chosen which are:

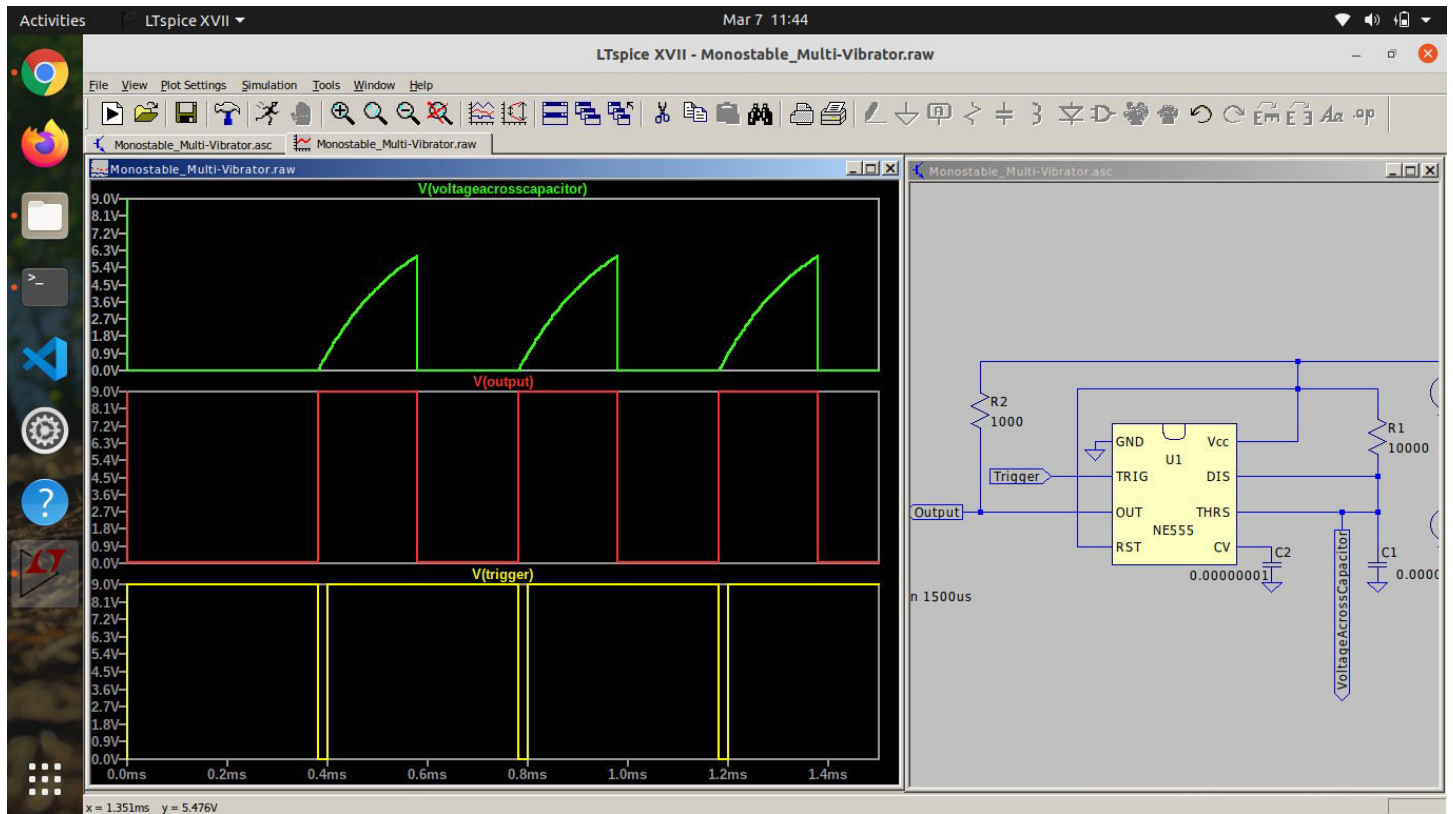
- 1) $R1 = 10\text{ k}\Omega = 10000\ \Omega$
- 2) $C1 = 0.018\ \mu\text{F} = 0.000000018\text{ F}$

The following calculations were made:

- 1) Pulse Width (W) = $\ln(3) * R1 * C1 = 1.1 * 10000 * 0.000000018$
 $W = 0.000198\text{ s} \approx 0.2\text{ ms or }200\ \mu\text{s}$

Screenshot of the Circuit Diagram and Simulation Result is:





The above simulation was carried out for 1.5ms or 1500 μ s.

Following is the colour convention :

- 1) Yellow Colour – The trigger voltage which was provided as the input.
- 2) Red Colour - Output voltage obtained for the Negative-Edge triggered Monostable Multi-Vibrator with given specifications
- 3) Green Colour – Voltage variation across the capacitor