

# Indian Institute of Information Technology, Allahabad

## ELECTRONICS AND COMMUNICATION ENGINEERING DEPARTMENT

### Course Name: Surface Mount Technology Lab

#### Objective:

- To design, simulate and prepare layout for an astable multivibrator circuit using EDWinXP.
- Prepare the PCB using dark room process.
- Mount the components using surface mount technology.

#### To design, simulate and prepare layout for an astable multivibrator circuit using EDWinXP

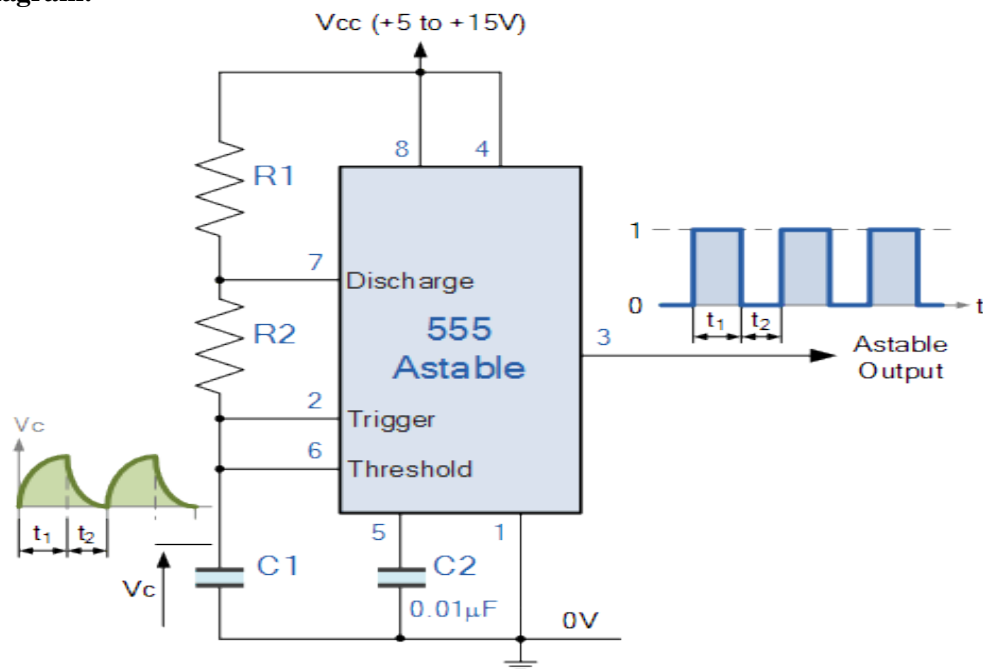
#### Tools / Component Required :

EDWinXP , 555 Timer IC, Resistance (10K $\Omega$  – 2 No), Capacitor (0.01  $\mu$ F, 0.1  $\mu$ F)

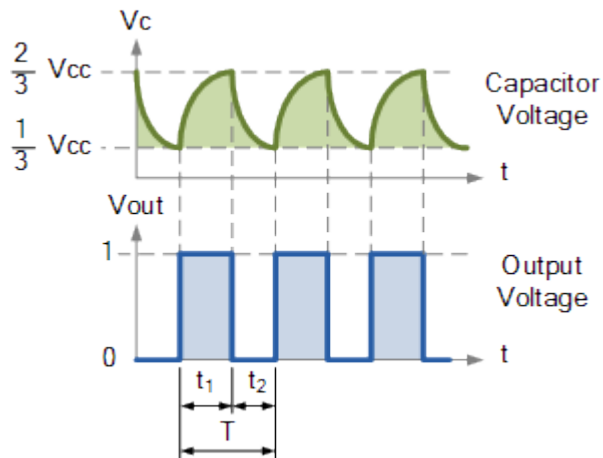
#### Theory:

555 timer IC can be connected in an Astable mode to produce a very stable **555 Oscillator** circuit for generating highly accurate free running waveforms whose output frequency can be adjusted by means of an externally connected RC tank circuit consisting of just two resistors and a capacitor.

#### Circuit Diagram:



Values:  $R1 = R2 = 10\text{ k}\Omega$  ,  $C1 = 0.1\ \mu\text{F}$

**Graph:****Calculations:**

Oscillator charge time =  $0.693 (R1+R2) C$

Oscillator discharge time =  $0.693 \times R2 \times C$

Oscillator frequency  $f = \frac{1.44}{(R1+2.R2) C}$

Oscillator duty cycle =  $\frac{T_{ON}}{T_{ON}+T_{OFF}} \% = \frac{R1}{R2+2.R2} \%$

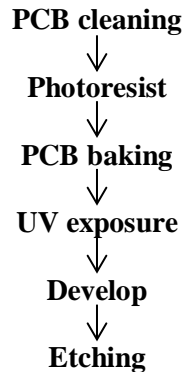
**Precautions:**

- Connections should be verified before clicking run button.
- The resistance to be chosen should be in K ohm range.

**NOTE : Perform the simulation and obtain the layout as explained in the video.**

## Prepare the PCB using dark room process.

Step by step procedure for making PCB in dark room



### **PCB cleaning**

- We'll have a single sided PCB (copper coating at one side).
- Clean the PCB by scrub to remove impurities.

### **Photoresist**

- PCB is dipped into photoresist with the help of tongs.
- Types of photo resist are: Positive Photoresist  
Negative Photoresist
- We will use Negative Photoresist.

### **PCB baking**

- Bake the PCB for 2 minutes to dry our resist on the PCB.

### **UV exposure**

- Align the PCB with photomask (layout print on butterpaper).
- Expose it to UV light for 4 minutes
- As we have used negative photoresist so, unexposed part will hardened

**NOTE:- process up to UV exposure is to be done in absence of light**

### **Develop**

- A Developing solution is needed to remove hardened resist.
- Dip the UV exposed PCB in developer solution for 10-15 minutes
- Layout pattern can be seen transferred on the PCB

### **Etching**

- $\text{FeCl}_3$  added to Hot water constitutes etching solution.
- Etching takes 20-25 minutes, it will not affect the circuit interconnections, and will remove remaining copper layer

### **Mount the components using surface mount technology**

With the help of solderpaste and pick and place machine mount the components onto the fabricated PCB.

**NOTE : The procedure has been shown in the video**