Experiment No.5

ASTABLE MULTIVIBRATOR

Aim:-To design an astable multivibrator to produce a square wave of 5KHz frequency using BC107B.

Components and Equipment:- Resistors, Capacitors, BC107B, RPS, Groove Board and CRO & DMM.

Circuit diagram:-

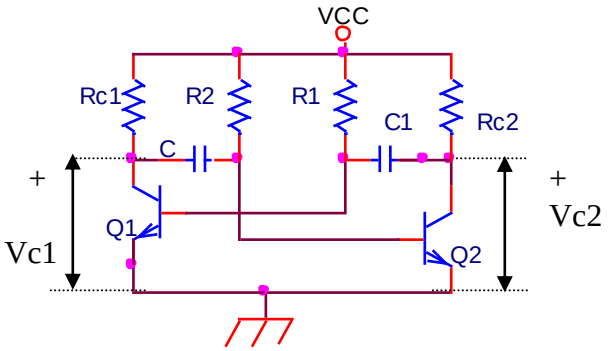


Fig5.1: Astable Multivibrator

Design:-

Given f = 5KHz, Vcc, Icsat.

$Rc = (Vcc-V_{CE}sat)/Icsat = 6-0.2/2mA = 2.9K\Omega$

To ensure saturation

$Ib > Ics/h_{fe}$,

Hence $R <= h_{fe}$. Rc

$Ri = Vcc/Ib = 6/0.011 = 540K\Omega$.

For a symmetrical ckt,

$R_1 = R_2 = R$; $C_1 = C_2 = C$;

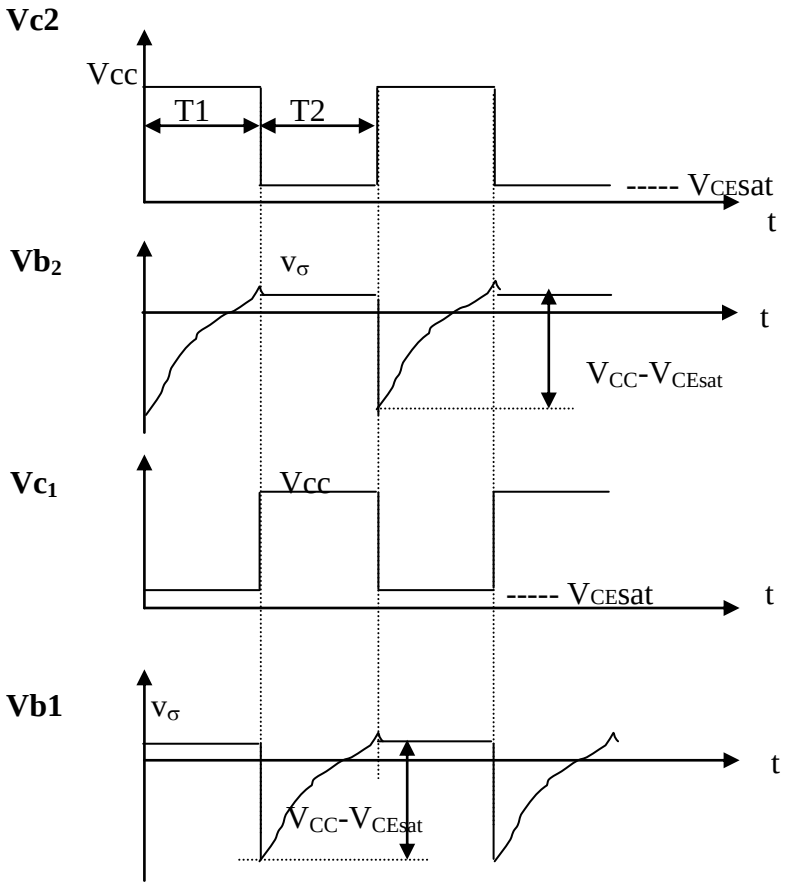
T/2 = 0.69

$C = T/2/(0.69RC) = 2.68x10^{-10}$ f = 268 pf

Procedure:-

- Construct the astable multivibrator circuit in fig5.1 using a 5V supply and the component values determined in design.
- Use an oscilloscope to observe the waveform at the collector and base of each transistor, and record in a form that shows all waveforms time referenced to each other. Also, note the waveform frequency and amplitude.
- Double one of the capacitors by paralleling it with another capacitor. Note the effect on the transistor waveform.

Observations:-



For an asymmetrical circuit,

$R_1 \neq R_2$ or $C_1 \neq C_2$.

$T = T_1 + T_2$;

Where $T_1 = 0.69R_1C_1$

$T_2 = 0.69R_2C_2$

$T = T_1 + T_2 = 0.69 (R_1C_1 + R_2C_2)$

Analysis:-

- Explain the waveforms obtained from the Astable circuit and compare the amplitudes and frequency to the design values (in example).
- Discuss the effect of doubling the capacitor value.

Conclusion:-

Without the aid of the external triggering circuit, the astable configuration makes transition from one quasi-stable state into another.