Institute of Engineering & Management
Department of Computer Science & Engineering
Communication Engineering Laboratory for 2nd year 4th semester 2017
Code: CS 491

Date: 8/02/18

ASSIGNMENT- 5

Experiment Name: Design an astable multivibrator using IC 555.

Objective: Designing an astable multivibrator using IC 555 using 2 resistors and 2 capacitors

Theory: An astable multivibrator, often called a free-running multivibrator, is a rectangular-wave generating circuit. This circuit does not require any external trigger to change the state of the output, hence the name free-running.

Circuit Diagram:

Circuit Operation: In figure, when Q is low or output V_{OUT} is high, the discharging transistor is cut-off and the capacitor C begins charging toward V_{CC} through resistances R_A and R_B. Because of this, the charging time constant is $(R_A + R_B)$ C. Eventually, the threshold voltage exceeds +2/3 V_{CC}, the comparator 1 has a high output and triggers the flip-flop so that its Q is high and the timer output is low. With Q high, the discharge transistor saturates and pin 7 grounds so that the capacitor C discharges through resistance R_B with a discharging time constant R_B C. With the discharging of capacitor, trigger voltage at inverting input of comparator 2 decreases. When it drops below $1/3V_{CC}$, the output of comparator 2 goes high and this reset the flip-flop so that Q is low and the timer output is high. This proves the auto-transition in output from low to high and then to low. Thus the cycle repeats. The time during which the capacitor C charges from 1/3 V_{CC} to 2/3 V_{CC} is equal to the time the output is high.

$$\mathbf{T_{high} = 0.693 (R_A + R_B) C}$$

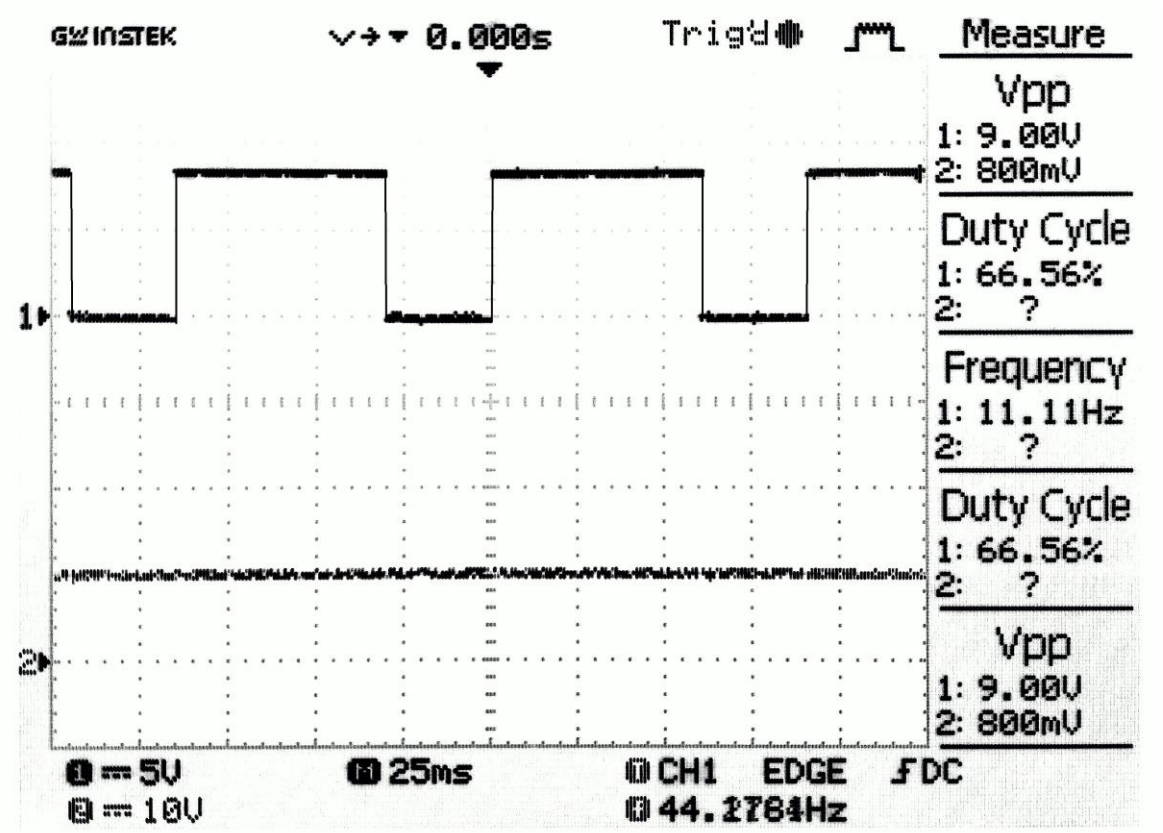
$$\mathbf{T_{low} = 0.693 R_B C}$$

Name: Ranajit Roy, **Sec:** A, **Roll:** 47

Observation Table:

No. of Obs	$R_A(\Omega)$	$R_B(\Omega)$	Calculated				Oscilloscope		
			T_{high}(ms)	T_{low}(ms)	frequency(Hz)	Duty Cycle	V_{PP}(V)	frequency(Hz)	Duty Cycle

Waveform:



Discussion: From this experiment, we came to know about the 555 timer implementations over various purposes including monostable, bistable operations, etc.
In our circuit, we omitted the diode to get practical duty cycle instead of near 50% duty cycle.

Name: Ranajit Roy, **Sec:** A, **Roll:** 47