EXPERIMENT NO: 9

AIM: To make and test the operations of Astable Multivibrator circuits using 555 timer

TOOL: Orcad PSpice

THEORY: The 555 Timer IC can be connected either in its Monostable mode thereby producing a precision timer of a fixed time duration, or in its Bistable mode to produce a flip-flop type switching action. But we can also connect the 555 timer IC 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. The 555 Oscillator is another type of relaxation oscillator for generating stabilized square wave output waveforms of either a fixed frequency of up to 500kHz or of varying duty cycles from 50 to 100%.

In the 555 Oscillator circuit above, pin 2 and pin 6 are connected together allowing the circuit to re-trigger itself on each and every cycle allowing it to operate as a free running oscillator. During each cycle capacitor, C charges up through both timing resistors, R1 and R2 but discharges itself only through resistor, R2 as the other side of R2 is connected to the discharge terminal, pin 7.Then the capacitor charges up to 2/3Vcc (the upper comparator limit) which is determined by the 0.693(R1+R2)C combination and discharges itself down to 1/3Vcc (the lower comparator limit) determined by the 0.693(R2*C) combination. . The individual times required completing one charge and discharge cycle of the output is therefore given as: t1 = 0.693 (R1+R2).C, t2 = 0.693 R2.C, T = t1 + t2.

Hints for Design

t1 = 0.693 (R1+R2) C

t2 = 0.693 R2C,

T = t1 + t2 = 0.693 (R1+2R2) C

Calculation:

Let t2 = 0.693S

t1 = 0.699S

let C= 10 μF,

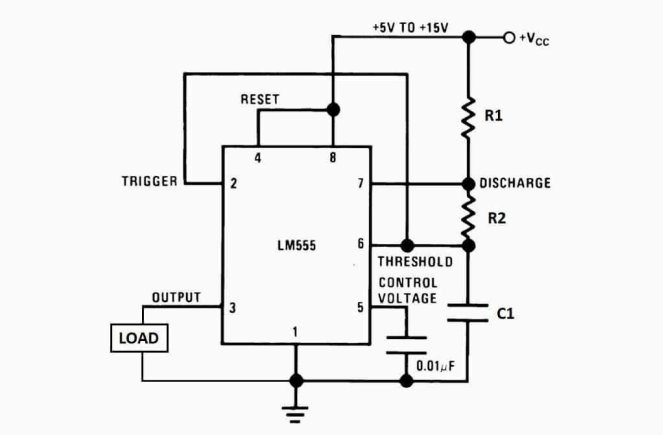
since t2 = 0.693S, R_2 =100KΩ

and t1 = 0.699S, R_1 =1KΩ

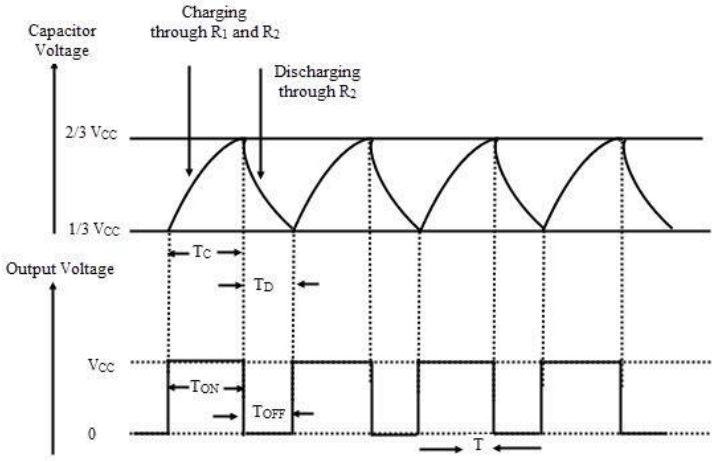
Connections:

Vcc =9V and R_L = 10 KΩ, at output pin 3. Pin 5 is connected to ground through 0.01μF.

CIRCUIT DIAGRAM



ANALYSIS:



CONCLUSION