DESIGN OF COLPITTS OSCILLATOR

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INTRODUCTION:

Colpitts Oscillator is designed for the generation of high frequency sinusoidal oscillations with the frequencies ranging from 10 KHz -300MHz.This is bipolar junction transistor (BJT).

When the power supplies are switched ON the capacitor starts charging and after the capacitors get fully charged it Starts discharging through the inductor causing damped harmonic oscillations. Hence the generation of oscillation and the frequencies of oscillations are determined by using the resonant frequency of a TANK circuit consisting of inductors and capacitors. The capacitors forms potential divider and this tapped capacitance in the tank circuit can be used to provide better frequency stability compared to the Hartley oscillator.

$$f_r = 1/ (2\pi\sqrt{(L*C)})$$

Where

f_r is the resonant frequency.

C is the equivalent capacitance.

L is the self inductance in tank circuit.

MODELLING:

BIASING RESISTOR VALUES:

R1=190k ohms
R2=36k ohms
R3=4.8k ohms
R4=1.2k ohms

TANK CIRCUIT DESIGN:

C4=20n F
C2=5n F
L=50m H

RTL SCHEMATIC USING ESIM SOFTWARE:

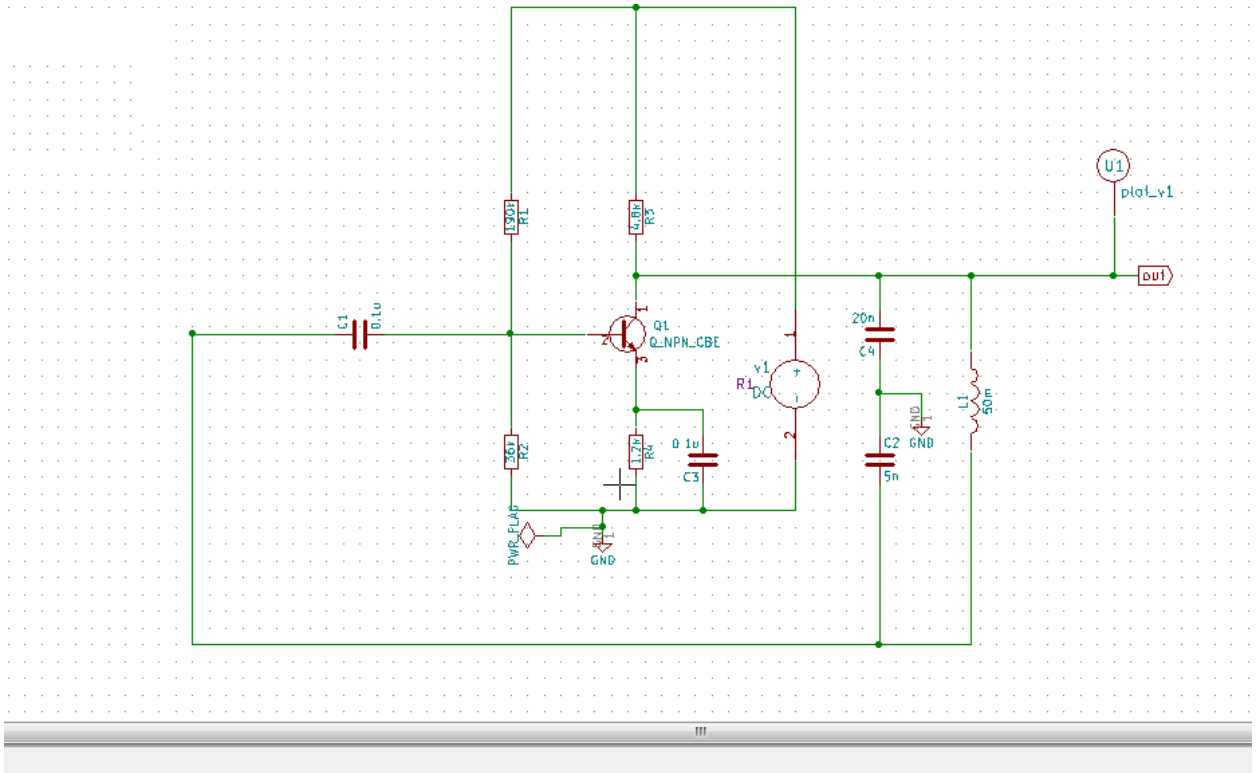

FIGURE 1: DESIGN OF COLPITTS OSCILLATOR

SIMULATION OUTPUT:

NGSPICE PLOT:

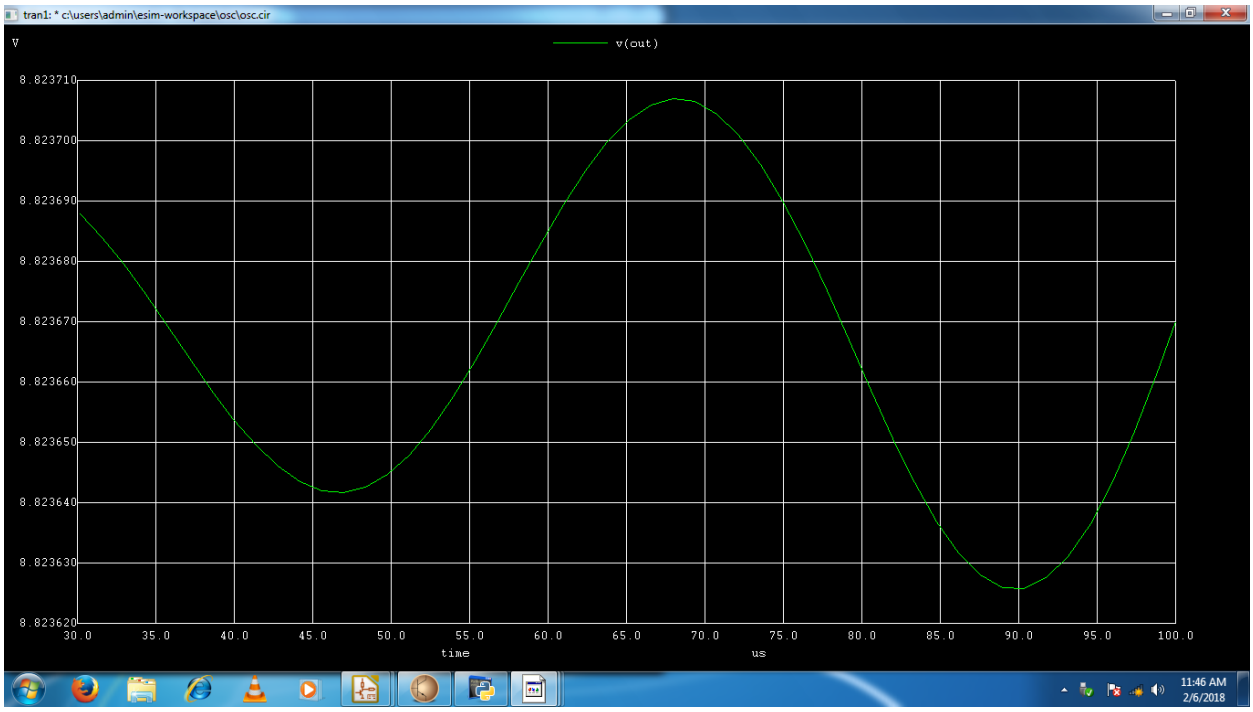

FIGURE 2: NGSPICE OUTPUT FREQUENCY PLOT

PYTHON PLOT:

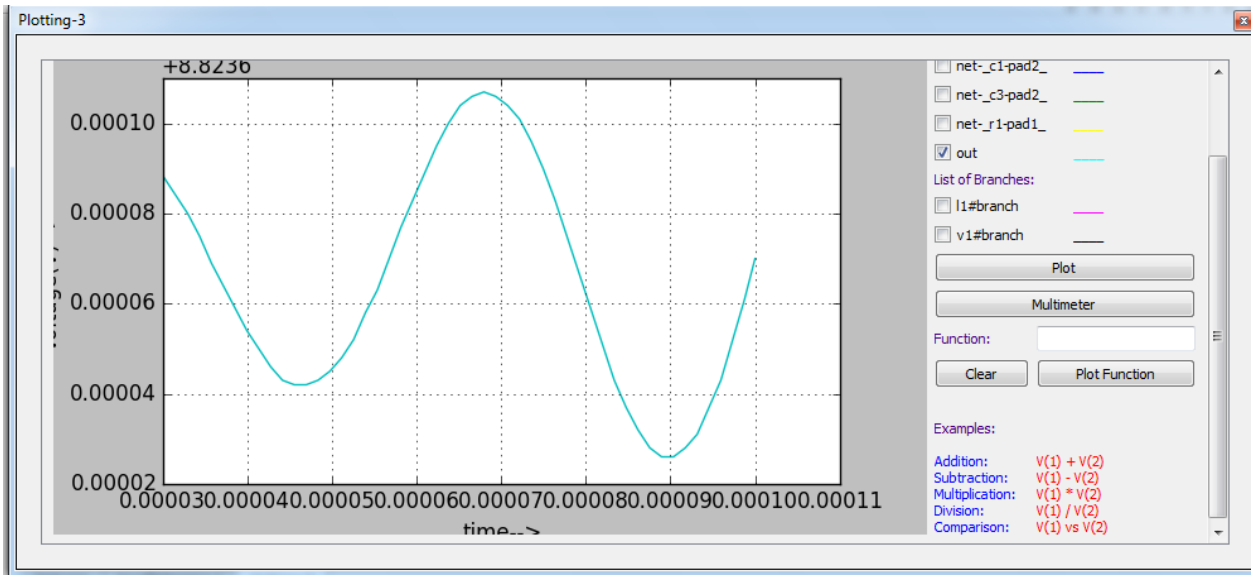

FIGURE 3: PYTHON PLOTTING OF OUTPUT

CONCLUSION:

Thus, we have designed colpitt's oscillator using esim and we get appropriate waveforms.

REFERENCE:

https://www.elprocus.com/colpitts-oscillator-circuit-working-and-applications/,referred on 10/01/2018.