Experiment - No - 6

Title :- Design and set up the following tuned oscillator circuits using BJT and determine the frequency of oscillation R.C Phase shift oscillator.

Objective :- To design and set up an RC phase shift oscillator using BJT and to observe the sinusoidal output waveform.

Theory :- An oscillator is an electronic circuit for generating an AC signal voltage with DC supply as the only input requirement. The frequency of the generated signal is decided by the circuits elements used. An oscillator requires an amplifier, a frequency selective network and a (+ve feedback from the returned to the i/p of the amplifier. This satisfies the Barkhausen condition for sustaining oscillating and total loop gain of this circuit is greater than or equal 1, this condition is used to generate the sinusoidal oscillation.

Observations:

	Theoritical	Practical
Frequency	$f = \dfrac{1}{2\pi\sqrt{6+4k}}$ where, $k = R_e/R$ which is usually <1	$f = 63.88 Hz$

Calculations:-

$$T = 15.68 ms$$

$$T_1 = 16.28 ms, \quad T_2 = 15.80 ms, \quad T_3 = 15.99 ms$$

$$\Delta t_1 = T_1 - T = 16.28 - 15.68 = 0.6$$

$$\Delta t_2 = T_2 - T = 15.80 - 15.68 = 0.12$$

$$\Delta t_3 = T_3 - T = 15.99 - 15.68 = 0.31$$

$$\Delta t = \Delta t_1 + \Delta t_2 + \Delta t_3 = 0.6 + 0.12 + 0.31$$
$$= 1.03 ms$$

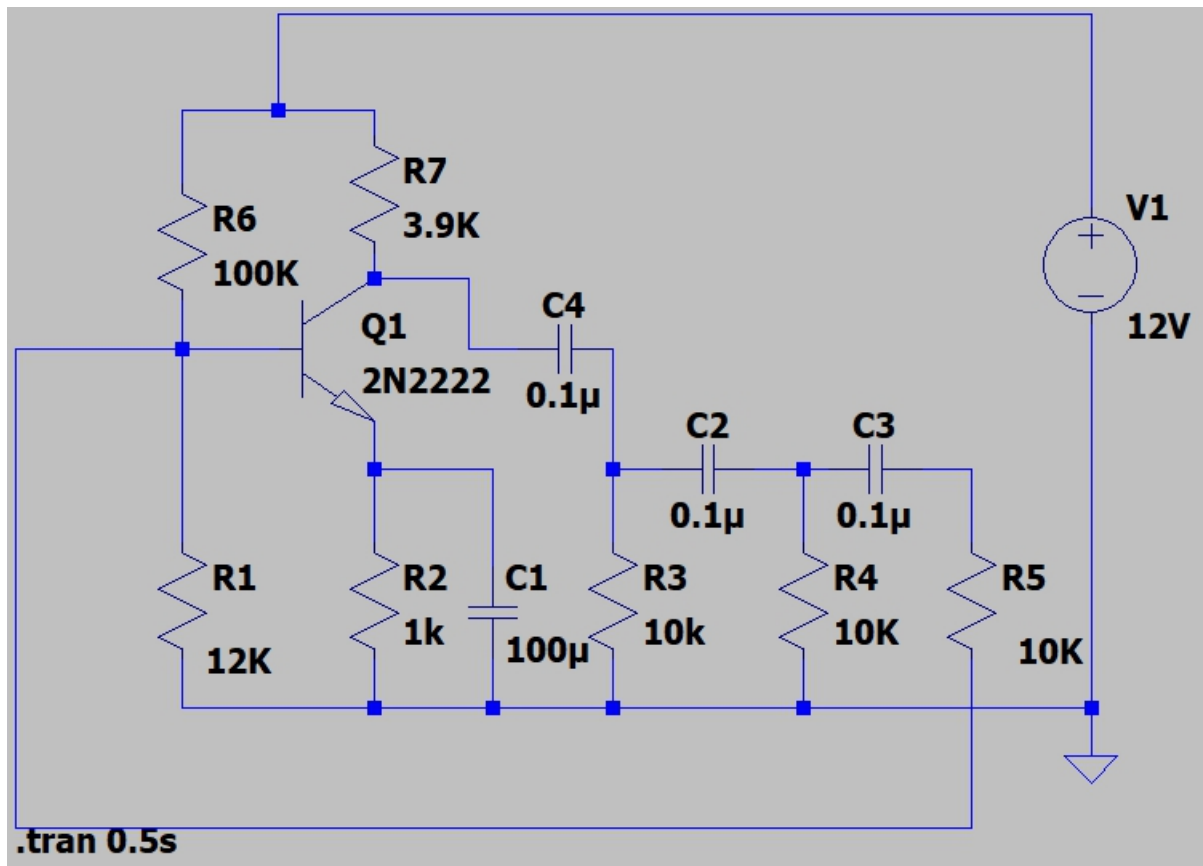$$f = \frac{1}{1.03} = 0.97 \times 10^{43} Hz$$
$$= 0.93 kHz$$

Questionaries:-

1) State Barkhausen Criteria for oscillation?

Ans) Generally the Barkhausen criteria for two conditions first the closed-loop-gain phase is equal to 1, Secondly, the closed loop phase is equal to 0, with these conditions the oscillator circuit would generate a sinusoidal signal.

(2) In which frequency range does a phase shift oscillator operates?

Ans) An operational amplifier based 3 stage RC phase shift oscillator is required to produce a sinusoidal o/p frequency of 4 kHz.

CIRCUIT DIAGRAM

GRAPH