SNS COLLEGE OF TECHNOLOGY

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Department of Biomedical Engineering

Course Name: 23BMB101-Electron Devices and Circuits

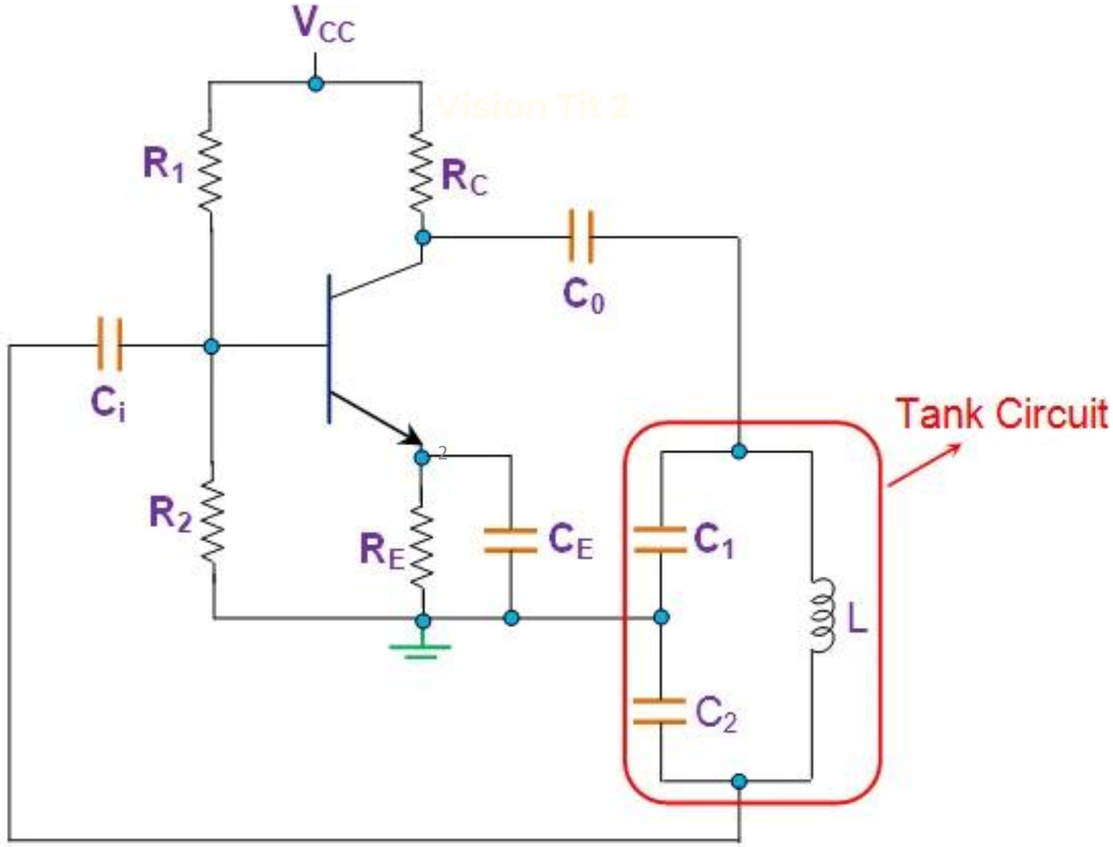
I Year : II Semester

Unit V –Feedback Amplifiers and Oscillators

Topic : Colpitts Oscillator

INTRODUCTION

- A Colpitts oscillator looks just like the Hartley oscillator but the inductors and capacitors are replaced with each other in the tank circuit.



Construction

- The resistors R1, R2 and Re provide necessary bias condition for the circuit.
- The capacitor Ce provides a.c. ground thereby providing any signal degeneration. This also provides temperature stabilization.
- The capacitors Cc and Cb are employed to block d.c. and to provide an a.c. path.
- The radio frequency choke (R.F.C) offers very high impedance to high frequency currents which means it shorts for d.c. and opens for a.c. Hence it provides d.c. load for collector and keeps a.c. currents out of d.c. supply source.

Oscillator - Construction

- The frequency determining network is a parallel resonant circuit which consists of variable capacitors C1 and C2 along with an inductor L.
- The junction of C1 and C2 are earthed. The capacitor C1 has its one end connected to base via Cc and the other to emitter via Ce.
- The voltage developed across C1 provides the regenerative feedback required for the sustained oscillations.
- When the collector supply is given, a transient current is produced in the oscillatory or tank circuit. The oscillatory current in the tank circuit produces a.c. voltage across C1 which are applied to the base emitter junction and appear in the amplified form in the collector circuit and supply losses to the tank circuit.

Oscillators

- As the CE configured transistor provides 180^o phase shift, it makes 360^o phase shift between the input and output voltages.
- Hence, feedback is properly phased to produce continuous Undamped oscillations. When the loop gain |βA| of the amplifier is greater than one, oscillations are sustained in the circuit.

$$F = \frac{1}{2\pi\sqrt{LC_{eff}}}$$

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$$\frac{C_1 C_2}{C_1 + C_2}$$