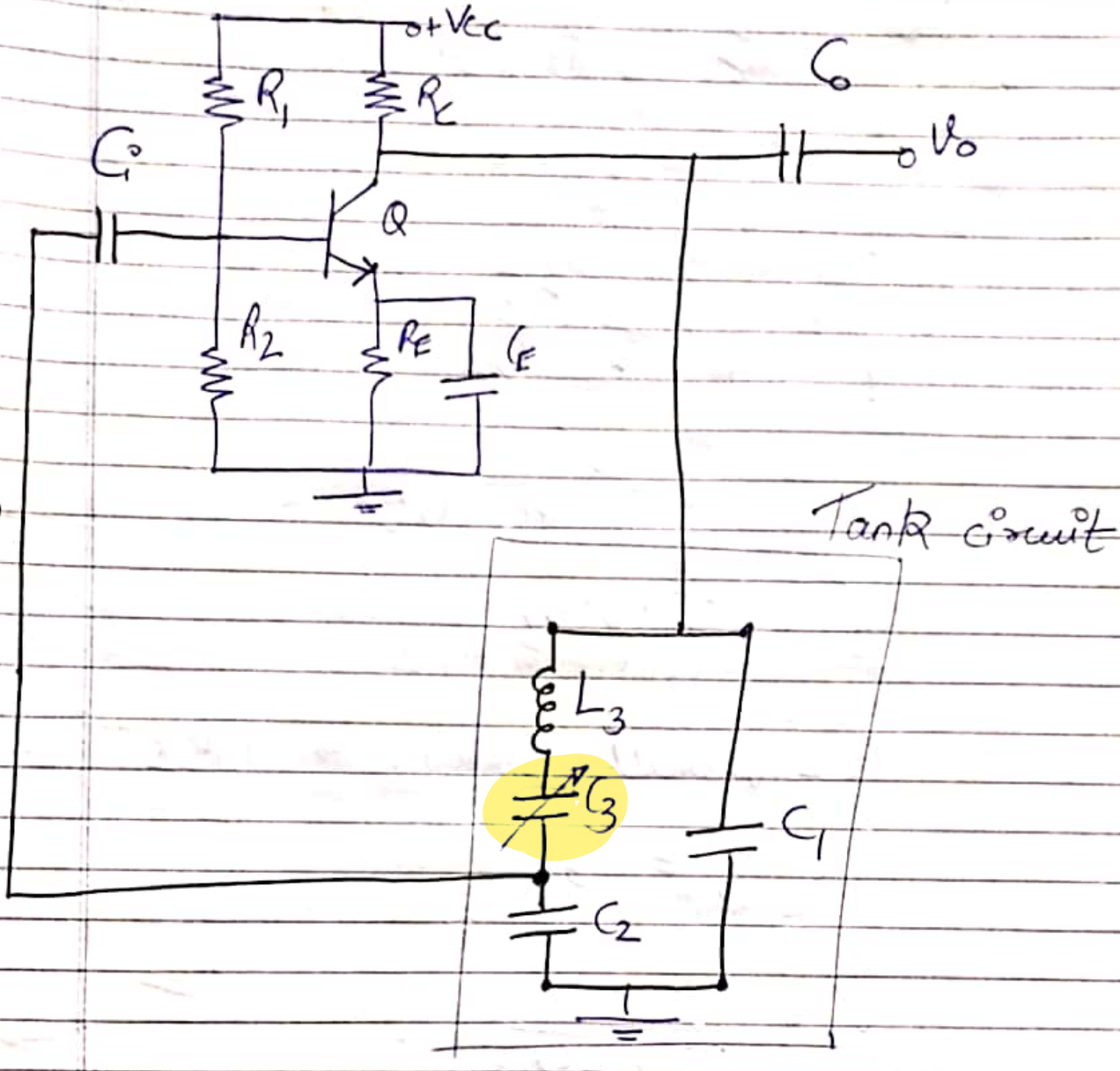
Clapp's oscillator:-



- improved version of colpitts oscillator.

Tank ckt : 180°
Ampl^r : 180°
Total Phase shift : 360° or 0°

- working similar to colpitts, but it offers superior freq^n stability
- Extra cap. C_3 is used

C_3 → pf , C_1, C_2 → μF

- Since C_3 is in series with C_1 & C_2 around the tank ckt.

$$\frac{1}{C_{eq}^{-1}} \equiv C_{eq} = C_1 \| C_2 \| C_3$$

$$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

$$C_{eq} = \frac{C_1 C_2 C_3}{C_1 C_2 + C_1 C_3 + C_2 C_3}$$

$$C_{eq} = \frac{C_1 C_2 C_3}{C_3 (C_1 + C_2) + C_1 C_2}$$

C_3 - v. small compared to C_1 & C_2

i.e $C_{eq} = C_3$.

$$\boxed{f_o = \frac{1}{2\pi \sqrt{L_3 C_3}}}$$

- higher freq^n achieved
- More stable oscillator
- very good freq^n stability & accuracy.
- Variable-freq^n oscillator, f_o vary by C_3.

$$K = \frac{C_1}{C_2}$$

$$\boxed{A_v \geq \left| \frac{C_2}{C_1} \right|}$$ - for oscillat's to be sustained.

- As with all the oscillator's, the Barkhausen criteria is satisfied as follows,

  Tank circuit (FIB network) : 180° phase-shift
  Amplifier : 180° phase-shift

  Thus, the total phase-shift from I/p to o/p is 0° or 360°.

- The working of Clapp's oscillator is exactly the same as Colpitt's oscillator, only difference being is that it offer's superior frequency stability compared to Colpitt's oscillator.

- The addition of C_3 capacitor improves the frequency stability which offer's Clapp's oscillator a unique characteristic of not being influenced by stray capacitance's and transister parameter's (which would otherwise alter the value of C_1 and C_2 as in Colpitt's oscillator)
- This results in a much more stable oscillator with a very good frequency stability and accuracy.

Advantages:
1) High frequency stability is achieved
2) It is possible to obtain oscillation's at very high frequencies
3) Variation in frequency is extremely simple because it can done by just changing (varying) value C_3.

Disadvantages:
1) It will have loading effect due to low I/P impedance offered by BJT, thus lowering it's resonant freq^n value

Applications:
1) It is used in FM receiver's as high frequency oscillator where a very accuracy and stable frequency is a requirement.

Note:- In Hartley, Colpitt's and Clapp's oscillator we have used BJT as an active element, but remember ever FET can be used.