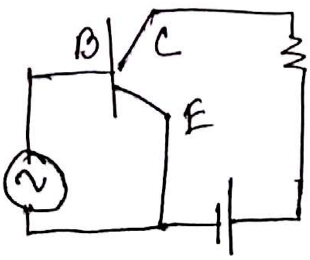
9.1 Faithful Amplification:

The Process of raising the Strengnt of a weak signal without any change in its general shepe is known as "faithful Amplification"

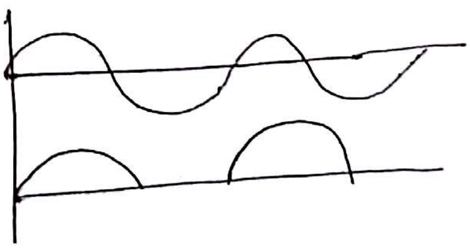
Candition must be satisfied:

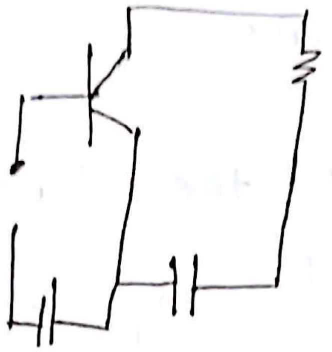
1. Proper zero signal collector current
2. minimum proper base- emitter voltage (V_{EE})
3. minimum proper collector emitter voltage. (V_{CE})

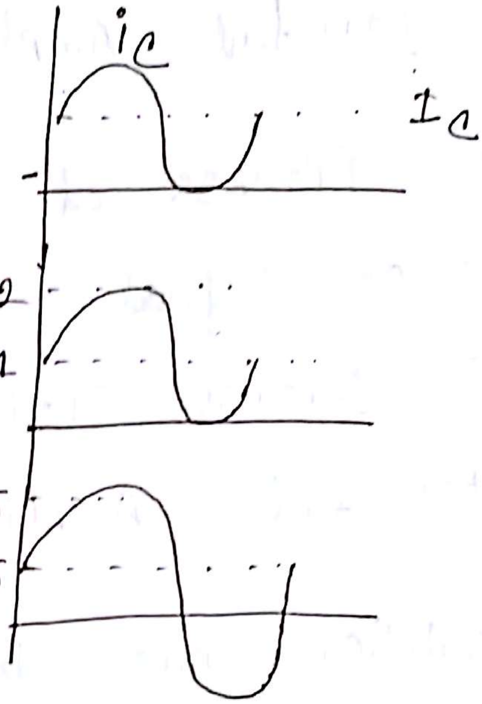
1. Proper zero signal collector current:



Page 1







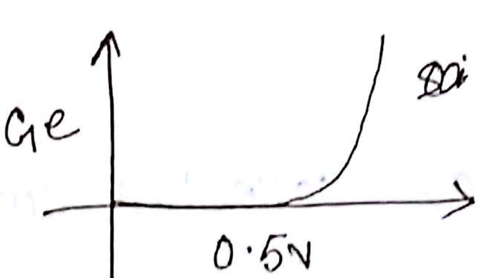
$i = I_C + i_c$

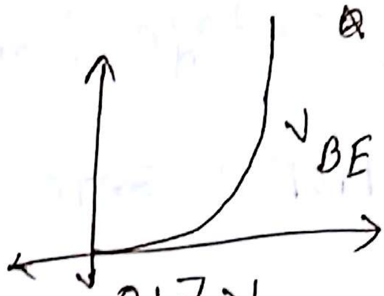
$I_C \rightarrow$ DC

$i_c \rightarrow$ AC

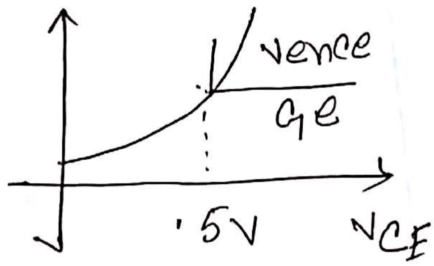
ii) Proper minimum V_{BE}:

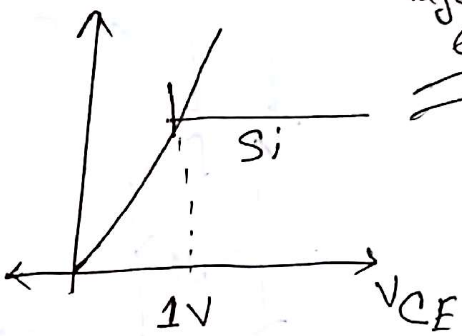
Page-4





iii) Proper minimum V_{CE}:





Page 6

9.2: Biasing def: Biasing page 7

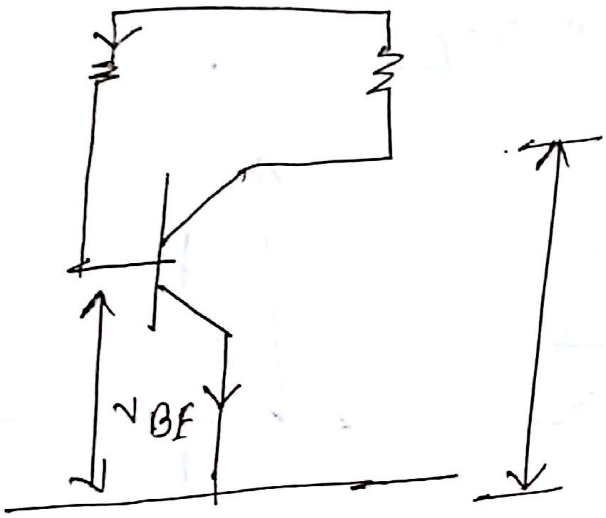
9.7 method of Biasing:

i) Base Resistor.
ii) voltage divider bias.

page - 8

9.8 . Base Resistor method:

page - 9



Circuit Analysis:

$$I_B = \frac{I_C}{\beta}$$

Applying KVL:

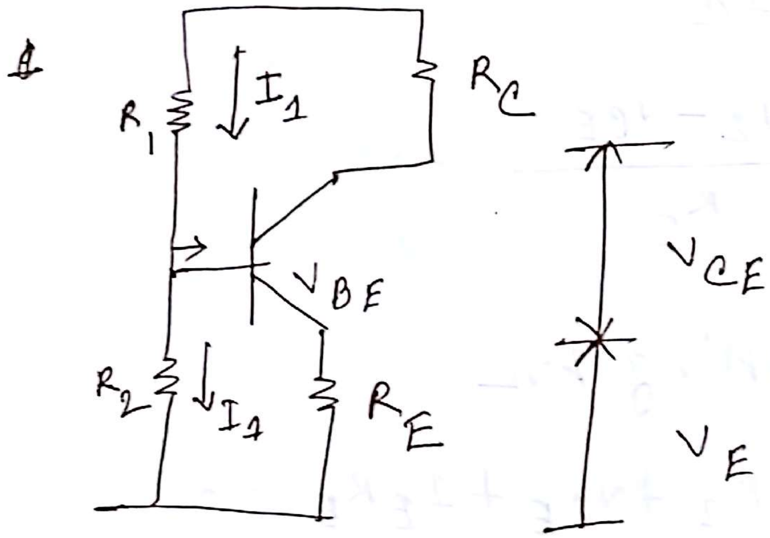
$$-V_{CC} + I_B R_B + V_{BE} = 0$$

$$\Rightarrow I_B R_B = V_{CC} - V_{BE}$$

$$\Rightarrow R_B = \frac{V_{CC} - V_{BE}}{I_B}$$

9.12:

11) voltage divider method bias:



Page: 11

$$I_1 = \frac{V_{CC}}{R_1 + R_2}$$

$$V_2 = \left(\frac{V_{CC}}{R_1 + R_2} \right) \times R_2$$

Now Appling KVL,

$$-V_2 + V_{BE} + V_E = 0$$

$$\Rightarrow V_2 = V_{BE} + V_E \qquad [V_E = I_E R_E]$$

$$\Rightarrow I_E = \frac{V_2 - V_{BE}}{R_E}$$

$I_E \approx I_C$

$$I_C = \frac{V_2 - V_{BE}}{R_E}$$

V_{CE}: Appling KVL

$$-V_{CC} + I_C R_C + V_{CE} + I_E R_E = 0$$

$$\Rightarrow V_{CC} = I_C R_C + V_{CE} + I_E R_E$$

$$= V_{CE} + I_C(R_C + R_E)$$

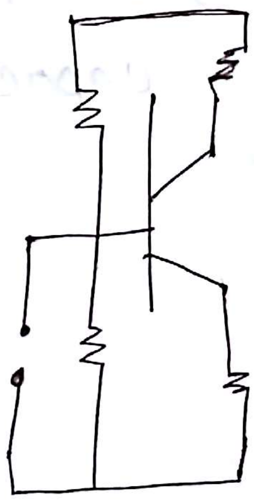
$$\Rightarrow V_{CC} = V_{CE} + I_C(R_C + R_E)$$

$$\therefore V_{CE} = V_{CC} - I_C(R_C + R_E)$$

Chapter 10

Single Stage transistor amp:

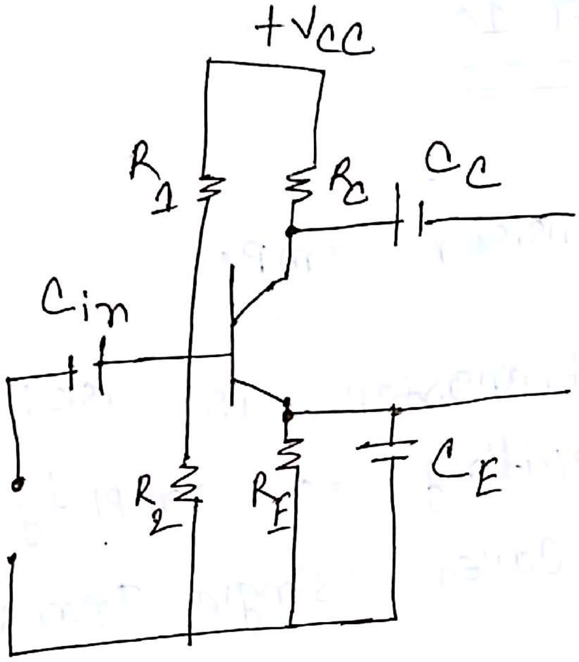
when only one transistor is used with associated circuiting to amplify a weak signal, it is called "single Transistor Amplifier"



Page - 16

10.4: Practical circuit:

Page - 16



i) Biasing circuit, (R_1, R_2, R_E)

ii) Input capacitor, C_{in}

iii) Emitter bypass capacitor, C_E

iv) Coupling capacitor, C_C

Emitter current:

$$i_E = \overbrace{I_E}^{DC} + i_e$$

Base current:

$$i_B = I_B + i_c$$

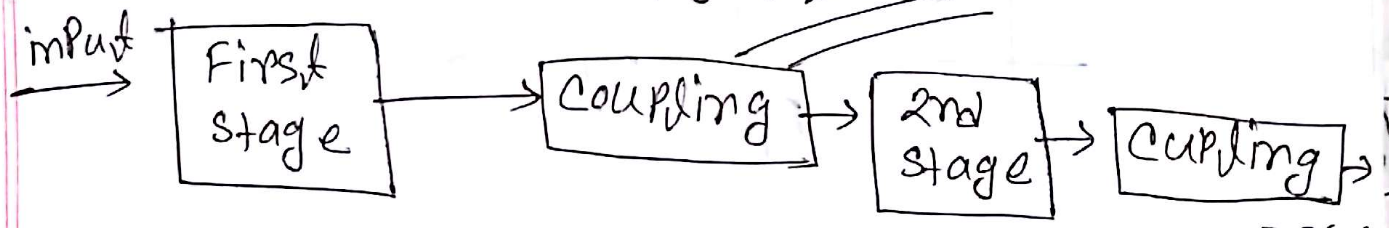
Collector current:

$$i_c = I_c + i_c$$

Chapter – 11

11.1 A Transistor containing more than one stage of amplification is known as " Multistage transistor Amplifier".

Page : 22

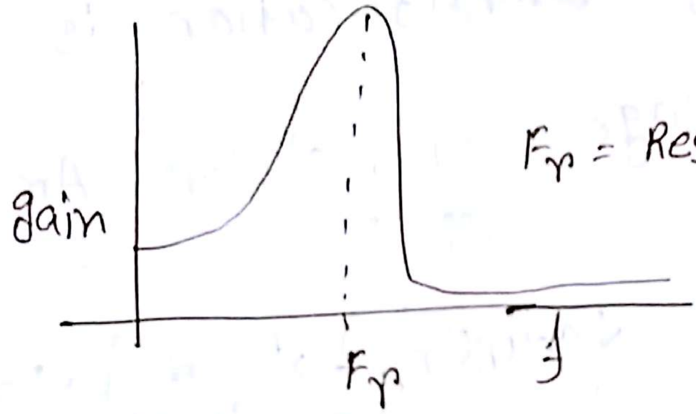


11.3 Gain: The ratio of output quantity to the input one is called Gain

$$G = G_1 \times G_2 \times G_3 \times \dots\dots$$

$$G_1 = \frac{o/p}{i/p}$$

ii) Frequency Response:



F_r = Response Frequency

iii) Decible gain:

The common logarith (base 10 of Power) gain known as bel power gain

$$\text{Power gain} = \log_{10} \frac{P_{out}}{P_{in}} \text{ bel}$$

$$1 \text{ bel} = 10 \text{ dB}$$

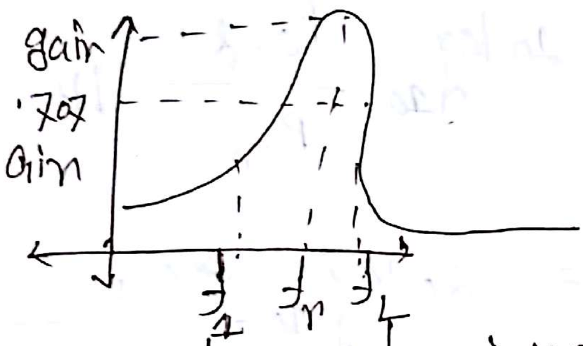
$\therefore$ Power gain = $10 \log_{10} \frac{P_{out}}{P_{in}}$ dB

$\therefore$ voltage gain = $20 \log_{10} \frac{V_{out}}{V_{in}}$ dB

$\therefore$ current gain = $20 \log_{10} \frac{I_{out}}{I_{in}}$ dB

(iv) Bandwidth:

The range of frequency over which the voltage gain is equal to or greater than 70.7% of max gain is known as "Bandwidth"



upper cutoff freq.

Lower cutoff freq.

Full in voltage from max gain =

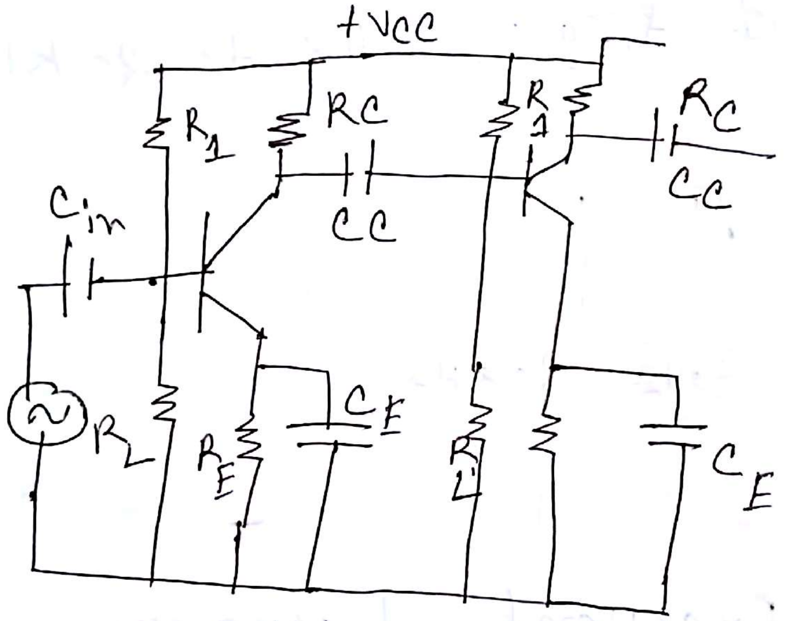
$$20\log_{10} 100 - 20\log_{10} 70.7$$

$$= 20\log_{10} \frac{100}{70.7}$$

$$= 20\log_{10} 1.4142 = 3\,dB$$

11.5 :

RC Coupled transistor Amplifier:



Page 29

Frequency Response:

1) At Low freq : -<50 Hz gain

→ C_c is very high

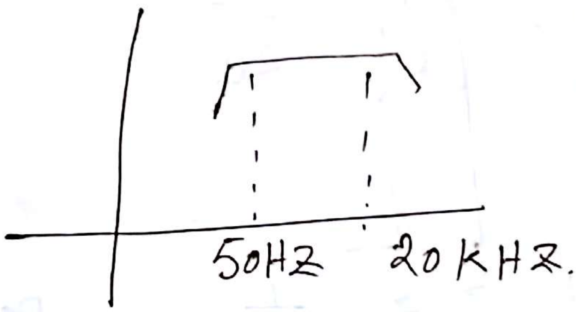
→ C_E cannot shunt

ii) At high freq : >20kHz

→ CC is very small.

→ Capacitive reactance is very Low.

iii) At mid freq: (50 HZ to 20 KHZ)



Adv: i) Excellent frequency

ii) Lower cost

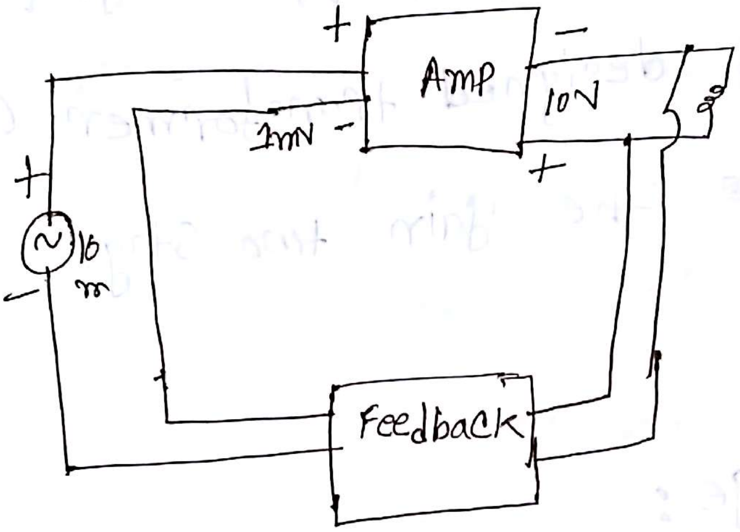
iii) circuit is compact

Dis Adv: i) Low voltage gain

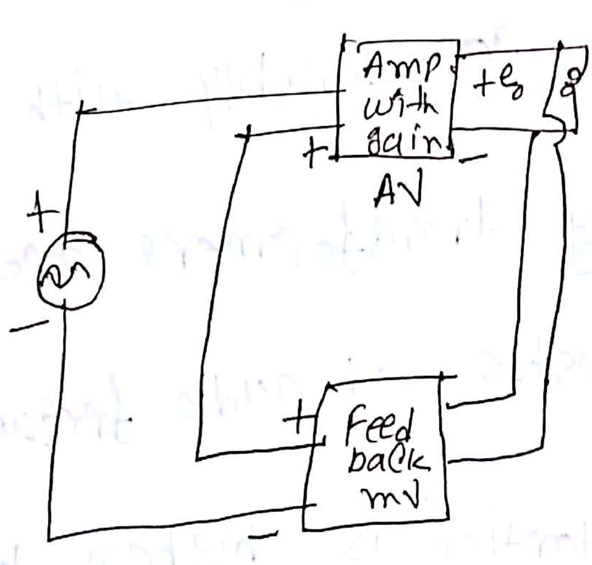
ii) noisy with age

iii) Impedence matching is Poor

Chapter: 13



13.3: gain of negative feedback:



Page 52

Actual input to amp $= e_g - m_v e_o$

$$\therefore (e_g - m_v e_o) A_v = e_o$$

$$\Rightarrow A_v e_g - A_v m_v e_o = e_o$$

$$\Rightarrow e_o (1 + A_v m_v) = A_v e_g$$

$$\Rightarrow \frac{e_o}{e_g} = \frac{A_v}{1 + A_v m_v}$$

$$\Rightarrow \boxed{A_{vf} = \frac{A_v}{1 + A_v m_v}}$$

Math

$A_v = 3000$

$m_v = 0.01$

$A_{vf} = ?$

$$V = 20 \log \frac{V_{out}}{V_{in}}$$

$$I = 20 \log \frac{I_{out}}{I_{in}}$$

$$\frac{\text{আগে} - \text{New}}{\text{আগে}}$$

$\boxed{13.2 - 13.8}$ Math

Ch-14

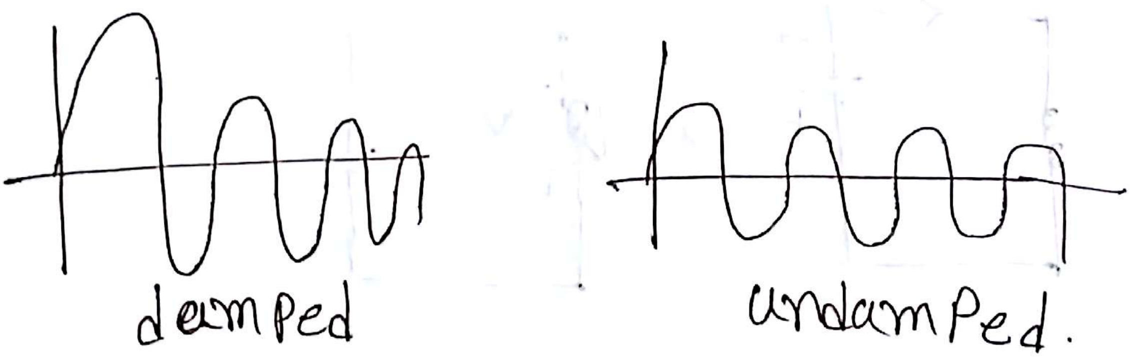
14.1 : oscillator: An electronic device that generatrs sinusoidal oscillations of desired frequency is known as ascillator

Adv:

1) Non rotating device
2) Quite silent.
3) Frequency rang is good (20 Hz to 1 mHz)
4) Good frequency stability.

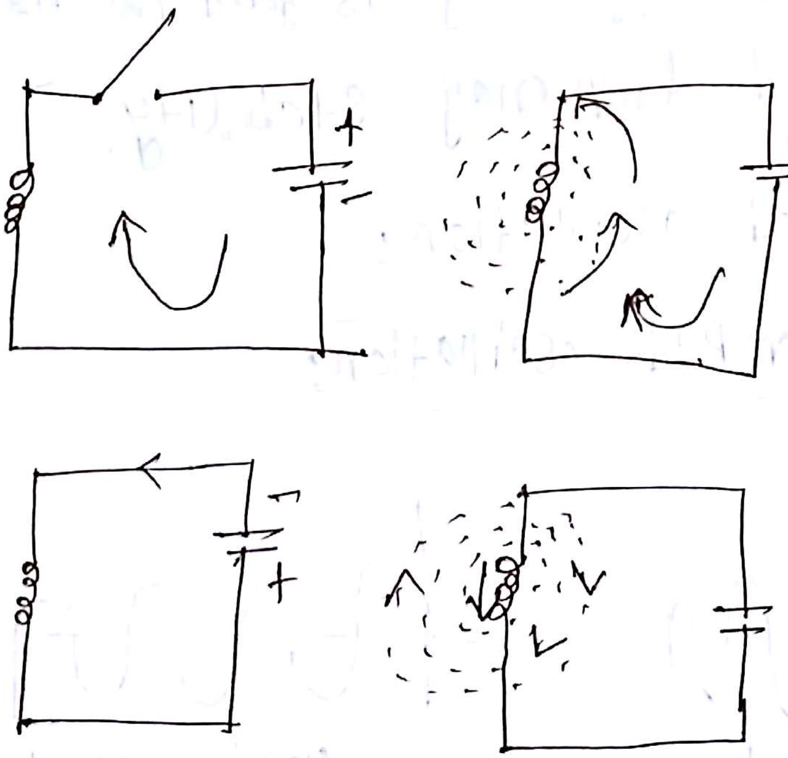
14.2 damped oscillation:

undamped oscillation:

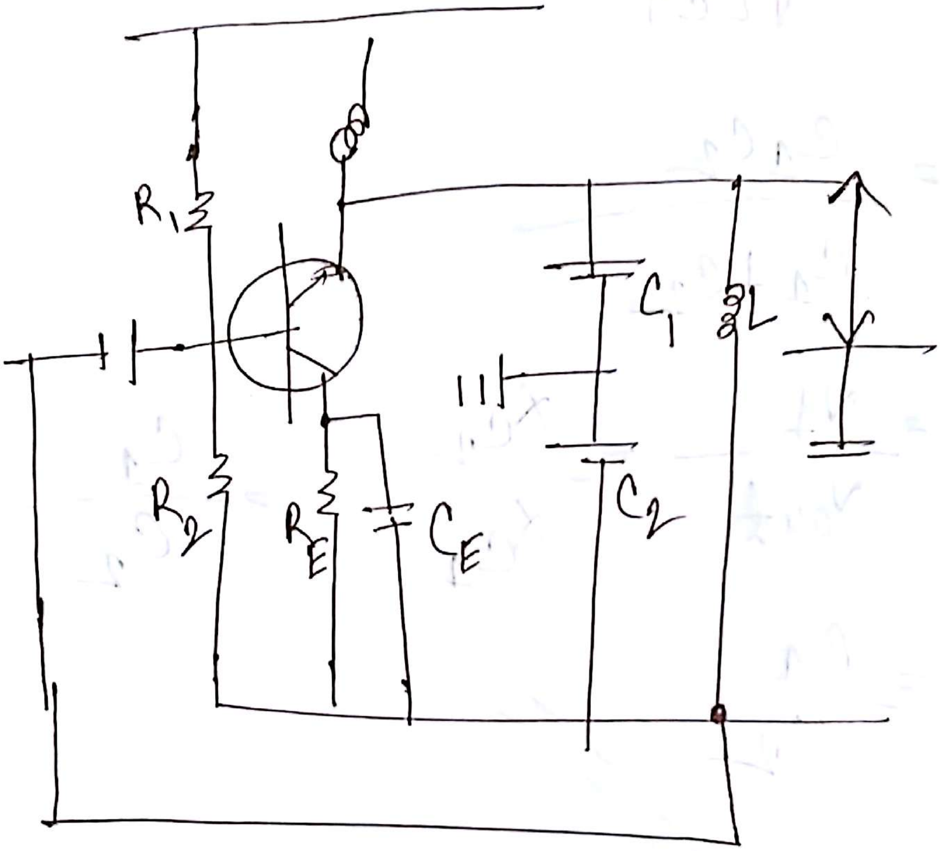


14.3: oscillatory circuit:

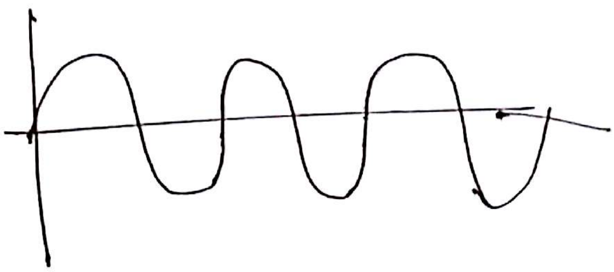
A circuit that Produces electrical ascillations of desired frequency is know as oscillatory circuit or tank circuit.



14.10



output:



$$f = \frac{1}{2\pi\sqrt{LC_T}}$$

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

$$m_V = \frac{V_f}{V_{out}} = \frac{X_{C_2}}{X_{C_1}} = \frac{C_1}{C_2}$$

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