Experiment :

Date 17/9/24
Page No. 29

Exp 5

BJT CE Amplifier

Aim- To study BJT CE Amplifier

Apparatus- Capacitor, resistor, transistor, connecting wires, Input AC

Theory- The CE configuration is widely used as a basic amplifier as it has both voltage and current amplification. R_{B1} and R_{B2} form voltage divider across base of transistor. Biasing done such that Q point is in active region

→ Bypass capacitor

The emitter resistor R_E is req to obtain DC Q point stability. Bypassed by a capacitor so that it acts as a short circuit for AC. Capacitor is connected in parallel.

$$X_{CE} \ll R_E$$

$$C_E \gg \frac{1}{2\pi f R_E}$$

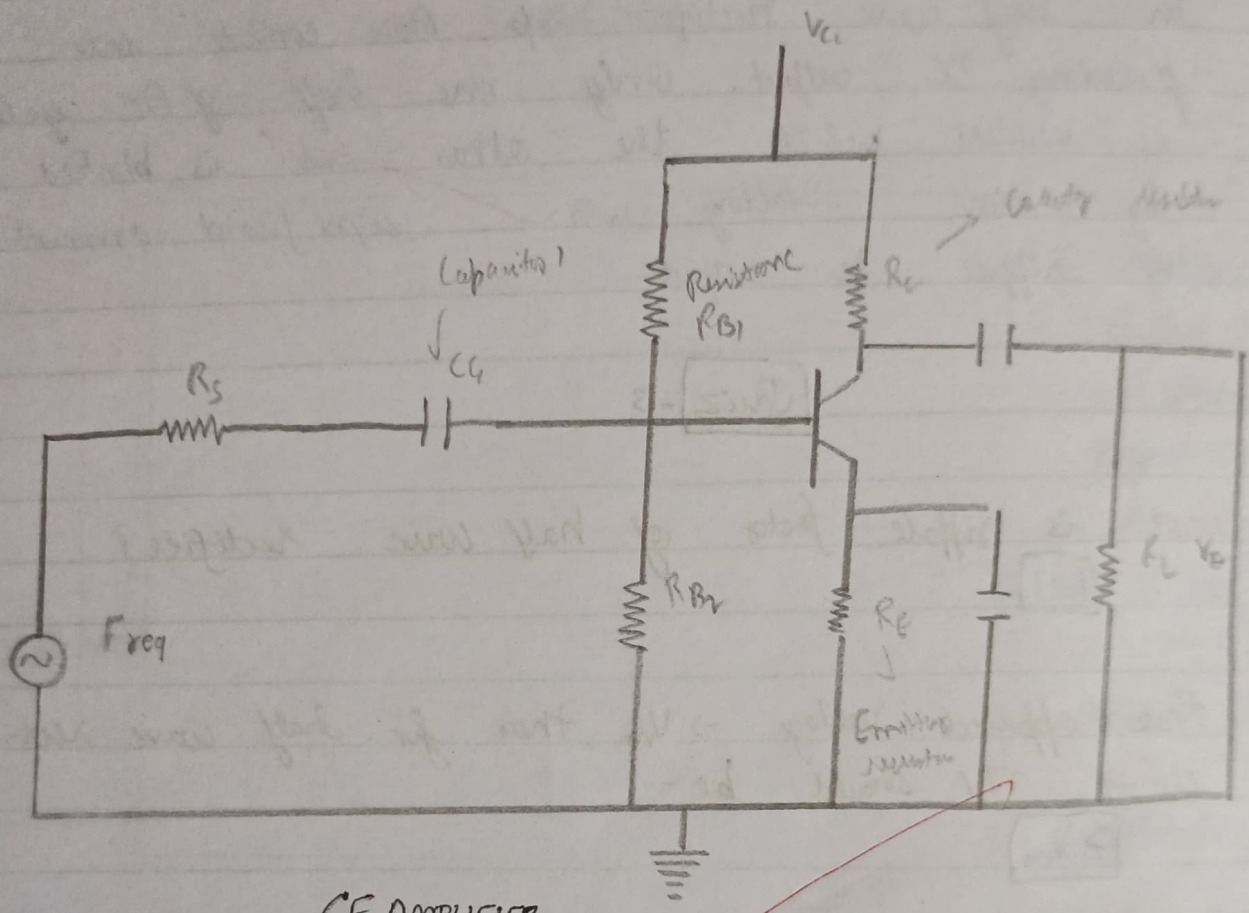
In order to have noiseless transmission of a signal DC shouldn't enter load. Accompanied by coupling capacitor.

→ Frequency response of CE Amplifier

Emitter bypass cap are used to short circuit and thus increase gain at high frequency. Stray capacitances are

CLASSTIME

→ DIAGRAM-



CE AMPLIFIER

Experiment :

Date

Page No.

effectively open circuits. Hence, the mid band frequency gain is maximum. At high frequencies, bypass and coupling capacitors are replaced by short circuits

$$A_{(s)} = \frac{A_m \times s^2 \times (s+\omega_{z1})}{(s+\omega_{p1}) \times (s+\omega_{p2}) \times (s+\omega_{p3})}$$

→ Precaution -

1. Ensure proper biasing of transistors
2. Use proper capacitor values for coupling and bypassing
3. Limit input signal amplitude and avoid short circuits

→ Conclusion

The BJT CE amplifier demonstrates how biasing and component selection affect amplifier's voltage gain, input / output characteristics and overall performance proper biasing ensures transistor operates in active region achieving desired amplification

※ Observation

Constants- $R_S = 100\,\Omega$, $C_{C_1} = 10\,\mu F$, $R_{B_2} = 10000\,\Omega$
$R_{B_1} = 47000\,\Omega$, $R_L = 4000\,\Omega$, $R_{CE} = 1000\,\Omega$, $C_{C_2} = 10\,\mu F$
$C_E = 10\,\mu F$, $R_L = 2000\,\Omega$

S.No	Frequency (Hz)	Magnitude (dB)
1	50	10.591
2	220	22.813
3	552	29.4378
4	959	32.0726
5	2896	34.065400000004
6	8746	34.3512
7	20036	34.368400000004
8	87462	34.3814
9	182734	34.376
10	418620	34.2238
11	1105130	33.9941
12	2641310	32.3504
13	7976646	26.28499
14	18273400	19.66136
15	50329200	10.99534

Midband gain = -52.4119

Low freq. cut off = 5058.95931 3745 Hz

High freq cutoff = 2.1455E + 7 Hz