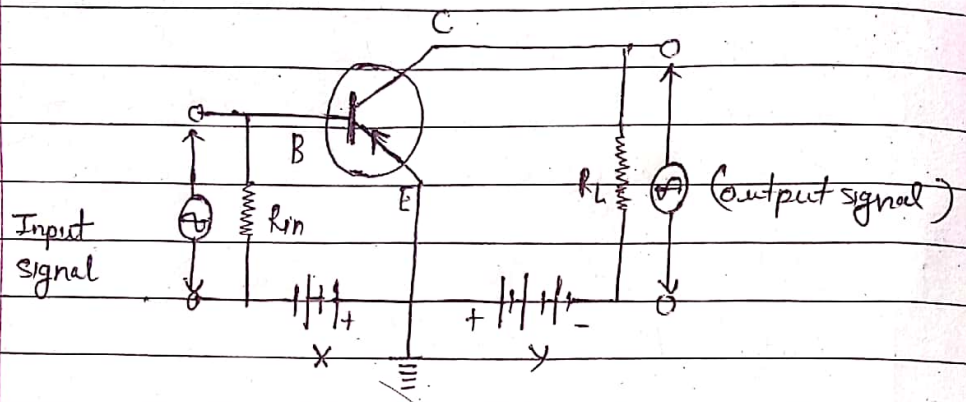
[B.Sc Physics (Six)th semester]

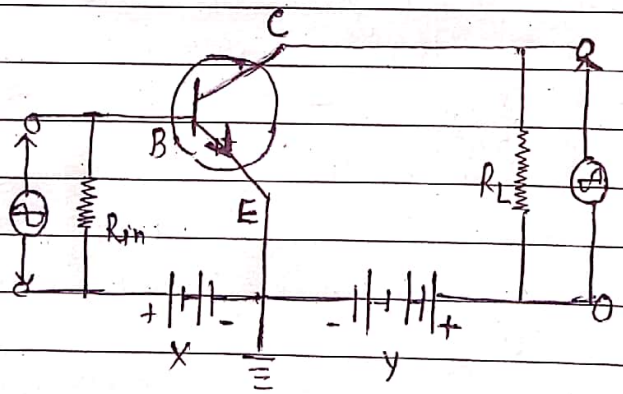
(UNIT-4)

Common Emitter Transistor amplifier.

Show respectively the PNP and NPN Transistor amplifiers in common emitter Configuration



[PNP Transistor]



[NPN - Transistor]

The Input circuit is kept in Forward bias by the battary X while the output circuit is kept

in reverse bias by the battery y The Input signal is applied between the terminals of base B and emitter E and the output Voltage is obtained across the load resistance R_L connected in series with the battery y in between the collector (C) and emitter (E) terminals

(a) Current gain ⇒ At a constant collector ——— x ——— emitter voltage · the ratio · of Change in collector current to the corresponding Change in base current is called the Current gain by a common emitter amplifier and It is represented by the symbol B thus

$$\text{Current gain } \beta = \left(\frac{\Delta I_C}{\Delta I_B}\right)_{V_{CE} = \text{constant}}$$

Its value is generally 49

(b) Voltage gain ⇒

——— x ———

$$A_V = \frac{\Delta V_{out}}{\Delta V_{in}} = \frac{R_L \Delta I_C}{R_{in} \Delta I_B}$$

$$= \frac{R_L}{R_{in}} \times \left(\frac{\Delta I_C}{\Delta I_B}\right)$$

$$= \beta \frac{R_L}{R_{in}}$$

(c) power gain.

By defination power gain = Current gain × Voltage gain

$$A_p = \beta \times \beta \left(\frac{R_L}{R_{in}}\right)$$

$$= \beta^2 \frac{R_L}{R_{in}}$$

(d) Input Impedance $R_{in} = \left(\frac{\Delta V_B}{\Delta I_B}\right)_{V_C}$

Its value is nearby in between

200 Ω to 800 Ω

(e) output Impedance

$$R_{out} = \left(\frac{\Delta V_C}{\Delta I_C}\right)_{I_B}$$

Its value is nearby of the order of 20 kΩ