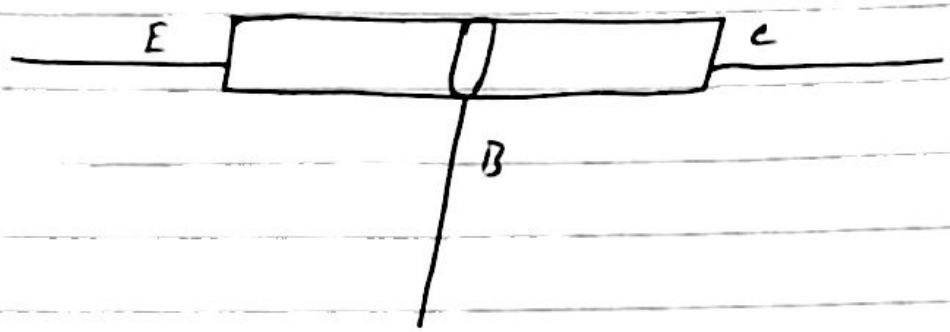
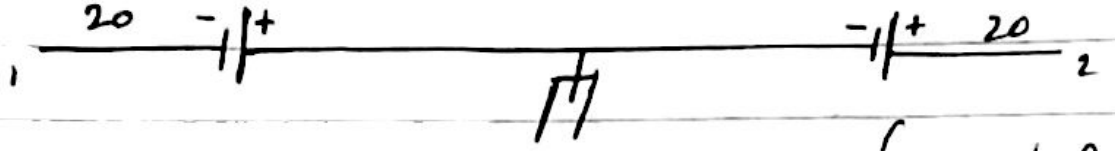
Subject

Date 17/2/15

(Lecture 17)



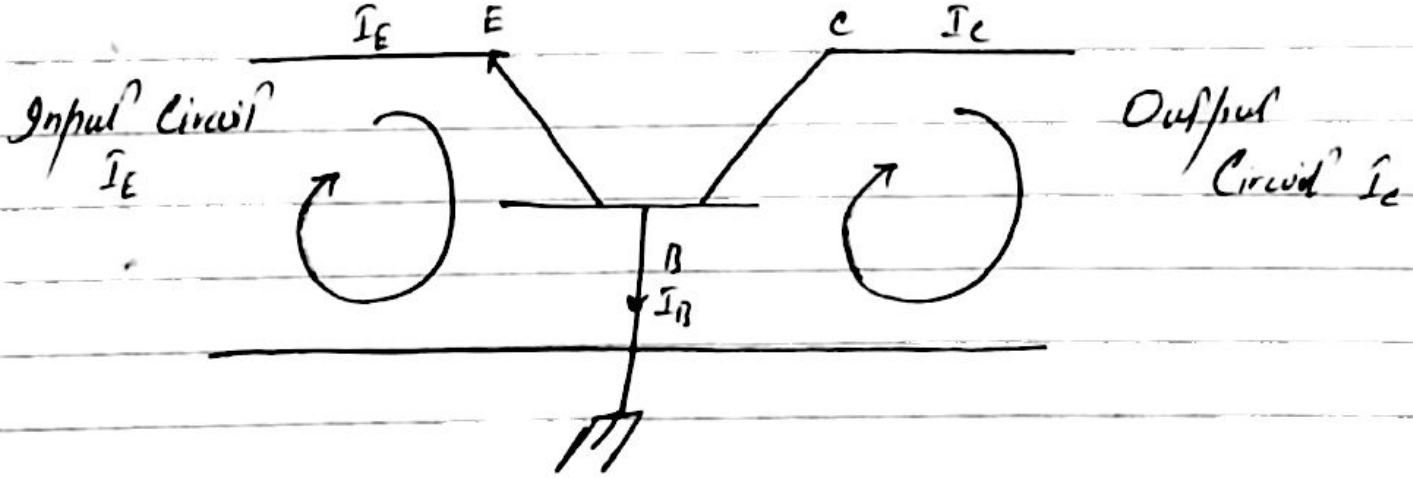


± 0V

(Two Junctions needs 4 terminals, 1 common terminal)

Different types of Configuration:-

Common base Configuration



Forward Current Gain Ratio:-

$$\frac{\text{Output Current}}{\text{Input Current}} = \frac{I_C}{I_E}$$

$h_{fb} = \alpha_{dc} = \alpha$ also used for above ratio as Symbols.

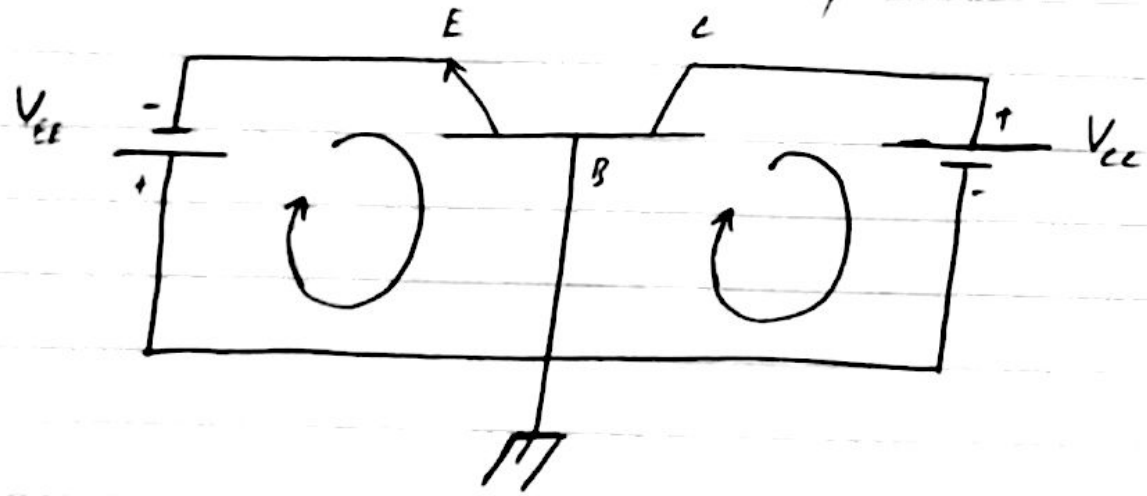
h_{fb} = forward current when base is Common

$\alpha = -I_c / +I_E = -I_c / I_E$

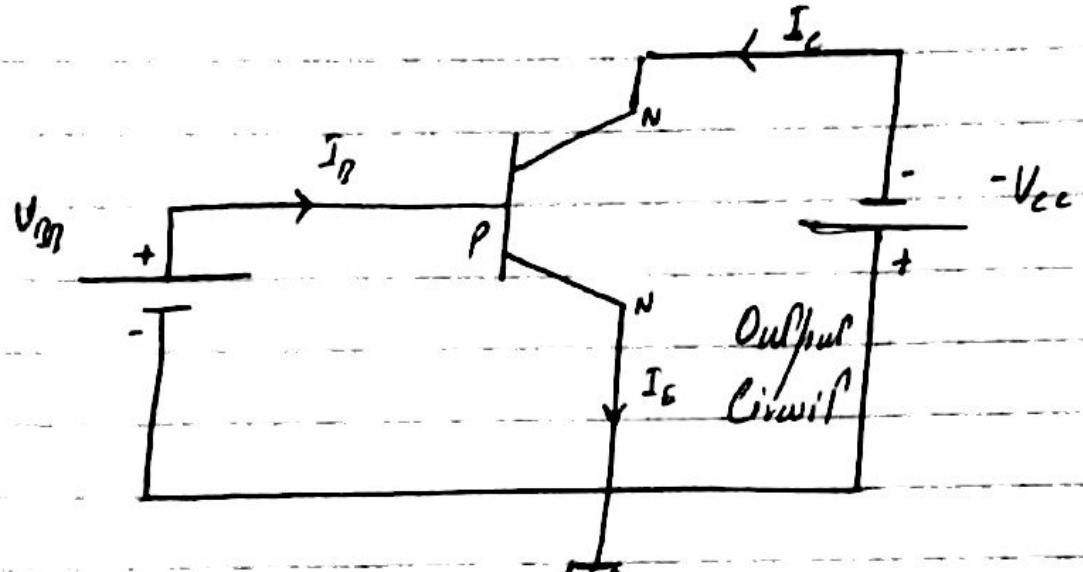
Negative sign only shows current direction but α is always positive.

$$\alpha = \frac{I_c}{I_E} = \frac{98\%}{100\%} = \frac{0.98}{1.00} = \boxed{0.98}$$

α_{max} = 1 only for ideal cases but in reality α is always less than 1.



Common Emitter Configuration (Important Topic)



Input Current = I_B // Output Current = I_C

$$h_{fe} = \beta_{DC} = \beta = +I_C / +I_B$$

Relationship b/w α and β

$$\alpha = I_C / I_E$$

$$I_E = I_C + I_B$$

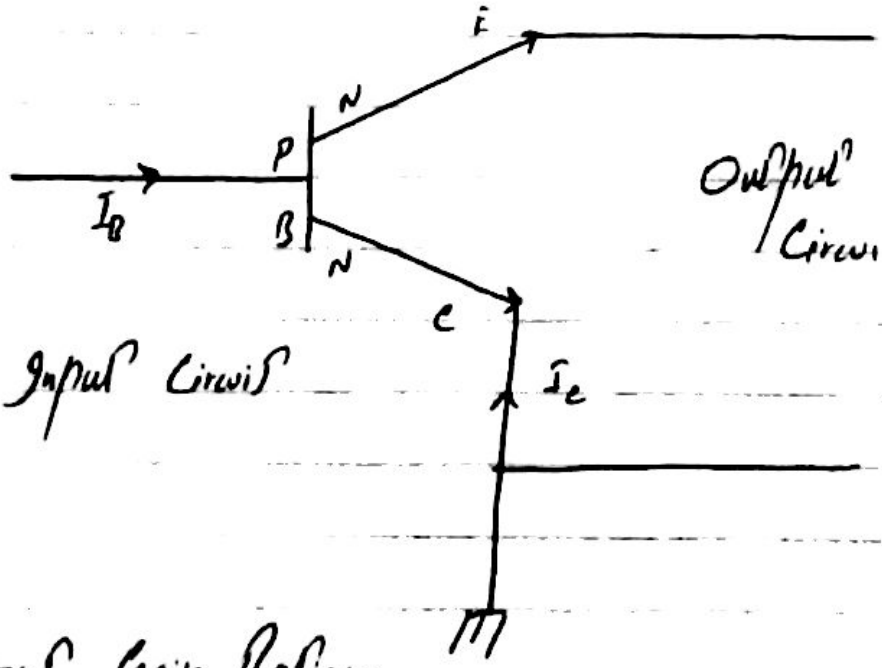
$$\alpha = \frac{I_C}{I_C + I_B} \quad \text{(divide by } I_B\text{)}$$

$$\alpha = \frac{I_c / I_B}{I_B / I_B + I_c / I_B} = \frac{\beta}{1+\beta} \quad \therefore \beta = I_c / I_B$$

β is always very very greater than 1.

$$\beta = \frac{I_c}{I_B} = \frac{98\%}{2\%} = \frac{0.98}{0.02} = 49 \gg 1$$

Common Collector Configuration



Current Gain Ratio:-

$$h_{fc} = \frac{I_E}{I_B} = \frac{I_E / I_c}{I_B / I_c} = \frac{1/\alpha}{1/\beta} = \beta/\alpha$$