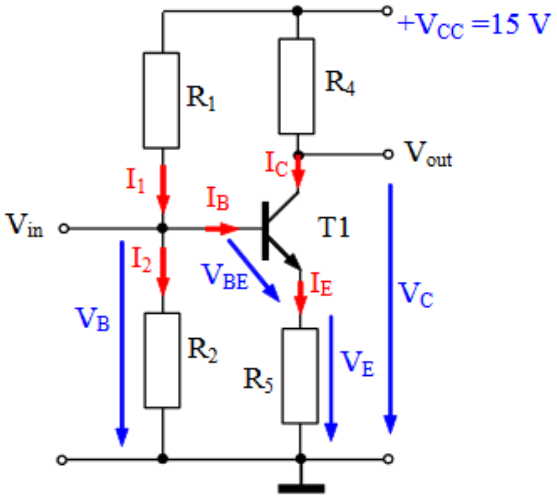
## *Lab. 5: BJT*

## *Part 1 :- Simulate the following circuit and fill the table below (you have to add screen shot of your simulator result ): -*

R1= 120kΩ, R2= 10kΩ,R4= 15kΩ , R5= 1kΩ  use BJT 2N2222 , consider β=75




Vin is the input voltage,
Vout is the output voltage.
Both are not used in this experiment.

| $V_B$ /V | $V_E$ /V | $V_C$ /V | $I_E$ | $I_C$ | $I_B$ | |
|---|---|---|---|---|---|---|
| | | | | | | Simulation result |
| | | | | | | Calculation |

Measure:-

| $V_{BE}$/V | $V_{BC}$/V | $V_{CE}$/V | $V_{R1}$ | $V_{R2}$ |
|---|---|---|---|---|
| | | | | |

The transistor work :-

a) In active region
b) At saturation point
c) At cut-off point

If VBE =VB-VE >0.6 then the junction is For.

VBE =VB-VE <0.6 then the junction is REV.

If VBC = VB-VC > 0.6 the junction is For.

If VBC = VB-VC < 0.6 the junction is REV.

Why ???

***Part 2:-***

***1- Change*** *R1 from 120k to 10k then measure*

| $V_B$ | $V_C$ | $V_E$ |
|---|---|---|
| | | |

The transistor work :-

a) In active region
b) At saturation point
c) At cut-off point

Why ???

***2- Change R4*** *from 15k to 2.7k then measure*

| $V_B$ | $V_C$ | $V_E$ |
|---|---|---|
| | | |

The transistor work :-

d) In active region
e) At saturation point
f) At cut-off point

Why ???

***3- Change** R2 from 10k to 3.3k then measure*

| $V_B$ | $V_C$ | $V_E$ |
|---|---|---|
| | | |

The transistor work :-

g) In active region
h) At saturation point
i) At cut-off point

Why ???

IE=IB+IC…….. kcl

| BE junction | BC junction | Mode of operation |
|---|---|---|
| F | R | F.Active (linear transistor used as amplifier |
| R | F | R.Active biasing some digital circuit |
| F | F | Saturation (s.w on) VEC <= VCE sat =0.2 |
| R | R | Cut-off (s.w off) |

Saturation :-

VEC <= VCE sat =0.2

Active region:- linear (region )

Ic=β IB

β = DC current gain

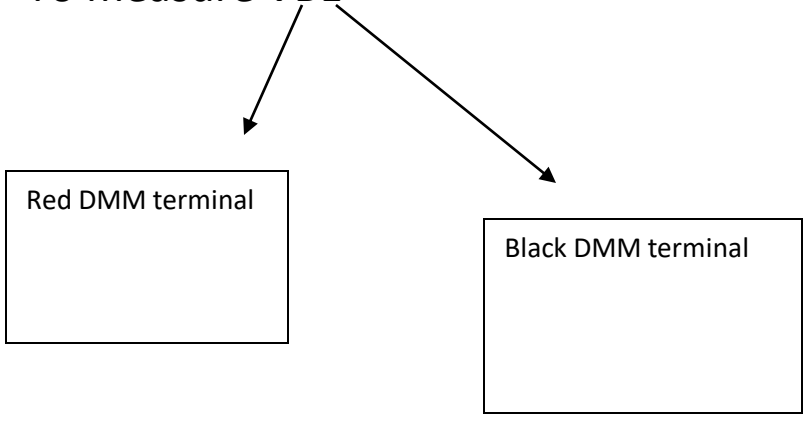
cut-off :-

IC=IE=IB=0

RB=Rth=R1//R2 = (R1*R2)/(R1+R2)

VB=Vth = (Vcc *R2)/(R1+R2)

To measure VBE



VBE= VB-VE