SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME : **19EC304 – ELECTRONIC CIRCUITS I**

II YEAR / III SEMESTER

Unit I- **BIASING OF DISCRETE BJT,FET**

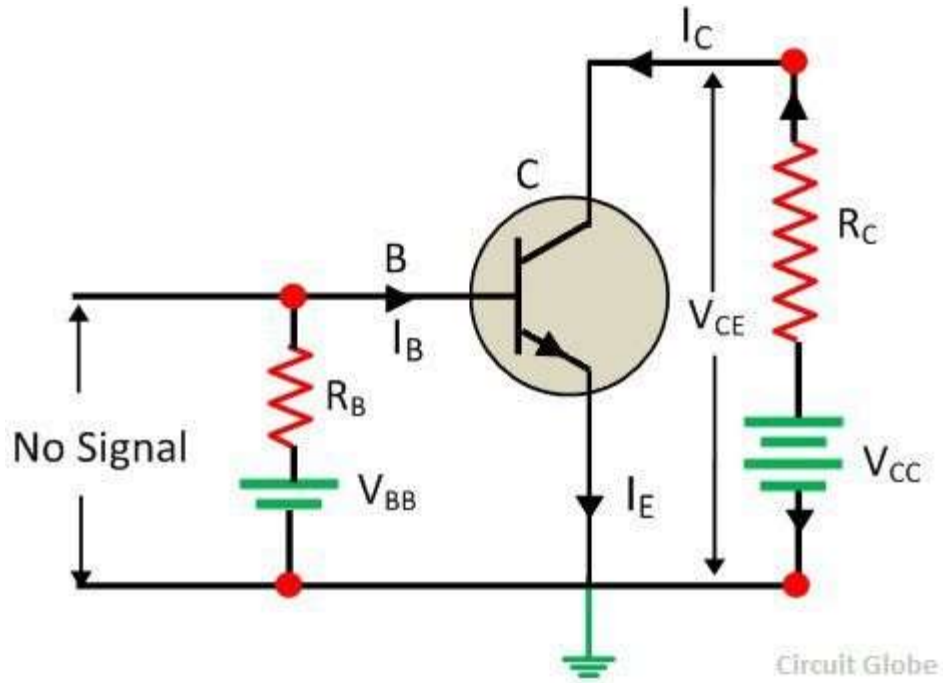
Topic : Load line Analysis

Transistor Load Line Analysis

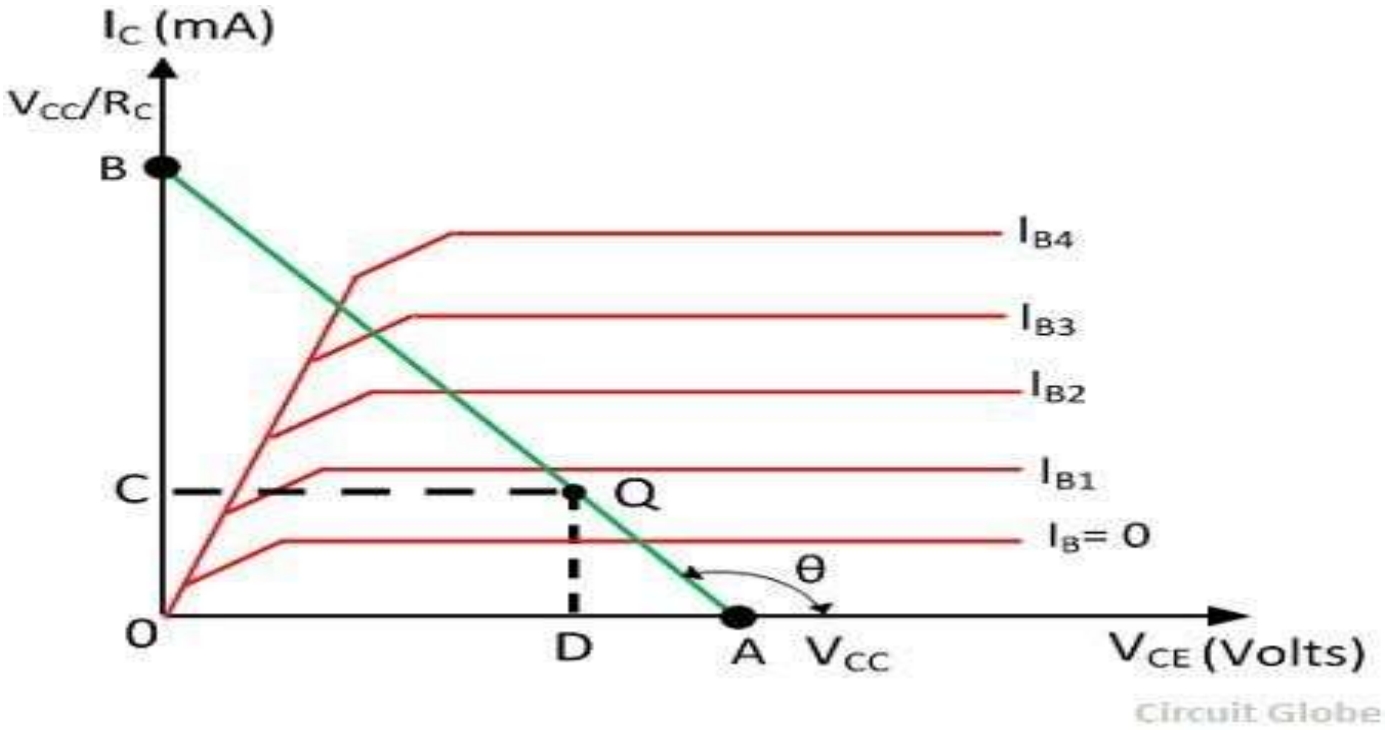
•The load line analysis of transistor means for the given value of collector-emitter voltage we find the value of collector current. This can be done by plotting the output characteristic and then determine the collector current I_C with respect to collector-emitter voltage V_{CE}. The load line analysis can easily be obtained by determining the output characteristics of the load line analysis methods.

DC Load Line

The DC load represents the desirable combinations of the collector current and the collector-emitter voltage. It is drawn when no signal is given to the input, and the transistor becomes bias.
Consider a CE NPN transistor circuit shown in the figure below where no signal is applied to the input side. For this circuit, DC condition will obtain, and the output characteristic of such a circuit is shown in the figure below.


I_C
C
R_C
B
I_B
V_{CE}
R_B
No Signal
V_{BB}
I_E
V_{CC}
Circuit Globe

The DC load line curve of the above circuit is shown in the figure below.



By applying Kirchhoff's voltage law to the collector circuit, we get,

$$V_{CC} = V_{CE} + I_C R_C$$

$$V_{CE} = V_{CC} - I_C R_C \ldots . equ(1)$$

The above equation shows that the V_{CC} and R_C are the constant value, and it is the first-degree equation which is represented by the straight line on the output characteristic. This load line is known as a DC load line. The input characteristic is used to determine the locus of V_{CE} and I_C point for the given value of R_C. The end point of the line are located as

The collector-emitter voltage V_{CE} is maximum when the collector current $I_C = 0$ then from the equation (1) we get,

$$V_{CE} = V_{CC} - 0 \times R_C$$

$$V_{CE} = V_{CC}$$

The first point A (OA = V_{CC}) on the collector-emitter voltage axis shown in the figure above.

2. The collector current I_C becomes maximum when the collector-emitter voltage V_{CE} = 0 then from the equation (1) we get.

$$0 = V_{CC} - I_C R_C$$

$$I_C = \frac{V_{CC}}{R_C}$$

This gives the second point on the collector current axis as shown in the figure above.

By adding the points A and B, the DC load line is drawn. With the help of load line, any value of collector current can be determined.

Any Query????

Thank you……