EXPERIMENT NO : 1

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Aim of the Experiment :

Analysis of small signal BJT Amplifier using eSim.

Theory :

In theBipolar Transistor the most common circuit configuration for an NPN transistor is that of the Common Emitter Amplifier circuit and that a family of curves known commonly as the Output Characteristic Curves, relate the transistors Collector current (Ic), to the Collector voltage (Vce)

All types of Transistor Amplifiers operate using AC signal inputs which alternate between a positive value and a negative value so some way of presetting the amplifier circuit to operate between these two maximum or peak values is required. This is achieved using a process known as Biasing. Biasing is very important in amplifier design as it establishes the correct operating point of the transistor amplifier ready to receive signals, thereby reducing any distortion to the output signal.

The DC load line can be drawn onto these output characteristics curves to show all the possible operating points of the transistor from fully ON to fully OFF, and to which the quiescent operating point or Q-point of the amplifier can be found. The aim of any small signal amplifier is to amplify all of the input signal with the minimum amount of distortion possible to the output signal, in other words, the output signal must be an exact reproduction of the input signal but only bigger (amplified).

To obtain low distortion when used as an amplifier the operating quiescent point needs to be correctly selected. This is in fact the DC operating point of the amplifier and its position may be established at any point along the load line by a suitable biasing arrangement. The best possible position for this Q-point is as close to the center position of the load line as reasonably possible, thereby producing a Class A type amplifier operation, ie.Vce = 1/2Vcc. Consider the Common Emitter Amplifier circuit shown below.