Experiment No: 07

Name of the Experiment: The BJT Biasing Circuits.

Objective:

Study of the BJT Biasing Circuits.

Theory:

Biasing a BJT circuit means to provide appropriate direct potentials and currents, using external sources, to establish an operating point or Q-point in the active region. Once the Q-point is established, the time varying excursions of input signal should cause an output signal of same waveform. If the output signal is not a faithful reproduction of the input signal, for example, if it is clipped on one side, the operating point is unsatisfactory and should be relocated on the collector characteristics. Therefore, the main objective of biasing a BJT circuit is to choose the proper Q-point for faithful reproduction of the input signal. There are different types of biasing circuit. However, in the laboratory, we will study only the fixed bias and self bias circuit. In the fixed bias circuit, shown if figure 6.1, the base current I_B is determined by the base resistance R_B and it remains constant. The main drawback of this circuit is the instability of Q-point with the variation of β of the transistor. In the laboratory, we will test the stability using two transistors with different β. In the self bias circuit shown if figure 6.2, this problem is overcome by using the self biasing resistor R_E to the emitter terminal.

Equipments And Components :

Serial no.	Component Details	Specification	Quantity
1.	NPN Transistor	C828, BD135	1 piece each
2.	Resistor	470Ω, 560Ω, 220KΩ	1 piece each
3.	POT	10KΩ	1 unit
4.	Trainer Board		1 unit
5.	DC Power Supply		1 unit
6.	Digital Multimeter		1 unit
7.	Chords and wire		as required

Experimental Setup:

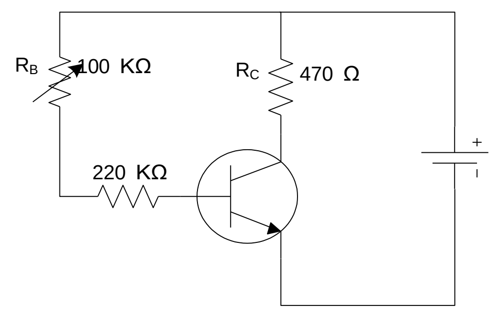

Figure 7.1: Experimental Circuit 1.

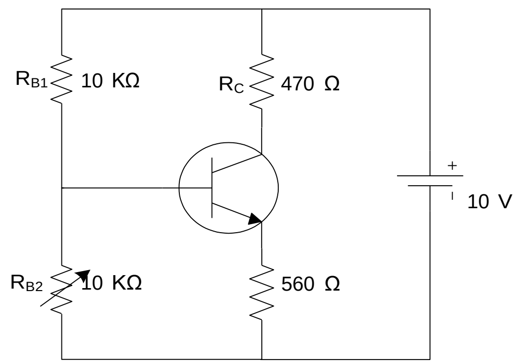

Figure 7.2: Experimental Circuit 2.

Procedure:

1. Arrange the circuit shown in figure - 6.1 by C828. Record R_C and set R_B to **maximum** value.
2. Decrease POT R_B gradually so that $V_{CE} = V_{CC} / 2$.
3. Measure voltage across R_C and V_{CE}.
4. Record the Q-point (V_{CE}, I_C).
5. Replace the C828 transistor by BD135 and repeat step 3 and 4.
6. Arrange the circuit shown in figure - 6.2 by C828. Record R_C and set R_B to **minimum** value.
7. Increase POT R_{B2} gradually so that $V_{CE} = V_{CC} / 2$.
8. Measure voltage across R_C and V_{CE}.
9. Record the Q-point (V_{CE}, I_C).
10. Replace the C828 transistor by BD135 and repeat step 8 and 9.

Data Sheet :

Table 7.1 : Data for Fixed Bias Circuit.

Transistor	R_C (Ω)	V_C (volt)	$I_C = V_C / R_C$ (Amp)	V_{CE} (volt)	Q-point
C828					
BD135					

Table 7.2 : Data for Self Bias Circuit.

Transistor	R_C (Ω)	V_C (volt)	$I_C = V_C / R_C$ (Amp)	V_{CE} (volt)	Q-point
C828					
BD135					

Report:

1. Which circuit shows better stability? Explain in the context of the results obtained in the laboratory.
2. Draw the DC load line for both the circuits and show the Q-point.
3. Add the PSPICE simulation waveforms of all the experimental circuits.