Transistors Study Notes for RRB ALP Stage 2 (Part B) for Electronic Mechanic 2018

After the ALP Computer-based Test, you need to start preparing for the next stage. The Stage 2 of ALP exam is technical and requires you to a lot more effort. In order to prepare strategically, you need to cover topics for RRB ALP Stage 2 (Part B) with Technical notes for Electronic/Mechanic. In this article, you will find Transistors Study Notes for Part B exam! Read these easy and helpful notes on **transistors terminals, transistor symbols, transistor biasing** and many more. Do download these notes as PDF!

What is a Transistor? - Definition

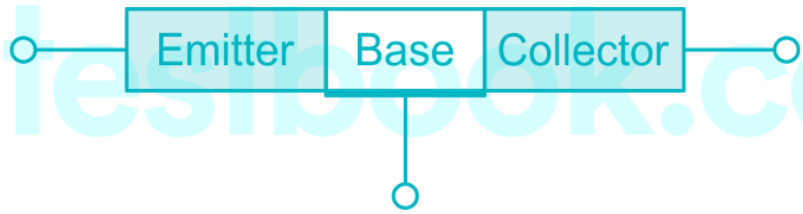
The transistor is a semiconductor device which transfers a weak signal from low resistance circuit to high resistance circuit. The words **trans** mean **transfer property** and **istor** mean **resistance property offered to the junctions.** In other words, it is a switching device which regulates and amplify the electrical signal likes voltage or current.

Transistors Study Notes - Symbols

There are two types of transistor, namely NPN transistor and PNP transistor. The transistor which has two blocks of n-type semiconductor material and one block of P-type semiconductor material is known as NPN transistor. Similarly, if the material has one layer of N-type material and two layers of P-type material then it is called PNP transistor. The symbol of NPN and PNP is shown in the figure below.

Transistor Terminals

The transistor has three terminals namely, emitter, collector and base. The terminals of the diode are explained below in details.



Emitter

- The section that supplies the large section of majority charge carrier is called emitter.
- The emitter is always connected in forward biased with respect to the base so that it supplies the majority charge carrier to the base.
- The emitter-base junction injects a large amount of majority charge carrier into the base because it is heavily doped and moderate in size.

Collector

- The section which collects the major portion of the majority charge carrier supplied by the emitter is called a collector.
- The collector-base junction is always in reverse bias. Its main function is to remove the majority charges from its junction with the base.
- The collector section of the transistor is moderately doped, but larger in size so that it can collect most of the charge carrier supplied by the emitter.

Base

- The middle section of the transistor is known as the base.
- Base forms two circuits, the input circuit with the emitter and the output circuit with the collector.
- The emitter-base circuit is in forward biased and offered the low resistance to the circuit.
- The collector-base junction is in reverse bias and offers the higher resistance to the circuit.
- Base of the transistor is lightly doped and very thin due to which it offers the majority charge carrier to the base.

Transistors Study Notes - Biasing

The supply of suitable external dc voltage is called as biasing. Either forward or reverse biasing is done to the emitter and collector junctions of the transistor. These biasing methods make the transistor circuit to work in four kinds of regions such as Active region, Saturation region, Cutoff region and Inverse active region (seldom used). This is understood by having a look at the following table.

Emitter Junction	Collector Junction	Region of Operation

Forward biased	Forward biased	Saturation region
Forward biased	Reverse biased	Active region
Reverse biased	Forward biased	Inverse active region
Reverse biased	Reverse biased	Cutoff region

Among these regions, Inverse active region, which is just the inverse of active region, is not suitable for any applications and hence not used.

Active Region - This is the region in which transistors have many applications. This is also called as linear region. A transistor while in this region, acts better as an Amplifier.

Transistors Study Notes - Important formula

$$I_E = I_B + I_C \qquad \alpha = \frac{I_C}{I_E} = \frac{\beta}{1+\beta}$$

$$I_C = I_E - I_B$$

$$\beta = \frac{I_C}{I_B} = \frac{\alpha}{1-\alpha}$$

$$I_B = I_E - I_C$$

$$I_B = \frac{I_C}{\beta} = \frac{I_E}{1+\beta} = I_E(1-\alpha)$$

$$I_C = \beta I_B = \alpha . I_E \quad I_E = \frac{I_C}{\alpha} = I_B(1+\beta)$$

Characteristic	Common Base	Common Emitter	Common Collector
Input Impedance	Low	Medium	High

Output Impedance	Very High	High	Low
Phase Shift	0☐	180☐	0☐
Voltage Gain	High	Medium	Low
Current Gain	Low	Medium	High
Power Gain	Low	Very High	Medium

We hope that you learned from this Electronic Mechanic Transistors Study Notes for RRB ALP Stage 2 Part B.

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