What is a Transistor?

Worksheet

A transistor is a three-terminal semiconductor device that amplifies current or acts as an electronic switch; in a BJT, collector current Ic = Ib.

$$I_C = @beta I_B$$

Questions

1. How many terminals does a standard BJT transistor have?

A) 2
B) 3
C) 4
D) 1

2. (beta) in a transistor represents:

A) Voltage gain
B) Current gain
C) Power gain
D) Resistance

3. The formula for collector current in terms of and Ib is:

A) Ic = Ib/
B) Ic = Ib
C) Ic = + Ib
D) Ic = Ib

4. In an NPN transistor, the majority charge carriers are:

A) Electrons
B) Holes
C) Protons
D) Ions

5. A BJT has = 150 and Ib = 0.02 mA. Find the collector current Ic.

6. A transistor has Ic = 100 mA and = 100. Find the base current Ib.

7. A BJT switch has Vin = 5 V, Vbe = 0.7 V and base resistor Rb = 10 k. Find Ib.

8. Define: What is a transistor?

9. Define: What are the three terminals of a BJT?

10. Define: What does (beta) represent?

Answer Key

1. B) 3 - A BJT has three terminals: base, collector and emitter.
2. B) Current gain - is the current gain, the ratio Ic/Ib.
3. B) Ic = Ib - Collector current equals the current gain times the base current.
4. A) Electrons - NPN transistors conduct mainly via electrons in the n-type regions.
5. Ic = Ib = 150 0.02 = 3 mA
6. Ib = Ic / = 100 / 100 = 1 mA
7. Ib = (Vin Vbe) / Rb = (5 0.7) / 10000 = 4.3 / 10000 = 0.00043 A = 0.43 mA
8. A semiconductor device that amplifies or switches electronic signals.
9. Base, Collector, and Emitter.
10. The current gain - the ratio of collector current to base current, Ic/Ib.