QUIZ – ANSWER KEY

QUIZ NO: 144

TOPIC: ELECTRICAL ENGINEERING

DATE: 05/01/2023

1. Which of the following is not a valid type of BJT?

   [A] PNP

   [B] NPN

   [C] PPN

   [D] NNP

   Answer: C
   Explanation: A BJT is a device with a layer of semiconductor sandwiched between 2 unlike types of semiconductors and hence, PPN is not a valid type of a BJT.

2. In a BJT, which of the following layers is heavily doped?

   [A] Collector

   [B] Emitter

   [C] Base

   [D] Electron

   Answer: B

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Explanation: The emitter is the most heavily doped and contains the maximum amount of charge carriers. It is the emitter's task to inject carriers into the base. These bases are thin and lightly doped. For npn B JT, emitter injects electrons, and for pnp, it injects holes.

3. Considering the resistances of emitter, collector and base to be R_e, R_c and R_b respectively, which of the following is the correct statements?

[A] $R_e > R_b > R_c$

[B] $R_c > R_b > R_e$

[C] $R_b > R_c > R_e$

[D] $R_b = R_c > R_e$

Answer: C
Explanation:
As the base is lightly doped, the number of free charge carriers are less and hence the resistance is high and as the emitter is the most highly doped, its resistance is low.

4. In a pnp-BJT, when the E-B junction is forward biased and no voltage is applied across C-B junction, what happens to the width of the depletion region in the E-B junction?

[A] Increases

[B] Decreases

[C] Remains same

[D] Can't be determined

Answer: B

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Explanation: On application of a forward bias voltage across E-B junction, the width of the depletion region decreases.

5. Which of the following statements is true about proper functioning of a BJT?

[A] One junction is forward biased and one is reverse biased

[B] Both junctions are forward biased

[C] Both junctions are reverse biased

[D] Can't be determined

Answer: A

Explanation: In a BJT, depending upon the biasing of the two junctions, the BJT behaves differently. The BJT may be in saturation, wherein it acts like a short circuit, or it may be in cut-off, i.e an open circuit. The BJT can be either in forward active or reverse active mode. Active mode is the common mode, used in BJTs and obtained by one forward biased and one reverse biased junction.

6. Which of the following currents in a BJT is also called leakage current?

[A] I_C

[B] I_E

[C] I_{CO}

[D] I_{CBO}

Answer: A

Explanation: Leakage current in BJT is represented by I_{CO}, which is due to the flow of minority carriers in the transistor. It consists of I_{CBO} and I_{CEO}. I_{CO} depends on temperature, doubling with 10° rise in temperature. It thus effects total collector current, I_C, and hence affects the power dissipation.

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7. Which of the following relations are correct?

[A] $I_E + I_B = I_C$

[B] $I_C + I_B = I_E$

[C] $I_E + I_C = I_B$

[D] $I_B + I_E = I_B$

Answer: B

Explanation: On applying KCL to the BJT, we get $I_C + I_B = I_E$

8. Given that the collector power dissipation is 300 mW, what is the value of collector current for the collector to emitter voltage = 12 V?

[A] 50 mA

[B] 0 mA

[C] 25 mA

[D] 100 mA

Answer: B

Explanation: $P = V_{CE}.I_C => 300mW = (12V)I_C => I_C=300/12$ mA = 25 mA.

9. Given that the collector power dissipation is 300 mW, what is the value of collector to emitter voltage for collector current = 50 mA?

[A] 6 V

[B] 3 V

[C] 0 V

[D] 2 V

Answer: A

Explanation: $P = V_{CE}.I_C => 300mW = V_{CE}(50\ mA) => V_{CE} = 300/50 = 6$ V

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10. For best operation of a BJT, which region must the operating point be set at ?

[A] Active region
[B] Cutoff region
[C] Saturation region
[D] Reverse active region

Answer: A

Explanation: Operating point for a BJT must always be set in the active region to ensure proper functioning. Setting up of Q-point in any other region may lead to reduced functionality.