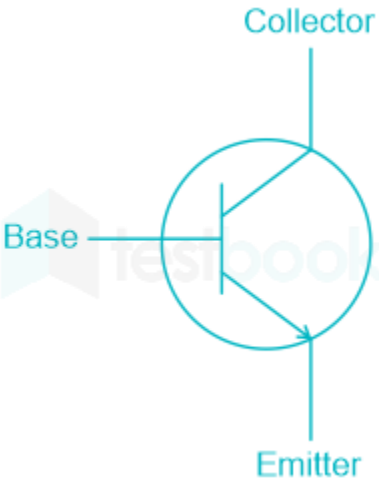
UNIT III

BIPOLAR JUNCTION TRANSISTORS

Multiple Choice Questions

1. The given symbols represent which transistor:
   (a) p-n-p transistor
   (b) n-p-n Transistor
   (c) P-N diode
   (d) Zener diode



2. Which of the following parameters will be high in the common base configuration of BJT….
   (a) Current gain
   (b) Voltage gain
   (c) Output resistance
   (d) Input resistance

3. The majority of the charge carriers in the NPN transistor are…
   (a) Electron
   (b) Holes
   (c) Trivalent atoms
   (d) Pentavalent atoms

4. The n-p-n transistors are preferred over the p-n-p transistor, because of ….
   (a) High mobility of holes
   (b) Low mobility of holes
   (c) Equal mobility of holes
   (d) Higher mobility of electrons than the mobility of holes in p-n-n transistor

5. In BJT, the flow of current is due to the ….
   (a) Electrons
   (b) Holes
   (c) Both electrons and holes
   (d) Immobile ions

6. BJT is a …
   (a) current controlled device
   (b) voltage controlled device
   (c) voltage controlled capacitor
   (d) current controlled capacitor

Part A

1. What is the need for biasing? What are the considerations in choosing an appropriate biasing scheme?
2. Write a note on BJT as an amplifier.
3. Draw and explain the BJT as switch characteristics terminology.
4. Explain the difference between CB, CE and CC configuration.
5. (i) Write the expression for α,β and γ of BJT. Also explain their relationship.
   (ii) The common base DC current gain of a transistor is 0.967. If the emitter current is 10mA, what is the value of base current?
6. Draw the small signal model of CE configuration. Also mention the current and voltage equations.
7. Sketch the VI characteristics of CC configuration.
8. In CB, I_C=2.98mA, I_E=3mA, I_{C0}=0.01mA. What is I_C when I_B=30μA in CE. Also find γ.
9. Draw the h parameter model of common base configuration and define forward current gain.
10. Explain early effect and its consequences.
11. Determine the values of I_B and I_E for the transistor circuit if I_C=80mA and β=170.

Part B

1. Sketch and explain the input and output characteristics of common emitter and common collector configuration.

2. With a neat sketch explain the V-I characteristics of common base configuration.

3. Derive the expression for Q point and stability factor for emitter bias method of BJT. Determine I_C and V_{CE} for the same if V_{CC}=16V, R_B=430KΩ, R_C=2KΩ, R_E=1KΩ, β=75.

4. Determine the DC operating point for a common emitter amplifier using voltage divider biasing with the following parameters. V_{CC}=22V, R_C=10KΩ, R_1=39KΩ, R_E=1.5KΩ, R_2=3.9KΩ, β=100, C_E=50μF and C_C=10μF.

5. Draw and derive the expressions and stability factor for fixed and voltage divider bias.

6. Draw hybrid model equivalent circuits for CE, CB and CC configurations.

7. Determine the quiescent current and collector to emitter voltage for a germanium transistor with β=50 in voltage divider biasing arrangement. Draw the circuit with given components values V_{CC}=20V, R_C=2KΩ, R_E=100KΩ, R_1=100KΩ and R_2=5KΩ. Also find the stability factor.