

Field Effect Transistors

1. Write down the differences between JFET and BJT.

Differences between JFET and BJT:

- JFET is a voltage-controlled device, while BJT is a current-controlled device.
- JFET has a higher input impedance than BJT, making it more suitable for high-impedance circuits.
- BJT has a higher gain than JFET, making it more suitable for amplification applications.
- JFET has a negative temperature coefficient, while BJT has a positive temperature coefficient.
- JFET is a unipolar device, while BJT is a bipolar device.

2. Discuss the similarities and dissimilarities between FET and BJT.

Similarities and dissimilarities between FET and BJT:

- Similarities: Both are used as amplifiers and switches in electronic circuits.
- Dissimilarities: FET is a voltage-controlled device while BJT is a current-controlled device. FET has a higher input impedance than BJT. FET is a unipolar device while BJT is a bipolar device.

3. Why is BJT called bipolar device but FET called unipolar device?

BJT is called a bipolar device because it uses both electrons and holes as charge carriers, while FET is called a unipolar device because it only uses one type of charge carrier (either electrons or holes).

4. Write down the families of FET.

The families of FET are:

- Junction Field Effect Transistor (JFET)
- Metal Oxide Semiconductor FET (MOSFET)
- Insulated Gate Bipolar Transistor (IGBT)

5. What Is JFET? What are the types of JFET?

JFET stands for Junction Field Effect Transistor. The types of JFET are:

- n-channel JFET
- p-channel JFET

6. Explain briefly the working principle of n-channel JFET/ p-channel JFET.

Working principle of n-channel JFET/ p-channel JFET:

- In an n-channel JFET, when a voltage is applied between the gate and the source, an electric field is created in the channel which controls the flow of current between the drain and source.
- In a p-channel JFET, the direction of current flow is reversed, and the electric field created in the channel is also reversed.

7. Write down the characteristics and some salient features of JFET.

Characteristics and salient features of JFET:

- High input impedance & gain
- Low noise & power consumption
- Linear response
- Simple construction
- Limited voltage and power handling capability

8. Write down the adv. Of using JFET in electronic circuit.

Advantages of using JFET in electronic circuits:

- High input impedance
- Low noise
- Simple construction
- Linear response

9. Write down some applications of JFET.

Applications of JFET:

- Amplifiers
- Switches
- Oscillators
- Voltage regulators

10. Discuss the parameter: (a) Drain saturation current (I_{DSS}), (b) Pinch of Voltage (V_p), (c) Threshold voltage (V_t / $V_{GS(OFF)}$).

- **Drain saturation current (I_{DSS}):** The maximum current that can flow through the drain when the gate is shorted to the source.
- **Pinch-off voltage (V_p):** The voltage at which the channel of the JFET is completely pinched off, resulting in zero current flow.
- **Threshold voltage (V_t / $V_{GS(OFF)}$):** The voltage at which the channel just starts to conduct when the gate-to-source voltage is zero.