

EXPERIMENT- 7

Objective: To study the JFET as an amplifier.

Resources Required: Trainer kit of JFET Amplifier

Theory:

A field-effect transistor (FET) is a type of transistor commonly used for weak-signal amplification (for example, for amplifying wireless signals). The device can amplify analog or digital signals. It can also switch DC or function as an oscillator. In the FET, current flows along a semiconductor path called the channel. At one end of the channel, there is an electrode called the source. At the other end of the channel, there is an electrode called the drain. The physical diameter of the channel is fixed, but its effective electrical diameter can be varied by the application of a voltage to a control electrode called the gate. Field-effect transistors exist in two major classifications. These are known as the junction FET (JFET) and the metal-oxide-semiconductor FET (MOSFET). The junction FET has a channel consisting of N-type semiconductor (N-channel) or P-type semiconductor (P-channel) material; the gate is made of the opposite semiconductor type. In P-type material, electric charges are carried mainly in the form of electron deficiencies called holes. The FET has some advantages and some disadvantages relative to the bipolar transistor. Field-effect transistors are preferred for weak-signal work, for example in wireless, communications and broadcast receivers. They are also preferred in circuits and systems requiring high impedance.

Circuit Diagram

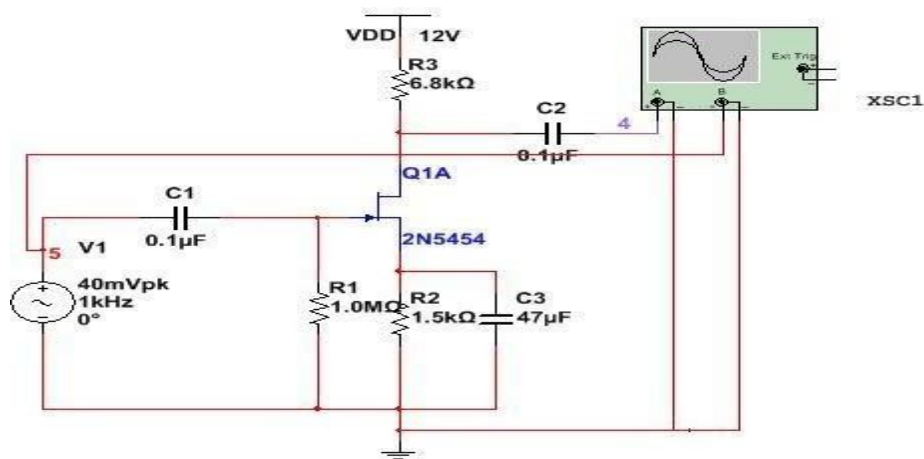


Fig: FET Amplifier

The FET is not, in general, used for high-power amplification, such as is required in large wireless communications and broadcast transmitters. Field-effect transistors are fabricated onto silicon integrated circuit (IC) chips. A single IC can contain many thousands of FETs, along with other components such as resistors, capacitors, and diodes. A common source amplifier FET amplifier has high input impedance and a moderate voltage gain. Also, the input and output voltages are 180 degrees out of Phase.

Procedure:

1. Place all the necessary components required for the design of the CS FET amplifier circuit i.e. Resistors, Capacitors, Transistors, Voltage sources, Power sources, Ground etc on the design window.
2. Connect all the components by proper wiring and also assure that nodes are formed at the interconnection points.
3. Connect the two channels of the Oscilloscope to input and output of the circuit.
4. From the frequency response, calculate the bandwidth of the Amplifier.

OBSERVATION TABLE:

S.No	Frequency(hz)	Output voltage(vo)	Voltage gain (vo/vi)	Gain (db) $A_{vf}=20 \log (vo/vi).$
1				

RESULT: We have obtained the frequency response of the common Source FET Amplifier and also found its Bandwidth to be _____ Hz.