Exp. No #6 Date:

FREQUENCY RESPONSE OF COMMON SOURCE AMPLIFIER

OBJECTIVE

The purpose of the experiment is to analyze and plot the frequency response of a single stage common source amplifier using MOSFET.

EQUIPMENT AND COMPONENTS USED

30 MHz Dual Channel Cathode Ray Oscilloscope
3 MHz Function Generator
0-30 V dc dual regulated power supply
4 ½ digit Digital Multimeter
MOSFET BS170
285kΩ, 110kΩ, 1kΩ, 220Ω Resistors, ¼ W
22μF, 100μF, 0.22μF capacitors
Breadboard and Connecting wires
BNC Cables and Probes

THEORY

- FETs are preferred over BJTs due to its high input resistance.
- In common source amplifier, the output voltage is taken at the drain and is 180^o out of phase with the input.
- An unbypassed resistance between the source and ground reduces the voltage gain of FET amplifier
- A load resistance connected to the drain of a common source amplifier reduces the voltage gain.
- The voltage gain is largely determined by the transconductance g_m and drain resistance R_D.

FURTHER READING

1. Robert Boylstad, Louis Nashelsky, “Electronic Devices and Circuit Theory”, PHI, 2008.
2. James Cox, ‘Fundamentals of Linear Electronics: Integrated and Discrete’, Delmar Thomson Learning, 2nd edition, 2001.
3. Theodore F.Bogart, Jeffrey S.Beasley, “Electron Devices and Circuits, PHI.
4. Robert Diffenderfer, “Electronic Devices”, Delmar Cengage Learning, 2005.

PRELAB

1. Use SPICE to create a common source amplifier. Observe the dc operating conditions.

2. Obtain a plot of the frequency response of the common collector amplifier over the frequency range from 1 Hz through 1 MHz. Observe the gain and bandwidth.

CIRCUIT DIAGRAM

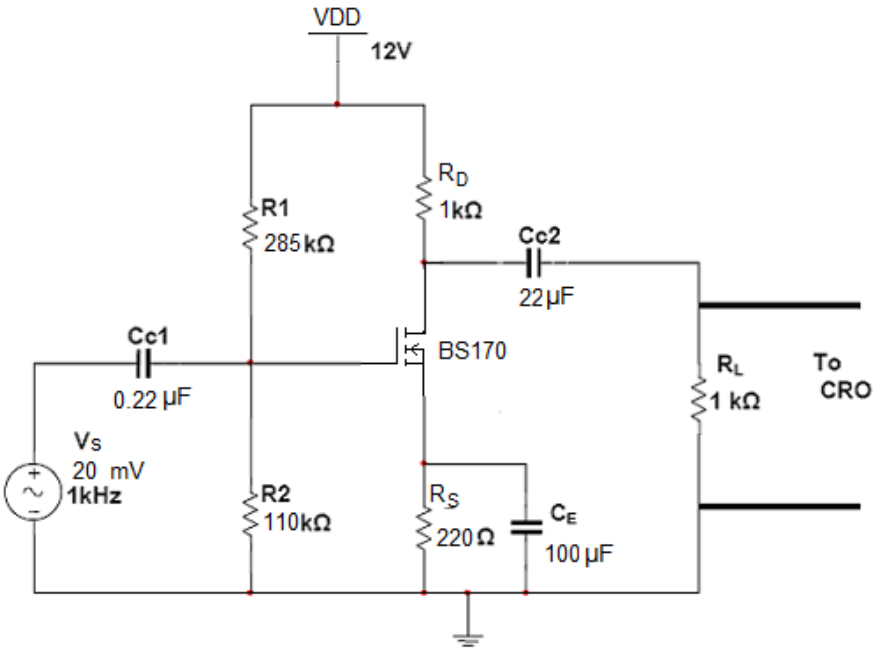


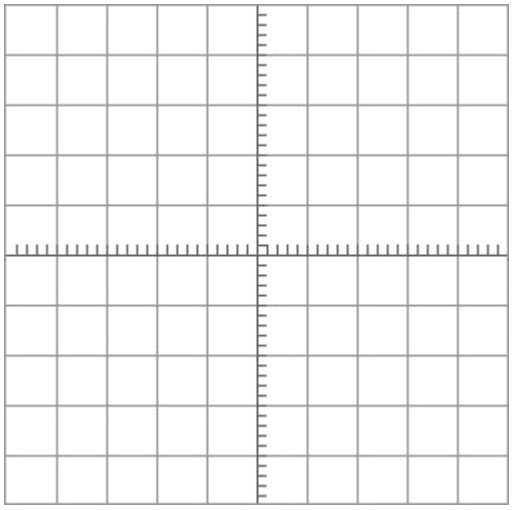
Figure 1

PRACTICE PROCEDURE

1. Connect the circuit as shown in Figure 1.
2. Apply the bias voltage V_{DD} and check the dc bias voltages at test points.
3. Apply an input sine wave signal of 20mV, 1 kHz from the function generator.

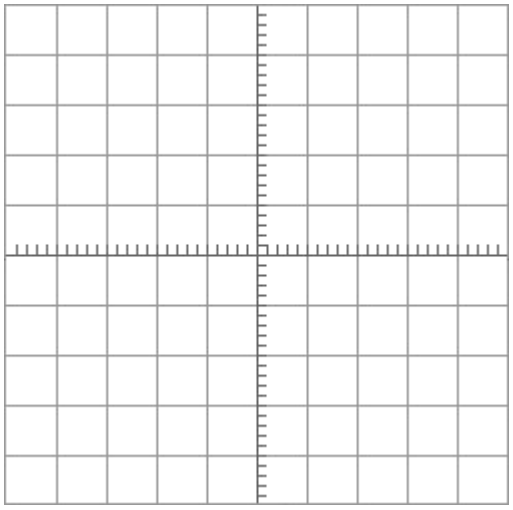
4. Observe the output in CRO. Calculate the corresponding gain.
5. Vary the frequency of the input signal and tabulate the output signal gain for different frequencies.
6. Plot the Frequency Vs Gain (dB) using semi-log sheet and calculate the bandwidth of the given amplifier from the plot.

Volt/div = Time/div =



Graph 1: Input sine wave

Volt/div = Time/div =



Graph 2: Output Waveform

Inference

Table1: Frequency response

Input voltage, Vs = mV

Input frequency (Hz)	Output voltage, Vo (volts)	Gain = Vo / Vs	20 log Gain (Gain in dB)
10			
20			
50			
100			
200			
500			
1k			
2k			
5k			
10k			
20k			
50k			
100k			
200k			
500k			
1M			

Inference

UNDERSTANDING & LEARNING

RESULTS AND CONCLUSION

Prepared by:
Name: _____ Reg. No.: _____

Experiment Date: ……

Report Submission Date: ……

Submission Delay: ……..

Signature

ASSESSMENT

Student Task	Max. Marks	Graded Marks
Pre-lab Preparation	15	
Performance	10	
Observation & Inference	10	
Post-lab / Viva-voce	15	
Total	50	