Department of Electrical & Computer Engineering
ENEE2103 - Circuits and Electronics Laboratory

Experiment #8
The Field-Effect Transistor

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1.1 Characteristics of the N-JFET

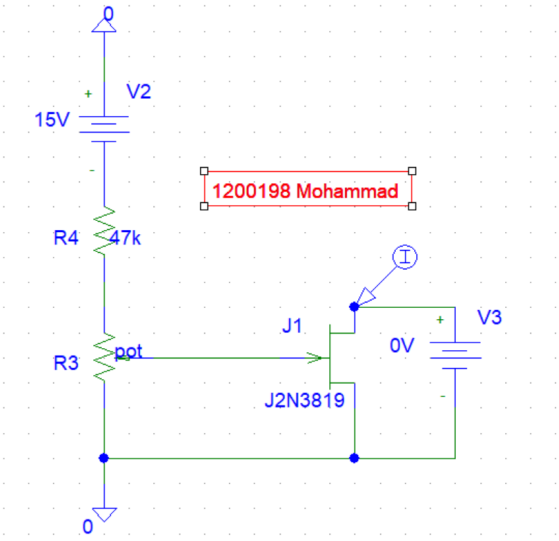


Figure 1: N-CHANNEL JFET Circuit

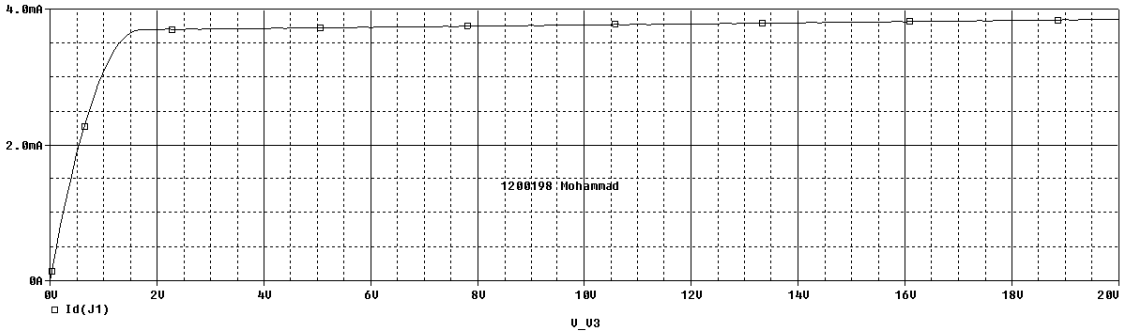


Figure 2: I_{DS} vs. V_{DS}

From the graph above, Id is unchanged with Vds after it exceeds 2V, Ig is very small and is almost zero.

1.2 Common Drain Amplifier

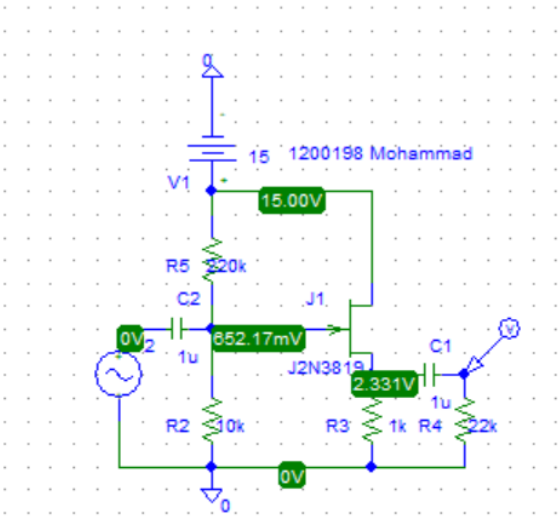
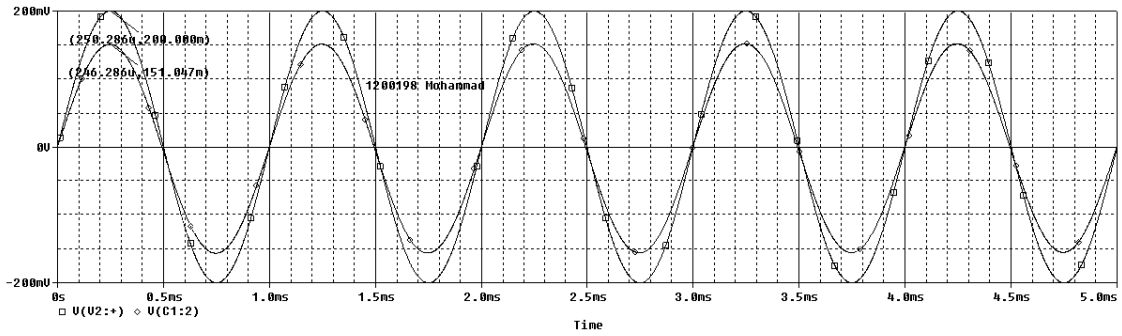


Figure 3: Common Drain Amplifier Circuit

From the above circuit, V_G is 652mV and V_S is 2.3V.



from the above graph, the voltage gain is given by:

$$A_v = \frac{V_{out}}{V_{in}} = \frac{151}{200} = 0.755 \tag{1}$$

and the phase shift is given by:

$$\phi = \Delta t \times 360 \times f = \frac{4 \times 360 \times 1000}{10^6} = 1.44^\circ \tag{2}$$

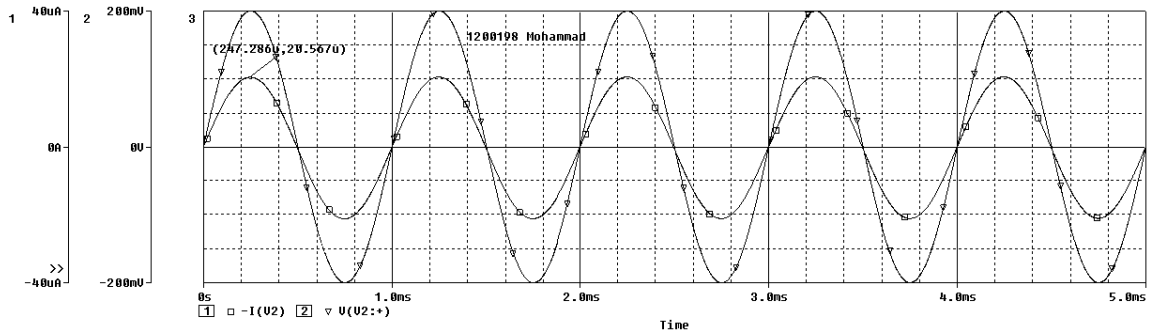


Figure 4: V_{in} and I_{in}

from the above graph, the input impedance is given by:

$$Z_{in} = \frac{V_{in}}{I_{in}} = \frac{200 \times 10^{-3}}{20.567^{-6}} = 9.72K\Omega \tag{3}$$

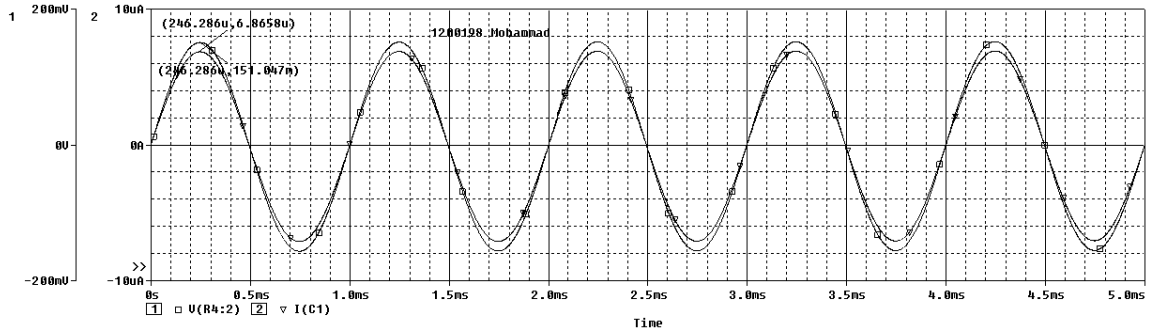


Figure 5: V_{out} and I_{out}

From the above graph, the output impedance is given by:

$$Z_{out} = \frac{V_{out}}{I_{out}} = \frac{151.047 \times 10^{-3}}{6.865^{-6}} = 22K\Omega \tag{4}$$