EEE 202S

Individual Assignment

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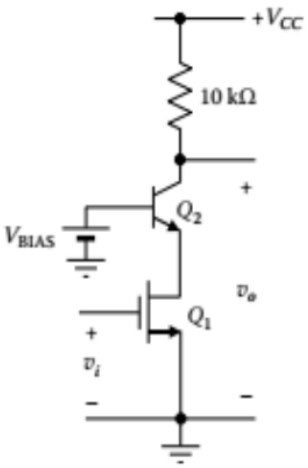
Level: 2

Term: 1

Date: 19.06.2021

Task:



Rsrc =20 k. For the MOSFET, gm = 4 mA/V, Cgs=2 pF,
and Cgd= 0.1 pF. For the BJT, β=100, gm=40 mA/V,
Cp =2.5 pF, and Cm =0.5 pF, and CL= 2 pF. Neglect channel-length and base-width modulations.

Determine:
the low- frequency gain vo/vsrc;

Answer:

For the BJT, $\beta = 100$

$g_m = 40$ mA/V

$$\therefore r_\pi = \frac{\beta}{g_m}$$

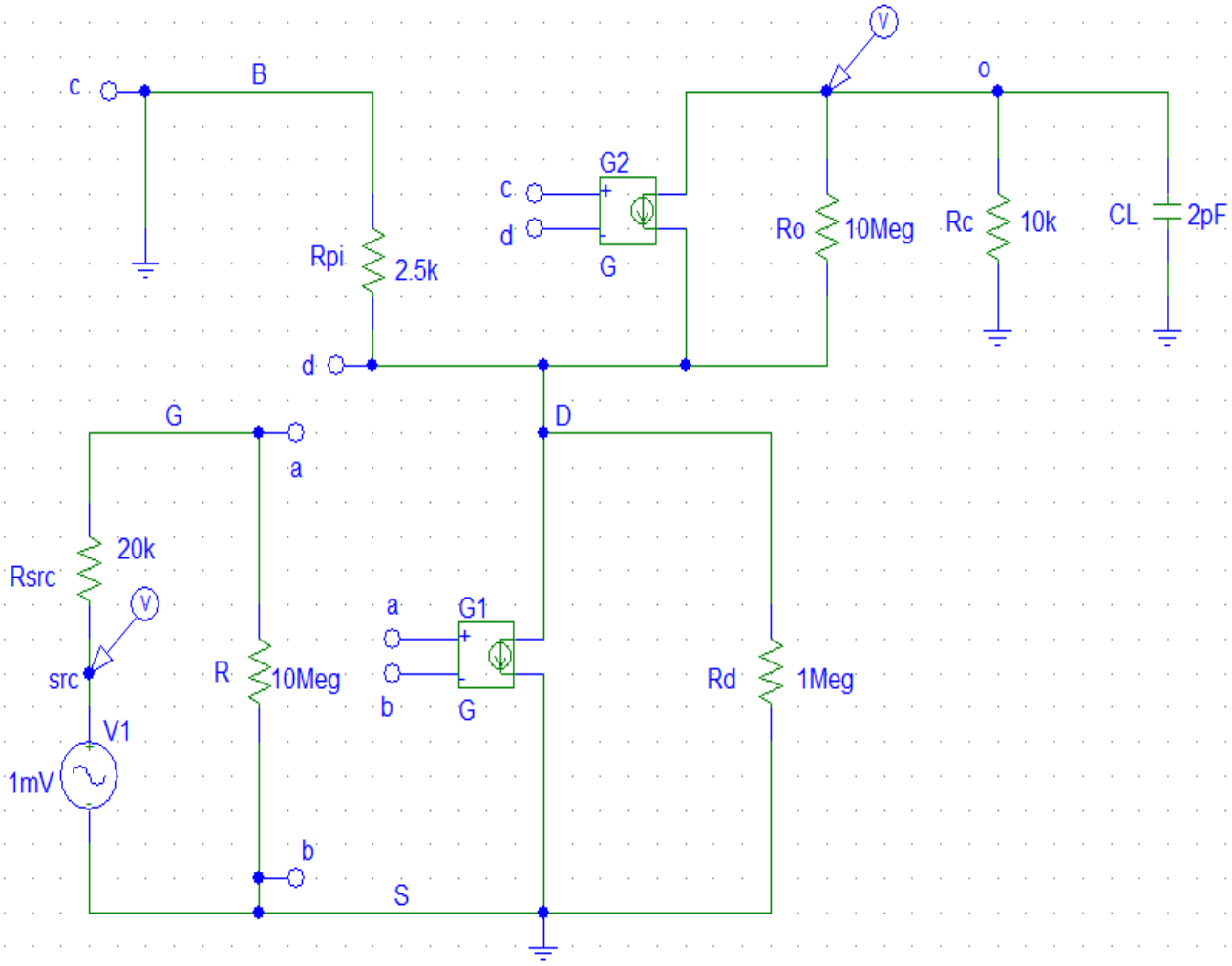
$$= \frac{100}{40\times10^{-3}}\ \Omega$$

$$= 2.5\ k\Omega$$

Now, for the low frequency gain, we will perform small signal analysis using low frequency equivalent model of MOSFET-Q1 and BJT-Q2. To implement the open circuit between Gate and Source of the MOSFET equivalent model, a resistor with high

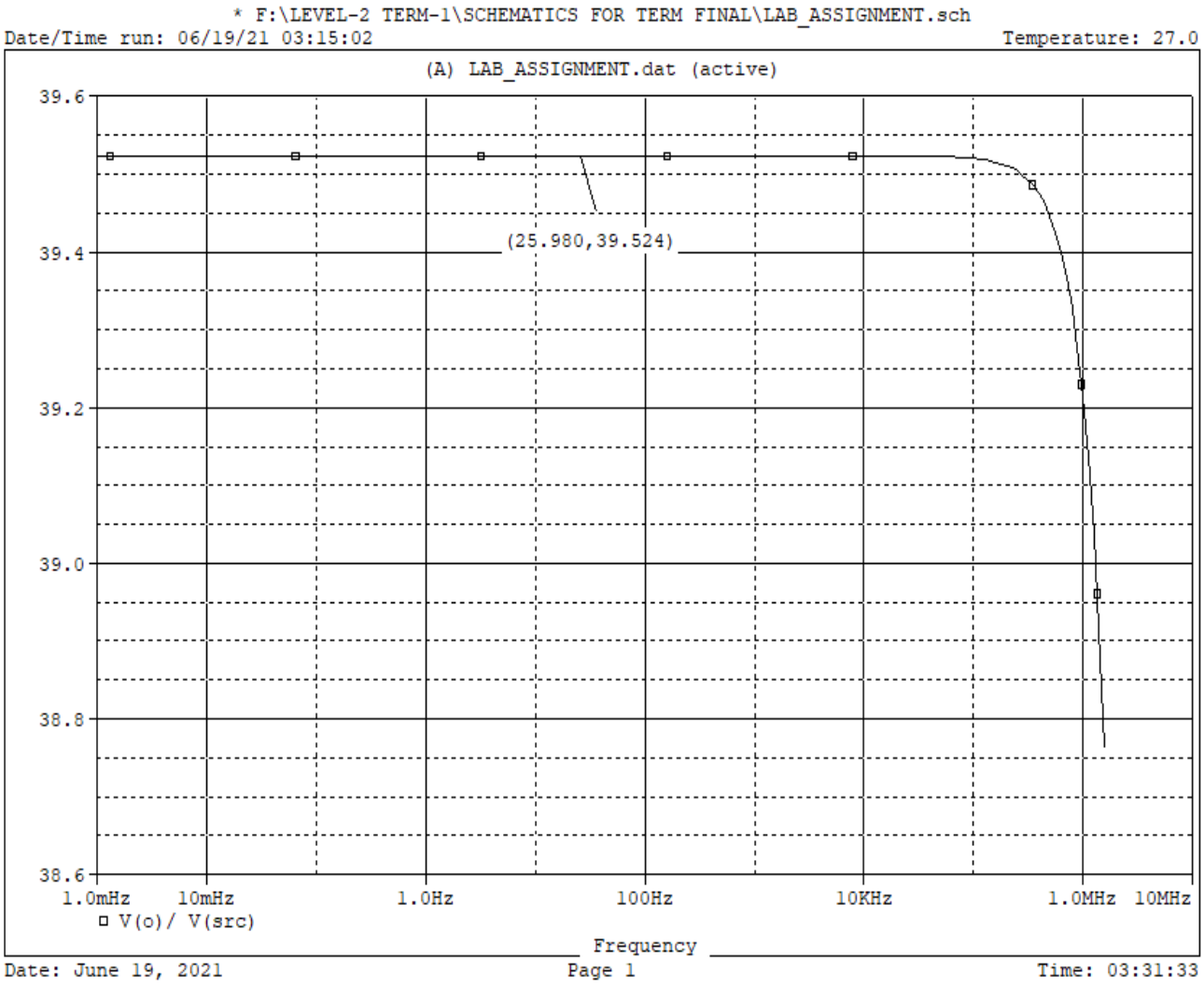
resistance value of 10 MΩ will be added, as PSPICE doesn't allow floating node.

Schematics Circuit Diagram:



Now, to observe low-frequency gain, a frequency sweep is needed. We will sweep "*f*" from 1 mHz to 1.5 MHz with 20 Points/Decade. Next, we will add the trace Vo/Vsrc.

Low-Frequency Gain (Vo/Vsrc):



From the above plot, using "Toggle Cursor" and "Mark Label" functions we get,

The low-frequency gain Vo/Vsrc = 39.524