

Answers to EEE210 Quiz #4 AY2014-2015

- The Q-point is $I_B = 48.3762 \mu\text{A}$, $I_C = 4.838 \text{ mA}$, $V_{CE} = 6.6687 \text{ V}$. This is easily seen to lie in the active region.
- (a) Set all DC sources to 0, replace all capacitors by short-circuits, replace the MOSFET by its small signal AC model with:

$$g_m = 14 \text{ mS}$$

and redraw. Easy. Refer to notes.

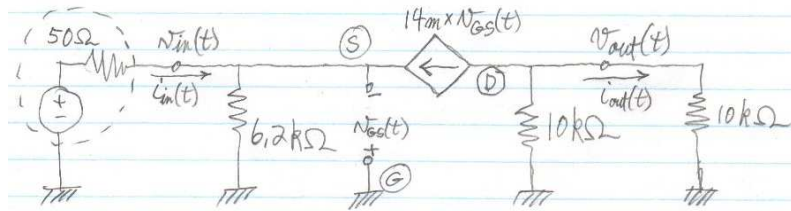


Figure 1:

(b)

$$\begin{aligned} A_V &= 70 \\ A_I &= 0.494 \\ A_P &= 34.59 \\ Z_{in} &= 70.6 \Omega \\ Z_{out} &= 10 \text{ k}\Omega \end{aligned}$$

(c)

$$\begin{aligned} I_D(t) &= 0.913 \text{ mA} - (14 \text{ mS}) v_{in}(t) \\ V_{DS}(t) &= 5.22 \text{ V} + 69 v_{in}(t) \end{aligned}$$

(d) $-72 \text{ mV} < v_{in}(t) < 65 \text{ mV}$.