

ENEE 303H Fall 2013 – Midterm Exam Add On Due Tu 12/10/13

Take Home. Open book open notes; 35 points total (1 hour max). Good luck

Your signed exam book guarantees that the work is totally your own,

For the NMOS transistor assume: $K_P=5 \times 10^{-4}$, $V_{TO}=1$, $LAMBDA=0.01$, $W/L=1$.

C_{inf} is very large so assume it to be a short for signal.

1. (35 points)

For the following circuit all resistors are of the same resistance R with R chosen such that the drain to source bias voltage is $V_{DS}=4V$; $V_{dd}=8V$.

- Show that the transistor is biased in the saturation region and with that give the value of the drain bias current I_D .
- Find the value of R
- Give numerically the transistor's g_m and g_o .
- Draw the small signal equivalent circuit including C_{gs} & C_{gd} using generic symbols (without numerical values).
- When $C_{gd}=0$ find (without numerical values) the small signal (transresistance) gain, $V_o/I_{in}(s)$ and give its poles and zeros (V_o measured with respect to ground).
- Evaluate numerically the poles and zeros when $C_{gs}=5pFd$.

