

EE 303 Midterm Spring 2007

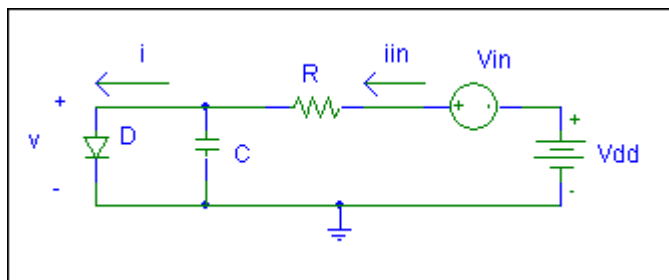
Open book, open notes. Only signed exam books, certifying all work is your own, will be graded. Be sure to show your reasoning for partial credit.

1. (50 points)

For the following circuit the diode is assumed to be described by the equation

$$i = \begin{cases} 0 & \text{if } v \leq 0 \\ 2 \cdot 10^{-3} \cdot v & \text{if } v \geq 0 \end{cases}$$

and $V_{dd}=5V$, $C=10pFd$, $v_{in}(t)=0.0001\sin(2\pi 10^6 t)$.



- Find R to give a Q point having $I_Q = 3mA$
- Draw the small signal equivalent circuit and give the admittance function $Y(s)=i_{in}(s)/V_{in}(s)$
- Calculate the small signal current $i_{in}(t)$.

2. (50 points)

For the following circuit $K_{Pn}=K_{Pp}=2 \times 10^{-4}$, $V_{TOn}=-V_{TOp}=1V$, $\lambda_n=\lambda_p=0$, and $W/L=1$ for all transistors.

- Assuming the potential of the drain of M_m is close to V_{DD} find the output current, I_{out} . Repeat if the M_m 's drain potential is near ground.
- If V_{TOp} changes by 10 % to $V_{TOp}' = -1.1$ find the new value of I_{out} when the potential of the drain of M_m is close to V_{DD} .

