EEE F244: Micro-electronic Circuits LT-SPICE Assignment

Dt. 13.03.2018

INSTRUCTIONS

1. *Make sure you comment your SPICE netlist to make it more readable.*
2. *Take minimum channel length as 1um. Choose convenient values of W.*
3. *Define your own model files for all devices.*
4. *All devices should operate in saturation region.*
5. *Some of these terms may be unfamiliar to you. It is suggested that you should look them up on the internet.*
6. *Take V_{DD} as 3.3V.*

1. Design a Cascode amplifier with voltage gain = 100. Your amplifier should be able to amplify an input of 15mV peak-to-peak without distortion. Determine the -3dB bandwidth and Unity Gain Bandwidth.

2. Perform AC Analysis on V_{in} for the given circuit for values of V_b varying from 0 to V_{DD} and find the small signal gain. Take appropriate value of input voltage so that all transistors are in saturation region. Use W/L = 8 for M_2 and W/L = 4 for M_1. (Circuit diagram given in Fig. 1)

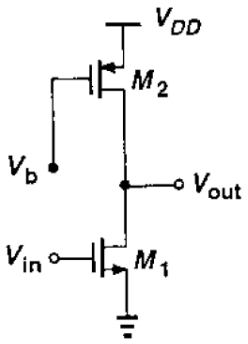

Fig. 1

3. Design a common gate amplifier with the following parameters:
   Gain ≥ 40dB
   Input impedance ≤ 80Ω
   Power dissipation < 4mW

4. Plot the Output vs Input Characteristics (i.e. Transfer Characteristics) for circuit in Fig. 2. Use R_D = 2K and R_s = 1K and W/L = 4 for M_1.

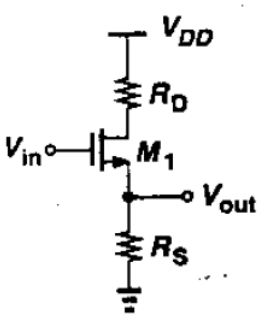

Fig. 2