

HW#2 Hint

Problem #1

- Use s-domain representation for capacitor when you derive the gain expression.

Problem #2

- See next pages

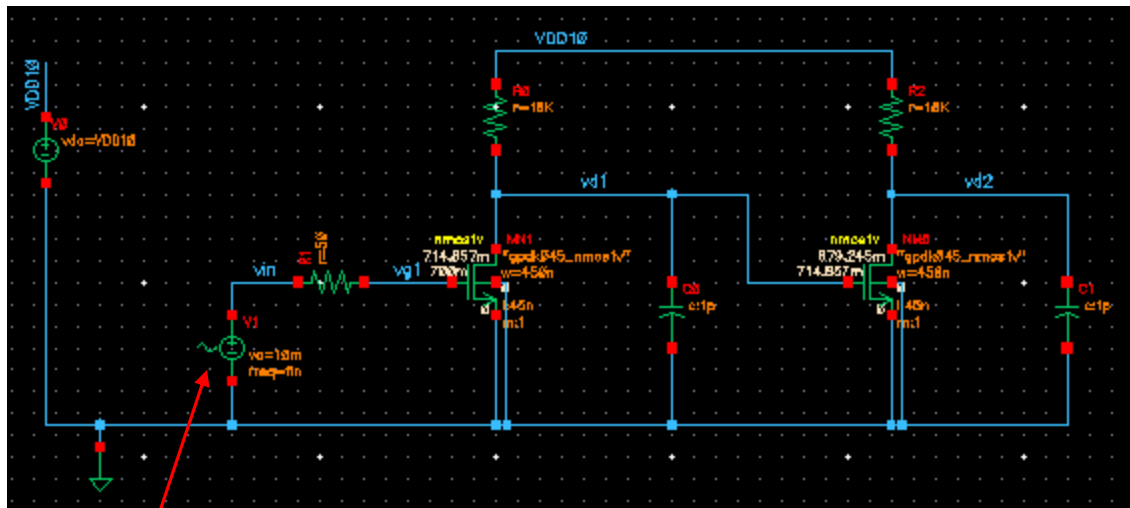
Problem #3

- Use VTH expression including gamma term when you have the body effect
- Solve for the source voltage
- Then use the Saturation current equation to solve for V_{gs}
- This will give you the Gate voltage you need

Problem #4

- You need a channel-bulk capacitance. Use $C_{jcb}=1\text{fF}/\mu\text{m}^2$

Cadence Simulation Problem



Use “vsin” from analogLib

Cadence Simulation Problem

Fill out the form similar to below

The screenshot shows the 'Edit Object Properties' dialog box in Cadence. The dialog is organized into several sections:

- Apply To:** Includes radio buttons for 'only current' (selected) and 'instance'.
- Show:** Includes checkboxes for 'system', 'user' (checked), and 'CDF' (checked).
- Buttons:** 'Browse' and 'Reset Instance Labels Display'.
- Property Table:** A table with columns 'Property', 'Value', and 'Display'. It contains entries for 'Library Name' (analogLib), 'Cell Name' (vsin), 'View Name' (symbol), and 'Instance Name' (v1). Each 'Display' column has an 'off' button and a red dropdown arrow.
- User Property Section:** Includes 'Add', 'Delete', and 'Modify' buttons. Below is a table with columns 'User Property', 'Master Value', 'Local Value', and 'Display'. The 'Ivsignore' property is set to 'TRUE'.
- CDF Parameter Table:** A large table with columns 'CDF Parameter', 'Value', and 'Display'. It lists various simulation parameters such as 'First frequency name', 'Second frequency name', 'Noise file name', 'Number of noise/freq pairs' (set to 0), 'DC voltage' (set to 'VINDC V'), 'AC magnitude' (set to '1m V'), 'AC phase', 'XF magnitude', 'PAC magnitude', 'PAC phase', 'Delay time', 'Offset voltage', 'Amplitude' (set to '10m V'), 'Initial phase for Sinusoid', 'Frequency' (set to 'fin Hz'), 'Amplitude 2', and 'Initial phase for Sinusoid 2'. Each 'Display' column has an 'off' button and a red dropdown arrow.

Cadence Simulation Problem

ADE L (1) - ee223Fall17 HW2_1 schematic

Launch Session Setup Analyses Variables Outputs Simulation Results Tools Help

27.0

Design Variables

Name	Value
1 fin	1MEG
2 VINDC	700m
3 VDD10	1
4 VDD18	1.8

Analyses

Type	Enable	Arguments
1 dc	<input checked="" type="checkbox"/>	t 200m 1 10m Linear Step Size Start-Stop
2 ac	<input checked="" type="checkbox"/>	1K 1G Automatic Start-Stop
3 tran	<input checked="" type="checkbox"/>	0 5u conservative
4 pz	<input type="checkbox"/>	/vd2 /gnd! 1

Outputs

Name/Signal/Expr	Value	Plot	Save	Save Options
1 MN1/D		<input type="checkbox"/>	<input checked="" type="checkbox"/>	yes
2 vin		<input checked="" type="checkbox"/>	<input type="checkbox"/>	allv
3 vg1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	allv
4 vd1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	allv
5 vd2		<input checked="" type="checkbox"/>	<input type="checkbox"/>	allv

Plot after simulation: Auto Plotting mode: Replace

> Results in ...432069@SJSUAD.SJSU.EDU

2(4) | Delete | Status: Ready | T=27.0 C | Simulator: spectre | State: spectre_state1

Cadence Simulation Problem

**When you sweep V_{in} , it is the same as you are sweeping the V_{g1}
So, plot the drain current MN1 and take deriv from Calculator**

I will add more hints next time if you are stuck.