

(F.T)

Degree : B.E Degree End Semester Examinations  
Branch : Electronics and Communication Engineering  
Semester : 6  
Code No. /Subject : EC8006 / CMOS Analog IC Design 1 (R-2012)  
Time: 3 Hours

APR/MAY 2019

Answer ALL questions

Max.marks: 100

PART-A

(10 X 2 = 20 marks)

Use the following parameters for the problems

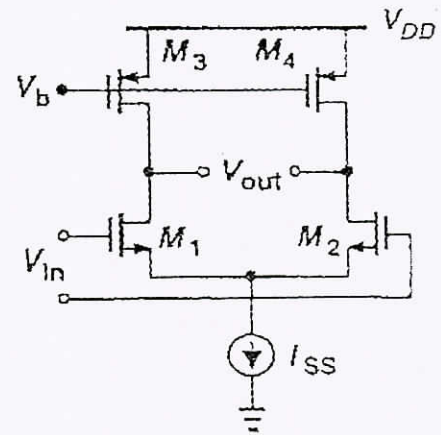
NMOS:  $V_{Tn0} = 0.4$ ,  $k'n = 115 \mu\text{A}/\text{V}^2$ ,  $V_{DSAT} = 0.6\text{V}$ ,  $\lambda = 0.06\text{V}^{-1}$ ,  $\gamma = 0.4 \text{V}^{1/2}$ ,  $2\Phi_F = -0.6\text{V}$ ,  $k_n^i = \mu_n C_{ox}$   
PMOS:  $V_{Tp0} = -0.4\text{V}$ ,  $k'p = -30 \mu\text{A}/\text{V}^2$ ,  $V_{DSAT} = -1\text{V}$ ,  $\lambda = -0.1\text{V}^{-1}$ ,  $\gamma = -0.4\text{V}^{1/2}$ ,  $2\Phi_F = 0.6\text{V}$ ,  $k_p^i = \mu_p C_{ox}$

1. What is the condition for MOSFET to operate in deep triode region?
2. Draw the small signal equivalent circuit of CG amplifier.
3. What is the advantage of folded cascode amplifier?
4. What are the uses of Gilbert cell?
5. Find the miller output impedance of amplifier with gain = -70 and feedback impedance of 150Ω.
6. What is meant by power spectral density of a signal?
7. How do you eliminate RHP zero of two stage CMOS op-amp?
8. What is the slew rate of amplifier to amplify the signal  $V_0 \sin \omega_0$  without distortion?
9. What is the effect on input resistance of amplifier with current voltage feedback?
10. What is the condition on phase margin for stable system?

PART-B

(5X16=80 Marks)

11. i. For the circuit in fig,  $W/L = 50/0.5$  for all transistors,  $I_{SS} = 1\text{mA}$ , find the small signal differential gain and maximum allowable output swing for  $V_{in-CM} = 1.5\text{V}$ .  
ii. Explain operation of current mirror.



12. a. Find transconductance, output impedance and intrinsic gain of NMOS and PMOS devices with  $W/L = 50/0.5$ ,  $I_D = 0.5\text{mA}$ .  
(or)  
b. For common source amplifier,  $W/L = 50/0.5$ ,  $R_D = 2\text{K}\Omega$ .  
i. Find the input voltages to get 1V and 2.5V at output.  
ii. Find drain current and transconductance for both cases

13. a. With high frequency equivalent circuit, derive the frequency response of Common Gate amplifier.

(or)

- b. Explain the effect of input referred noise in differential amplifier.

14. a. Explain simple implementation of two stage op-amp with circuit diagram.

(or)

- b. Briefly explain about noise in op-amp.

15. a. Derive open loop gain of voltage-current feedback amplifier with loading

(or)

- b. Explain Miller compensation of two stage op-amp.

