

SEM - VIII - ETRX - CBSGS - NOV/Dec. 2018.  
20.11.18

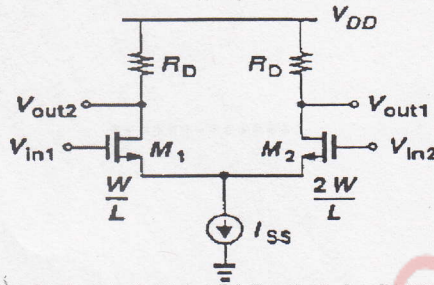
Time: 3 Hours

Max Marks: 80

- N.B. 1) Question No.1 is compulsory  
2) Solve any three questions from the remaining questions.  
3) Assume suitable data if necessary.

1 Solve the following.

- (a) Analyze following circuit to get voltage gain equation if  $M_2$  is twice wide as that of  $M_1$  and  $V_{in1} = V_{in2}$  5



- (b) Explain the concept of switched capacitor circuit 5  
(c) Compare performance of various op-amp topologies 5  
(d) Explain System on Chip and System in Package. 5

- 2 (a) Design two stage operational amplifiers that meet the following specifications 20  
with a phase margin of 60. Assume the channel length is to be  $1\mu\text{m}$ ,  $K_N' = 100\mu\text{A}/\text{V}^2$ ,  $K_P' = 20\mu\text{A}/\text{V}^2$ ,  $V_{TN} = |V_{TP}| = 0.5\text{V}$ ,  $\lambda_N = 0.06\text{V}^{-1}$ , and  $\lambda_P = 0.08\text{V}^{-1}$ .  $A_v > 5000\text{v/v}$ ,  $V_{DD} = 2.5\text{V}$ ,  $V_{SS} = -2.5\text{V}$ ,  $\text{GBW} = 5\text{MHz}$ ,  $C_L = 10\text{pf}$ ,  $\text{SR} > 10\text{v}/\mu\text{sec}$ ,  $V_{out}$  range =  $\pm 2\text{V}$ ,  $\text{ICMR} = -1$  to  $2\text{V}$ ,  $P_{diss} \leq 2\text{mw}$ .

- 3 (a) Derive expression for voltage gain  $A_V$  and output resistance  $R_o$  of source 10  
follower stage.  
(b) Compare full custom and semi-custom design in terms of its trade-off and 5  
applications.  
(c) Explain Non-ideal effects in PLL. 5

- 4 (a) Derive equation of differential gain, common mode gain and CMRR of 10  
differential amplifier.  
(b) Explain White & Flicker noise in MOSFET. Derive equation for output and 10  
input referred noise voltage of CS stage

- 5 (a) Draw and explain AMS design flow. 10  
(b) Draw and explain discrete time integrator along with the output waveform. 10

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Write short note on any four

- (a) Band Gap references
- (b) Cascode current mirror circuit.
- (c) Advantage and disadvantages of DLL
- (d) Stability and frequency compensation of two stage Opamp
- (e) Performance parameters of VCO

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