

Time:- 3 hrs.

Maximum Marks:- 80

N. B.

1. Q.1 is compulsory.
2. Answer any **three** out of the remaining five questions.
3. Figures to the right indicate marks.
4. Answer to the questions should be grouped and written together.

- Q1. Solve **any four** out of five 5
- a. What is the Over Drive Voltage and its Significance. 5
 - b. Explain ADC Specifications. 5
 - c. Compare common source, Common gate and common Drain Amplifier in brief. 5
 - d. What is the drawback in Current Mirror circuit? How to overcome it? 5
 - e. Explain various issues associated with Mixed Signal Circuit Layout.

- Q2 a. Draw and explain the Input common mode response of differential amplifier. 10
- b. For a NMOS Amplifier with driver (M1) with V_{in} as the input voltage and PMOS as a load (M2) with V_b as the input gate Voltage to the PMOS. The $V_{DD} = 1.8V$. $\lambda_1=0.1 V^{-1}$, $\lambda_2=0.15 V^{-1}$, $\mu_n C_{ox} = 200 \mu A/V^2$, $|V_{th}| = 0.4V$. The Amplifier should provide gain of 10 with bias current of 0.5mA. Compute (W/L) of M1. 10

- Q3 Draw and explain the Pipeline DAC. 10
- b Derive the Voltage Gain for CS Stage with Diode Connected Load. 10

- Q4 20
- Design a two stage Op-Amp for the following specifications**

Design a two stage Op-Amp with a phase margin of 60 degree and channel Length $= 1 \mu m$

$A_v > 3500v/v$, $V_{dd} = 2.5v$, $V_{ss} = -2.5v$, Gain Bandwidth = 6MHz

Load = 10pf, SR. 10 V/us, V_{out} range = +2 to -2 v,

ICMR = -1.125 V to +2V, Power Dissipation < 2mw

$\epsilon_0 = 8.854 \times 10^{-14} F/cm$

$\epsilon_{si} = 11.7 \epsilon_0 F/cm$

$\epsilon_{ox} = 3.9 \epsilon_0 F/cm$

Threshold Voltage (NMOS) = 0.7V

Threshold Voltage (PMOS) = - 0.7V

Channel length modulation index (NMOS) = 0.04 V^{-1}

Channel length modulation index (PMOS) = 0.05 V^{-1}

- Q5 a Derive the expression for Input referred noise for the CS Amplifier. 10
- b. Draw and explain Flash type ADC. 10

- Q6 **Write short notes on**
- a. Successive Approximation method ADC 5
 - b. Noise in MOSFETs. 5
 - c. CMOS band gap reference generator. 5
 - d. Triple CASCODE circuit 5
