

(3 Hours)

Total Marks: 80

**N.B: (1) Question No.1 is compulsory and solves ant three questions from remaining questions.**

**(2) Assume suitable data if necessary.**

**(3) Draw neat and clean figures.**

1. **Answer any four:**

- (a) Explain trade off in Analog design with the help of analog design octagon **5**
- (b) For N channel MOSFET draw i) small signal model ii)small signal model with channel length modulation iii)small signal model with body effect? **5**
- (c) Explain importance of Miller theorem **5**
- (d)Explain noise in differential amplifier circuit? **5**
- (e) Draw and explain 3-bit flash ADC with its methodology of conversion? **5**

2. (a) Derive voltage gain of diode connected load CS amplifier? **10**

(b) Derive equation of differential gain, common mode gain, CMRR of differential amplifier? **10**

3. (a)Explain in detail how to generate temperature independent reference? **10**

(b) Explain correlated and uncorrelated noise sources in CMOS circuit? **10**

4 (a) Design an amplifier that meet the following specification with a phase margin of 60.assume the channel length is to be  $1\mu\text{m}$

$A_v > 5000\text{v/v}$  ,  $V_{dd} = 2.5$  ,  $V_{ss} = -2.5\text{v}$  ,  $GB = 5\text{MHz}$  ,  $CL = 10\text{pf}$  ,

$SR > 10\text{v}/\mu\text{sec}$  ,  $V_{out\ range} = \pm 2\text{V}$  ,  $ICMR = -1\text{ to }2\text{V}$  ,  $P_{diss} \leq 2\text{mw}$ .

5 (a)Explain Mixed signal layout issues in detail? **10**

(b)Explain noise in single stage CS amplifier circuit? **10**

6 Write short notes( any three)

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- (a) White and flicker noise in MOSFET
- (b) Cyclic DAC
- (d) Noise bandwidth
- (e) Operational Amplifier Design Parameters

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