2063
M. Tech. (Microelectronics)
Second Semester
MIC-203: Analog and Mixed Signal Device Design

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

1. Attempt all: (2*5)

(a) Define the resolution, settling time and conversion time of D/A converters.

(b) Draw the circuit for analog multiplier.

(c) Write note on ADC architecture.

(d) Draw cascode amplifier configuration and list out its advantages.

(e) Explain the working and derive the output impedance of a simple MOS current mirror.

SECTION A

2. What is basic concept behind single stage amplifiers? Discuss about current source and sink of single stage amplifiers. (10)

3. Why diode connected load is important in common source stage. Derive an expression for small signal voltage gain for diode connected common source stage in MOSFET Technology. (10)

4. In fig. 1, Circuit uses a resistor rather than a current source to define a tail current of 1mA. Assume that $(W/L)_{1,2} = 25/0.5$, $\mu C_{ox} = 50 \ \mu A/V^2$, $V_{TH} = 0.6V$, $\lambda = \gamma = 0$, and $V_{DD} = 3V$. (10)

(a) What is the required input Common Mode (CM) for which R_{ss} for which sustains 0.5V?

(b) Calculate R_D for a differential gain of 5.

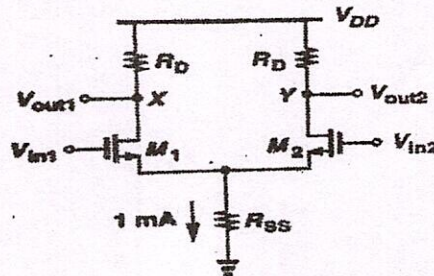(c) What happens at the output if the input CM level is 50mV higher than the value calculated in (a)?

Fig.1

SECTION B

5. Discuss about single slope and dual slope ADC. (10)

6. (a) Differentiate between single ended and differential operation. Explain how input mode range is computed for a differential pair with diagram. (5)

(b) Discuss about Gilbert Cell. (5)

7. Derive mathematical expressions for differential gain and common mode gain of a differential pair in MOS Technology. (10)

x-x-x