R09

Code No: D7702, D6802, D5702

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY-2012
CMOS ANALOG AND MIXED SIGNAL DESIGN
(COMMON TO EMBEDDED SYSTEMS & VLSI DESIGN, VLSI & EMBEDDED SYSTEMS, VLSI SYSTEM DESIGN)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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1.a) What are the three effects that cause the current mirror to be different from the ideal situation?

b) Explain the general principle of the band gap reference and draw a conventional band gap reference.

2.a) Consider the circuit below(figure 1), where a single MOS diode M_2 drives two current mirrors M_1 and M_3. A signal V_{sig} is present at the drain of M_3. What is the effect of V_{sig} on the signal at the drain of M_1 V_{out}?

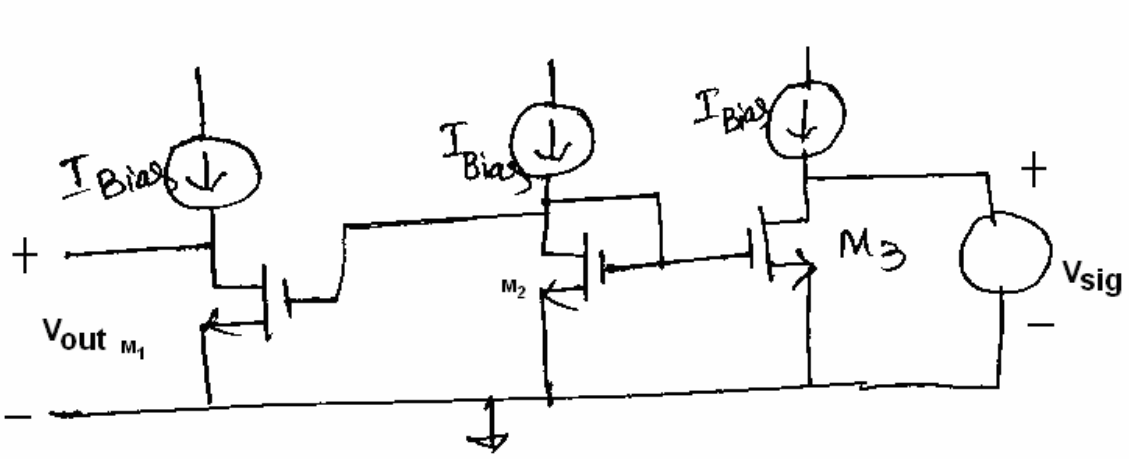

figure 1

b) Derive the transfer function V_{sig} / V_{out} for the above circuit in 2(a).

3.a) What are the properties of negative feedback in amplifier?

b) Draw a push-pull inverting CMOS amplifier and explain its characteristics.

4.a) What are the advantages of class AB amplifier over other amplifiers?

b) For the CMOS push pull inverter find the small signal voltage gain A_V, -3dB frequency if $I_D = 200\mu A$, $W_1/L_1 = W_2/L_2 = 5\mu m/1\mu m$. $C_{gd1} = C_{gd2} = 5PF$, $C_{bd1} = C_{bd2} = 30PF$ and $C_L = 10PF$.

5. Show that if the voltage gain of an op-amp approaches infinity, the differential input becomes a null port. Assume that the output is returned to the input by means of negative feedback.

6.a) List out the static and dynamic characteristics of a comparator.

b) For the circuit (figure 2) given design a high gain, open-loop comparator having an upper trip point of 1V and a lower trip point of 0V if V_{OH}=2V and V_{OL}=-2V.

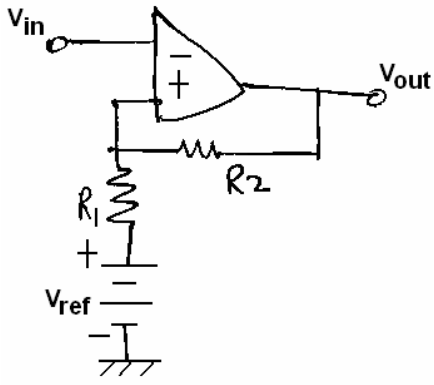

Figure 2

7. Design a switched capacitor realization for a first order, high pass circuit with a high frequency gain of -10 and a -3dB frequency of 1 kHz using a clock of 100 kHz.

8. Write a brief note on any one
   a) DAC architecture
   b) Analog multipliers.

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