Total No. of Questions : 8]

SEAT No. :

P5237

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[5671]-264
M. E. (E & T/C) (VLSI & Embedded Systems)
ANALOG CMOS DESIGN
(2017 Course)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Attempt any 5 Questions.***
2) ***Figures to the right in bold indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) How does MOSFET behave as PN diode? What are its applications? Give the expressions for its DC current and dynamic resistance. **[5]**

b) Where voltage/current reference circuits find applications. Draw a circuit of supply independent voltage source and explain its working. **[5]**

Q2) a) What is effect of body effect and channel length modulation on MOSFET & show how these are accounted in basic small signal model. **[5]**

b) For the current mirror circuit shown in figure 1, find current I_{out} in terms of I_{REF} and device dimensions. Assume all MOSFETs are in saturation. **[5]**

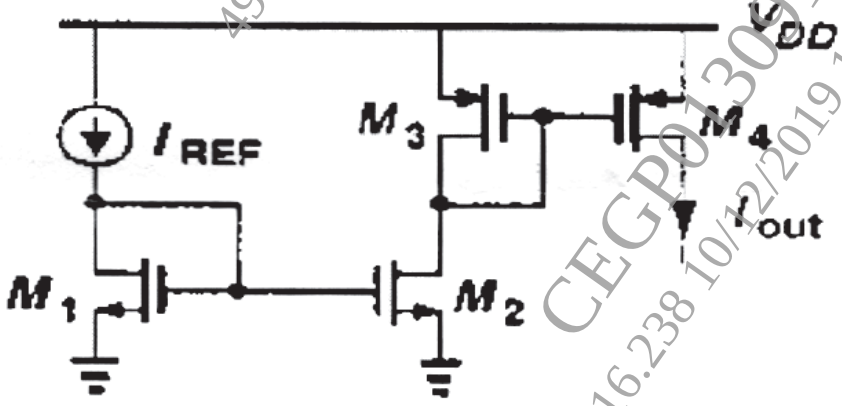

Fig. 1

P.T.O.

Q3) a) Compare Active load, Current source load and Push-pull inverter with respect to important performance parameters. **[5]**

b) What are limitations/constraints due to output offset voltage of CMOS op amp. **[3]**

c) Which are dominant noises in CMOS Op amp? List the techniques to reduce those. **[2]**

Q4) a) What is need of cascode amplifier, draw its schematic and discuss its advantages/disadvantages over single stage CS amplifier. **[4]**

b) Where micro power op amp finds applications. Explain in short the techniques used in micro power op amps. **[4]**

c) What is effect of source degeneration resistance on the voltage gain of CS amplifier? **[2]**

Q5) a) List and explain important parameters of comparator. **[3]**

b) What is need of compensation in multistage amplifiers. Explain Miller Compensation in two stage CMOS Op amp. **[5]**

c) How propagation delay is related with slew rate, derive the relation. **[2]**

Q6) a) Draw and Explain Following Analog Circuits (Any Two) **[5]**

i) Cascode Current mirror Source

ii) Balanced and unbalanced CMOS differential amplifiers.

iii) CMOS Comparator.

b) List and elaborate performance parameters of op amp. Also draw cascode op amp circuit. **[5]**

Q7) a) Explain differential LNA with neat circuit diagram. **[4]**

b) With the help of schematic in detail, explore the design steps of single ended LNA. **[4]**

c) Explain Spurs in Mixer. **[2]**

Q8) a) How to use zeros as bandwidth enhancer? Explain shunt peaking in amplifier. Give the expression for extended bandwidth. **[4]**

b) How nonlinear systems work as linear mixers. Explain square-law MOSFET mixer with neat circuits. **[4]**

c) What are the techniques to improve the bandwidth? **[2]**