P3941

[5462] - 664

M.E. (E & T/C) (VLSI & Embedded Systems)
ANALOG CMOS DESIGN
(2017 Course) (Semester - II) (504207)

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

Instructions to the candidates:
1) *Attempt any five questions.*
2) *Figures to the right side indicate full marks.*
3) *Assume suitable data.*

Q1) a) How does MOSFET behave as PN diode? What are its applications? Give the expressions for its DC current and dynamic resistance. **[4]**

b) Explain small signal high frequency model for MOS transistor. **[4]**

c) Differentiate between small signal and large signal model for MOS transistor. **[2]**

Q2) a) Explain in short "Implementation of current sink and current source using MOSFET". What are the voltage compliances? How to improve them? **[4]**

b) Explain in detail the concept of BGR with its necessity. **[4]**

c) List the performance parameters of voltage reference circuits. **[2]**

Q3) a) What do you mean by large signal, small signal analysis? Draw the schematic of CMOS difference amplifier with current mirror load give the expression for GMD, ICMR, CMRR and 3dB frequency. **[5]**

b) Short note on: Folded Cascode amplifier. **[3]**

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

Q4) a) Compare Active load, Current source load and Push-pull inverter with respect to important performance parameters. **[4]**

b) What is the use of micro power op-amp? Explain in short the techniques used in micro power op-amp. **[4]**

c) What are constraints/ limitations due to output offset voltage of CMOS Op amp? **[2]**

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Q5) a) Explain need of frequency compensation. State various techniques of frequency compensation. **[5]**

b) Explain Miller Compensation in two stage CMOS Op amp. **[5]**

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

i) Cascode Current Source

ii) Common source amplifier with NMOS diode connected load.

iii) Common source amplifier with current mirror source load.

iv) CMOS Comparator.

b) Write a note on stability of Op amp and its effect on slew rate. **[5]**

Q7) a) What are the types of mixer? Explain any one with the help of mathematical analysis in detail. **[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 band width. **[4]**

b) What is power constrained noise optimization? Explore with necessary expressions. **[4]**

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

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