Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech(ECE-VLSI)/SEM-2/MVLSI-203/2012

2012

ANALOG IC DESIGN

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

Answer the following questions :

1. Design the block diagram of an ideal operational amplifier. $2\frac{1}{2}$

2. Design a small signal equivalent circuit of a MOSFET. $2\frac{1}{2}$

3. How is the MOS diode compared with a *p-n* diode ? 3

4. What is DNL ? What is value of DNL for ideal DAC ? 2

5. What is INL ? What is value of INL for ideal DAC ? 2

6. What is resolution value for 8-bit DAC with reference voltage of 16V ? 2

GROUP – B

Answer any *four* of the following. 4 × 14 = 56

7. Design and explain the MOSFET switch model. Explain ON and OFF characteristics of a MOS switch. 6 + 8

8. Describe how a MOSFET can work as a diode. Why do we need to use MOSFET as resistor ? Give a qualitative analysis of the different types of MOS differential amplifier. 5 + 2 + 7

9. Write a short note on how MOSFET can work as current sink and source. How to improve the performance of a simple NMOS current sink by connecting a resistance between source and ground ? 6 + 8

10. Show DAC components by block diagram. Explain Binary Weighted Resister 4-bit DAC with circuit diagram. Explain R-2R Ladder 4-bit DAC with circuit diagram. 2 + 6 + 6

11. Show ADC components by block diagram. Explain *N*-bit Ladder Comparison ADC using block diagram. Explain *N*-bit Flash ADC using block diagram. Explain pros and cons of these two ADCs. 2 + 5 + 5 + 2

12. How can you realize resistor using switched capacitor circuit ? Explain PLL operation. 6 + 8