Total No. of Questions : 10] [Total No. of Printed Pages : 3

Roll No. .....

EC–505(N)

B. E. (Fifth Semester) EXAMINATION, June, 2011

(Electronics & Communication Engg. Branch)

CMOS VLSI DESIGN

[EC–505(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : All questions are compulsory. All questions carry equal marks.

1. (a) Explain the various capacitances associated with MOS transistor. Also discuss MOS capacitance model. 10

   (b) What do you mean by subthreshold condition in MOS transistor ? Explain. 10

Or

2. (a) Explain the voltage-transfer characteristics (VTC) of CMOS inverter. Also explain the effect of varying the β (beta) i.e., (W/L) ratio of the VTC. 10

   (b) Explain what do you mean by body effect in MOS ? How does it affect the stacking of MOS transistors ? 10

3. (a) Discuss the photolithography process. What are positive and negative photoresistive materials ? 10

P. T. O.

(b) Discuss the various fabrication steps during the fabrication of integrated circuits. 10

Or

4. (a) Discuss the layout design rules with suitable examples. 10

(b) Draw the layout of CMOS inverter having $(W/L)_P = 2\mu m$ and $(W/L)_n = 1\mu m$ in $0{\cdot}5\mu m$ CMOS technology as per design rules. 10

5. (a) Discuss the static and dynamic power dissipation in CMOS VLSI circuits. On what factor does power dissipation in these circuits depend ? 10

(b) What do you mean by low power VLSI circuits ? Explain the basic principle used in such circuits to achieve extremely low power. 10

Or

6. (a) What do you mean by scaling in CMOS circuits ? What are various scaling techniques ? Explain constant field scaling. 10

(b) What is logical effort ? How logical effort is useful in choosing best number of stages in multistage logic networks ? Write logical efforts of all basic gates. 10

7. (a) Draw the common source amplifiers with the following : 10

(i) Resistive load

(ii) Diode connected load

(iii) Diode connected-PMOS load

(iv) Source degenerated

Compare these amplifier circuits.

(b) What do you mean by a current mirror ? Draw a basic current mirror circuit and explain its operation with desired equation. 10

Or

8. (a) Draw a two-stage CMOS operational amplifier and explain its operation. 10

(b) List various types of Analog to Digital converters. Explain the principle of operation of successive approximation ADC. 10

9. (a) What is sense amplifier ? Explain its operation with neat circuit diagram. 10

(b) Draw a generalized circuit diagram of domino CMOS logic and explain its operation. Give its limitations. 10

Or

10. (a) Compare the static and dynamic CMOS circuits with suitable examples. 10

(b) What do you mean by floor planning ? List the various floor planning algorithms and explain any *one*. 10