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**Question Paper Code : 64121**

M.E. DEGREE EXAMINATION, MAY/JUNE 2014.

First Semester

Applied Electronics

VL 7102 — VLSI DESIGN TECHNIQUES

(Common to M.E. VLSI Design and M.E. Medical Electronics)

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Which mode of operation of MOS transistor is used for digital circuits? Justify.
2. Draw the small signal model of a MOS transistor.
3. Define Latch-up.
4. Draw the stick diagram of CMOS inverter.
5. Compare static CMOS design with dynamic CMOS design.
6. What is the drawback of transmission gate?
7. What happens to CMOS power dissipation as load capacitance increases? Justify.
8. Define delay time.
9. What are the basic differences between parallel multiplier and serial multiplier?
10. What is meant by cross talk?

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is threshold voltage of a MOS transistor? List three main factors that affect the threshold voltage of MOS device (4)  
(ii) Derive the Basic DC equation of MOS device in various regions of its operation. (12)

Or

- (b) Discuss the various second order effects associated with MOS transistor.

12. (a) With neat diagrams, explain twin-tub process of CMOS fabrication.

Or

(b) What are the needs for design rules? Explain Mead-Conway design rules for nMOS process.

13. (a) (i) Determine the pull up to pull down ratio of nMOS inverter having depletion type load. (8)

(ii) Explain how super buffer is used for driving large capacitive loads. (8)

Or

(b) Design a BCD to Gray code converter and implement using

(i) Clocked CMOS-logic (8)

(ii) Dynamic CMOS logic (8)

14. (a) Explain in detail about the static and dynamic power consumption in CMOS inverter.

Or

(b) (i) Discuss the requirements and limitations of CMOS scaling. (10)

(ii) Explain the influence sheet resistance and standard unit of capacitance of device performance. (6)

15. (a) Explain, in detail, any two multiplier structures with necessary diagram.

Or

(b) Explain the implementation of ALU function using adder.