

Total No. of Questions : 8]

SEAT No. :

P4644

[Total No. of Pages : 2

[4960]-1252

M.E. (E & TC) (VISI & Embedded Systems)

DIGITAL CMOS DESIGN

(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Answer any five questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data if necessary.*

Q1) a) What is need of technology scaling? What are its types? Explain in brief.[5]

b) Draw MOSFET equivalent circuit and explore the parasitics in detail.[5]

Q2) a) Draw the cross section of an inverter and mention dimensions. Show various capacitances. [5]

b) With the help of suitable diagrams, explain layout design rules in detail.[5]

Q3) a) Derive the expressions for static & dynamic power dissipations. Compare them. [4]

b) With the help of suitable example, explain logical efforts. [4]

c) What is cross talk? How to minimize on chip level? [2]

Q4) a) Explain fan in & fan out of CMOS logic. Give the expressions & explain dependencies. [4]

b) Derive the expression for power delay product. What is its significance?[4]

c) How does layout introduce delay? Which parasitics are responsible for it? [2]

P.T.O.

- Q5)** a) Design CMOS logic for $Y = AB + C + D(E + F)$. Calculate area on chip. [4]
b) Explore need of transmission gate. What are limitations? [4]
c) Why is transistor sizing important? Give analysis for logic with & without sizing for justification. [2]
- Q6)** a) Explain metastability. What are the reasons? What are solutions? [4]
b) With help of suitable combinational logic, explore static & dynamic hazards in detail. What are the sources & mitigation techniques? [4]
c) How to achieve symmetry in the voltage transfer characteristics of CMOS inverter? [2]
- Q7)** a) What is need of sense amplifier circuit? With the help of schematic, explain sense amplifier circuit for typical application in detail. [4]
b) Explore NORA logic in detail. [4]
c) List high speed design techniques. [2]
- Q8)** a) Compare the circuit families in brief. [4]
b) Write note on advance materials in CMOS design. [4]
c) Explain the concept of ratioed circuit. [2]

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