Total No. of Questions : 8]

SEAT No. :

P3939

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[5462] - 661

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

DIGITAL CMOS DESIGN

(2017 Pattern) (Semester - I)

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

Instructions of the condidates:

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

Q1) a) With the help of diagram & typical dimensions, explain cross section of CMOS Inverter. Comment on the doping concentrations & poly silicon layer. **[5]**

b) What is need of technology scaling? Explain the types & their characteristics in detail. **[5]**

Q2) a) Derive the expression for power delay product. How is it useful to the designer? **[5]**

b) Explore multistage logic network & delays. **[5]**

Q3) a) Explore equivalent circuit of MOSFET. Explain the gm, Cgs & their significance. **[4]**

b) With the help of suitable diagrams, explore n-well process. **[4]**

c) What is need of transient analysis? **[2]**

Q4) a) Explain various RC delay models in brief. Comment on their accuracies. **[4]**

b) With the help of mathematical analysis, explain the need of transistor sizing. **[4]**

c) Write note on design margin. **[2]**

P.T.O.

Q5) a) Draw a logic circuit involving dynamic hazards & explain the waveforms. **[4]**

b) Design five input CMOS NAND & NOR gates. Compare w.r.t.area, dissipation & delay. **[4]**

c) Why hazards are not so serious in synchronous machines? **[2]**

Q6) a) Design CMOS logic for P = ABCDE + F + G + H. Comment on area & propagation delay. **[4]**

b) Draw FSM diagram & write HDL code for tea/coffee vending machine. Assume suitable data. **[4]**

c) Design 4:1 mux using transmission gates. Compare with conventional method. **[2]**

Q7) a) What are merits of differential circuits? Explore sense amplifier based circuit in detail. **[4]**

b) Compare at least three logic families in detail. **[4]**

c) Write note on techniques of low power design. **[2]**

Q8) a) What is merit of dynamic circuit? Explain with schematic. **[4]**

b) Explain in brief about materials involved in performance improvement. Give at least two examples. **[4]**

c) Write note on high speed design. **[2]**

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