Total No. of Questions : 8]

SEAT No. : ____

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M.E. (E & TC)

VLSI & EMBEDDED SYSTEMS

Digital CMOS Design

(2017 Pattern)

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

Instructions to the candidates:

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 diffusion capacitances, explain various parasitics of enhancement MOSFET. Which capacitances are dominant? **[5]**

b) What is lambda parameter? Explain various wiring parasitics in detail. Explore the concept of sheet resistance. **[5]**

Q2) a) Explain static dissipation, dissipation due to cross conduction & dissipation due to charging - discharging of load capacitor in case of CMOS logic. **[5]**

b) With mathematical expressions, explore fan out in detail. On what factors does it depend? **[5]**

Q3) a) What is SPICE model? Explain any three spice parameters. **[4]**

b) Explain any one CMOS fabrication process in brief. **[4]**

c) Explore any two design rules of DRC. **[2]**

Q4) a) With the help of suitable example of logic circuit, explain the logical efforts. Why are these efforts needed? **[4]**

b) What are sources of cross talk? Explain cross talk mechanism. **[4]**

c) Give the expression for propagation delay. Explain the significance of each parameter. **[2]**

P.T.O.

Q5) a) Design CMOS logic for Y = A + BCDEF + GH. Compute active area. **[4]**

b) Can transmission gate produce strong 1 & 0? Explain in detail. **[4]**

c) Write note on metastability. **[2]**

Q6) a) Draw FSM diagram & write HDL code for 4 bit ring counter. Write test bench for it. **[4]**

b) Draw D flip flop using transmission gates. Compare with conventional method. **[4]**

c) Explain pass transistor logic in brief. **[2]**

Q7) a) What is the concept behind ratioed circuits? Explain in brief. **[4]**

b) With suitable schematic, explain cascode voltage switch logic in detail. **[4]**

c) Write note on dynamic circuits. **[2]**

Q8) a) Write note on domino logic. **[4]**

b) Explain NORA logic & its merits. **[4]**

c) List merits of BiCMOS. **[2]**