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18AA1152

M.Tech. EXAMINATION, 2020

(First Semester)

(C Scheme) (Re-appear Only)

ECE

MTEC503C

ANALOG & DIGITAL CMOS DESIGN

Time : 3 Hours] [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Q. No. **9** is compulsory.

Unit I

1. (a) What is Body effect and Velocity saturation in MOSFET ? **7.5**

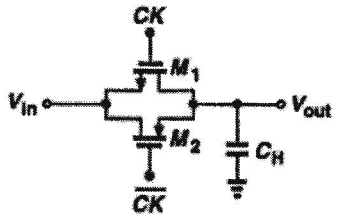
(b) Discuss any small signal MOS model for digital design. **7.5**

2. (a) Draw and explain transfer characteristics of CMOS inverter. **7.5**

(b) Draw and discuss the schematic of enhancement load inverter. **7.5**

Unit II

3. (a) Following sampling network is designed with $(W/L)_1 = 20/0.5$, $(W/L)_2 = 60/0.5$ and $C_H = 1\mu F$. If $V_{in} = 0$ V and initial value of V_{out} is + 3V, find the time required for V_{out} to drop to + 1 mV. **7.5**



(b) Explain whether a master-slave D flipflop can operate as a phase detector or a frequency detector. Assume the flipflop provides differential outputs. **7.5**

4. (a) Design a CMOS Schmitt trigger and point out the challenges in the design. **7.5**

(b) Implement a transfer function in Pseudo NMOS logic. **7.5**

Unit III

5. (a) Discuss the design of and performance parameters associated with simple current mirror. **7.5**

(b) What are various applications of current mirror ? **7.5**

6. (a) Design the schematic of MOS differential pair with resistive load. **7.5**

(b) Compare the design of MOS differential pair with resistive load and current mirror load. **7.5**

Unit IV

7. (a) Discuss the design and issues associated with design of recent generation Operational Amplifiers. **7.5**

(b) What are various performance characteristics involved in design of MOS Operational Amplifier ? **7.5**

8. (a) Explain operation and characteristics of FinFET. **7.5**

(b) What is organic transistor ? How is it different from other transistor models ? **7.5**

9. (a) What is propagation delay ? **3**

(b) Differentiate Domino CMOS and transmission gate logic. **3**

(c) Draw frequency response of common drain amplifier. **3**

(d) What is single electron transistor ? **3**

(e) Discuss Miller effect with reference to CMOS amplifier. **3**