

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Total No. of Pages : 02

Total No. of Questions : 08

**M.Tech (VLSI Design) (Sem.-1)**  
**CMOS VLSI DESIGN CONCEPTS**  
**Subject Code : MTVL-101-18**  
**Paper ID : [75205]**

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carry TWELVE marks.

Q1. a) Enlist three regions of operation of MOS Transistor. Also describe various equations used for a particular MOS design

b) Enlist the advantages of CMOS over nMOS.

Q2. Discuss the components that establish the amount of power dissipated in the CMOS circuits.

Q3. a) Consider a MOS system with the following parameters :

- $t_{ox} = 200 \text{ \AA}$
- $\phi_{GC} = -0.85V$
- $N_A = 2.10^{15} \text{ cm}^{-3}$
- $Q_{ox} = q2.10^{11} \text{ C/cm}^2$

i) Determine the threshold voltage  $V_{T0}$  under zero bias at room temperature ( $T=300K$ ).  
Note that  $\epsilon_{ox} = 3.97\epsilon_0$  and  $\epsilon_{si} = 11.7\epsilon_0$ .

ii) Determine the type (p-type or n-type) and amount of channel implant ( $N_I/\text{cm}^2$ ) required to change the threshold voltage to 0.8V.

b) Describe the concept of body effect in multiple input gate.

Q4. Write the short note on system design of :

a) Transmission gate adder

b) Comparator

- Q5. a) Briefly outline the needs of low power chip design.
- b) Enlist the two problems associated with low  $V_T$  circuits. Discuss any one technique to eliminate these problems.
- Q6. a) Explain the principle of BiCMOS inverter.
- b) What is the need of pipelining in system processing? Describe the pipelining processing approach with example.
- Q7. Describe various clocking strategies in detail.
- Q8. Explain the following :
- a) Tri state pads
  - b) Zero/one detector
  - c) Charge sharing