



# MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PE-EC603C CMOS VLSI Design

UPID : 006751

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

## Group-A (Very Short Answer Type Question)

1. Answer any ten of the following :

[ 1 x 10 = 10 ]

- (I) Name the oxide material which is used as a gate oxide layer in the MOSFET.
- (II) What is diffusion process in VLSI fabrication?
- (III) In CMOS logic circuit the n-MOS transistors act as \_\_\_\_\_ Network.
- (IV) What is interconnect delay?
- (V) What is SPLD?
- (VI) Name the material that is used for gate electrode of MOSFET?
- (VII) What type of bias is to be given for a n-channel enhancement type MOSFET ?
- (VIII) What is ingot?
- (IX) How many transistors will be required to implement a X-input dynamic CMOS logic?
- (X) What do you mean by Global Routing?
- (XI) What is the output of physical design ?
- (XII) What is the unit of trans-conductance parameter of MOSFET ?

## Group-B (Short Answer Type Question)

Answer any three of the following :

[ 5 x 3 = 15 ]

2. Discuss the principle of operation of MOSFET [5]
3. What are the advantages of using SiO<sub>2</sub> in VLSI circuits? Write down Fick's equations (one dimension) for diffusion. [5]
4. Describe three design domains in VLSI using Y-chart. [5]
5. Briefly Explain the Narrow channel effects in MOSFET? [5]
6. Describe Photolithography process with diagram. [5]

## Group-C (Long Answer Type Question)

Answer any three of the following :

[ 15 x 3 = 45 ]

7. (a) State Moore's law. What are the advantages of using CMOS compared to BJT. [ 5 ]  
(b) What do you mean by hierarchy, regularity, modularity & Locality of any VLSI design. [ 6 ]  
(c) Explain the features of ASIC [ 4 ]
8. (a) Explain the principle of operation of n- channel MOSFET . [ 8 ]  
(b) Draw the MOSFET I-V Characteristics and explain the different regions. [ 7 ]
9. (a) Discuss Different types of Small Geometry effects in a MOSFET. [ 12 ]  
(b) Explain different Narrow channel effects in MOSFET? [ 3 ]
10. (a) With suitable diagram describe the nMOS fabrication process . [ 10 ]  
(b) Briefly explain about etching process. [ 5 ]
11. (a) Explain the different steps of twin tub CMOS process of fabrication using n-well and p-well. [ 10 ]  
(b) Explain the fabrication of SiO<sub>2</sub> using the dry oxidation technique. [ 5 ]

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