

**B. TECH.**  
**SEVENTH SEMESTER EXAMINATION, 2003-2004**  
**VLSI-DESIGN**

*Time : 3 Hours*

*Total Marks : 100*

- Note :** (1) Attempt All questions.  
(2) All questions carry equal marks.

1. Attempt any *FOUR* parts of the following :—
  - (a) Briefly describe the evolution of integrated circuits.
  - (b) How did the technology shift from SSI to MSI then to VLSI ?
  - (c) What is photomask ? How many masks are required to complete an integrated circuit ?
  - (d) What is Ion-Implantation ? What are the advantages and disadvantages of this process over diffusion process ?
  - (e) What is the origin of oxide charges ? How does it affect the performance of a device ?
  - (f) Draw a TTL inverter circuit and explain its transfer characteristics.
  
2. Attempt any *FOUR* parts of the following :—
  - (a) . How many diffusions are needed to form an MOS transistor ? Explain the purpose of each diffusion step.
  - (b) Explain the difference between metal gate and silicon gate MOS technologies.

- (c) Sketch the cross-section and explain the operation of n-channel enhancement type MOS transistor. Draw the characteristics of the device.
- (d) What are the different short channel effects? Explain.
- (e) What is body effect? Explain.
- (f) Explain the term, 'self-aligned gate'. What is the requirement of self-aligned gate? How is it achieved?
3. Attempt any *TWO* parts of the following :—
- (a) Describe the operation of basic MOS inverter. Derive the expression for pull-up to pull-down ratio for an n-MOS inverter driven by another n-MOS inverter.
- (b) What do you mean by MOS layers. Explain, with example, how stick diagrams are used to convey layer information through the use of a colour code.
- (c) Describe the Lambda based design rules and Layout methodology for C-MOS circuits design.
4. Attempt any *TWO* parts of the following :—
- (a) Design a four-line gray code to binary code converter.
- (b) Construct a colour coded stick diagram to represent the design of a C-MOS circuit that implements the following function :—

Input		Output
x	y	z
0	0	1
0	1	0
1	0	0
1	1	0

(c) Write a short note on 'Application Specific Integrated Circuits'.

5. Attempt any TWO parts of the following :—

(a) Write a short note on VLSI Testing.

(b) What is Programmable Logic Arrays ? What are the different types of array structure of PLA ? Explain.

(c) Write a short note on Programmable Array Logic.