

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – III • EXAMINATION – WINTER • 2014****Subject code: 732902****Date: 27-11-2014****Subject Name: VLSI Circuits and Design****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- | | | | |
|------------|------------|---|-----------|
| Q.1 | (a) | (1) What are the concepts of hierarchal abstraction, Regularity & Locality?
(2) Write a technical note on: - Semiconductor Memories. | 06 |
| | (b) | Draw the Y-Chart and explain the VLSI design Process. | 04 |
| | (c) | Write a brief note on :- CPLD | 04 |
| Q.2 | (a) | What is Built-in-self test? Explain it with suitable diagrams. | 07 |
| | (b) | Explain the following Process for VLSI fabrication with sketches:-
(i) Photo-Lithography (ii) oxidation | 07 |
| | | OR | |
| | (b) | How the testability is increased? Explain any two testable design techniques. | 07 |
| Q.3 | (a) | Define threshold voltage of a MOSFET. Derive the equation of threshold voltage for P-channel MOSFET. | 07 |
| | (b) | Draw the device structure of CMOS Inverter. | 07 |
| | | OR | |
| Q.3 | (a) | Draw & explain the different regions for
(i) MOSFET V-I characteristics
(ii) MOSFET C-V characteristics | 07 |
| | (b) | Design a (i) Two input NAND gate (ii) Half adder circuit | 07 |
| Q.4 | (a) | Explain in detail concept of channel length Modulation. | 07 |
| | (b) | Realize the optimized CMOS logic circuit for
(i) Two input XOR gate (ii) $Y = A(B+C)+DE$ | 07 |
| | | OR | |
| Q.4 | (a) | Write a detailed note on: - oxide related capacitances. | 07 |
| | (b) | What are the basic building blocks of CMOS OP-AMP? Draw them. | 07 |
| Q.5 | (a) | Compare BJTs and CMOS for various aspects. | 06 |
| | (b) | Draw the BiCMOS device structure and explain the function of same. | 08 |
| | | OR | |
| Q.5 | (a) | Write a short note on :- FPGA | 06 |
| | (b) | Explain with suitable diagram how complex binary logic can be implemented using BiCMOS. | 08 |
