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Question Paper Code : 51537

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Sixth Semester

Electronics and Instrumentation Engineering

EI 2353/EI 63/10133 EI 603 – DIGITAL SYSTEM DESIGN

(Regulations 2008/2010)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Name two radical differences between ECL output and CMOS output.
2. When is a pull-up resistor required in interfacing TTL and CMOS ?
3. What is the function of a decoder ?
4. How does a PLA differ from PAL ?
5. How many 16×1 RAMs are required to achieve a memory with a word capacity of 16K and a word length of eight bits ?
6. What is the total capacity of a ROM that has 14 address lines, 8 data inputs, and 8 data outputs ?
7. What is the need of control waveforms in multiplexing displays ?
8. Write down the types of flash memory.
9. Define the term controllability and observability with respect to design for testing of logic circuits.
10. When do we go for scan methods based testing ?

PART – B (5 × 16 = 80 Marks)

11. (a) Draw the circuit diagram of two input TTL NOR gate and explain its operation. Also explain TTL-TO-CMOS interface
- OR**
- (b) Draw the circuit of CMOS NAND gate and explain its operation. Mention different types of CMOS logic family ICs.
12. (a) (i) Implement the function $F = (x_1, x_2, x_3, x_4) = \Sigma(0, 1, 3, 4, 8, 9, 15)$ with multiplexers where the following variables are connected in the specified order to selection lines s_2, s_1, s_0 respectively. (8)
- (1) x_1, x_2, x_3
- (2) x_2, x_3, x_4
- (ii) Compare a ROM implementation with a PLA implementation of the circuits with output function.
- $F_1 \Sigma(0, 1, 6, 7) = \overline{x_1} \overline{x_2} + x_1 x_2$
- $F_2 \Sigma(1, 3, 5, 6, 7) = x_3 + x_1 x_2$
- $F_3 \Sigma(1, 2, 3) = \overline{x_1} x_3 + \overline{x_1} x_2$. (8)
- OR**
- (b) (i) Explain the schematic design of programmable interconnect and basic logic element of typical FPGA. (8)
- (ii) Discuss on the design of hexadecimal counter using PLA's and flip-flops. (8)
13. (a) (i) Draw the 6T cell SRAM and explain its operation. (8)
- (ii) Write a technical note on different types of ROM. (8)
- OR**
- (b) (i) Using ROM, design a combinational circuit which accepts 3 bit number and generates an output binary number equivalent to the square of input number. (8)
- (ii) Describe features of main and peripheral memories. (8)
14. (a) With a neat functional diagram, explain the concept of time measurement. (8)
- OR**
- (b) Explain in detail the design of digital voltmeter. Mention few factors that decide the resolution of the digital voltmeter.
15. (a) Discuss in detail about digital circuit testing by applying test vectors and by in-circuit testing. (8)
- OR**
- (b) Explain the concept of :
- (i) Full Serial Integrated Scan and
- (ii) Isolated Serial Scan.