

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-II • EXAMINATION – WINTER • 2014

Subject Code: X21102**Date: 30-12-2014****Subject Name: Digital Logic 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)** Answer the following questions: **07**
- 1 $(73.375)_{10} = (\quad)_2$
 - .
 - 2 $(46155)_{10} = (\quad)_{16}$
 - .
 - 3 $(1E9.FC)_{16} = (\quad)_8$
 - .
 - 4 $(100101.10001)_2 = (\quad)_{10}$
 - .
 - 5 Obtain 10's complement of $(09900)_{10}$.
 - .
 - 6 What is difference between BCD code and binary code?
 - .
 - 7 Add $(18D)_{16}$ and $(75)_{16}$ without converting to decimal.
 - .
- (b)** Answer the following questions: **07**
- 1 State duality principle.
 - .
 - 2 Simplify the Boolean function $F = x + x'y$ to a minimum number of literals.
 - .
 - 3 Simplify the Boolean function $F = a'bc + ac + a'c$ to a minimum number of literals.
 - .
 - 4 Prove that: $(AB + C + D)(C' + D) = ABC' + D$
 - .
 - 5 Find the complement of the function $F = A'B'C + AB'C'$
 - .
 - 6 Show that the dual of the exclusive-OR is equal to its complement.
 - .
 - 7 Differentiate between combinational logic circuit and sequential logic circuit.
 - .
- Q.2 (a)** Answer the following questions: (3+2+2) Marks **07**
- 1 Perform the subtraction $(100)_2 - (110000)_2$ using 1's complement.
 - 2 Demonstrate by means of truth table the validity of the distributive law of $+$ over $\cdot$.
 - 3 Implement Boolean function $F = (A + B)(C + D)E$ using only NOR gates. Assume that both the normal and complement inputs are available.
- (b)** Simplify the Boolean function $F = w'(x'y + x'y' + xyz) + x'z'(y + w)$ using don't-care conditions $d = w'x(y'z + yz') + wyz$ in (i) sum of products and (ii) product of sums using Karnaugh map. **07**

OR

- (b) Design a combinational circuit with four input lines that represent a decimal digit in BCD and four output lines that generate the 9's complement of the input digit. **07**
- Q.3 (a)** Simplify the Boolean function $F(x_1, x_2, x_3, x_4) = \sum m(0, 5, 7, 8, 9, 10, 11, 14, 15)$ using tabulation method. **07**
- (b)** Write brief note on "Full adder" and explain carry propagation in binary parallel adder. **07**
- OR**
- Q.3 (a)** Design a counter with the binary sequence: 0, 1, 3, 7, 6, 4 and repeat. Use T flip-flops. Determine the effect of unused states. **07**
- (b)** Write brief note on (i) 3-to-8 line decoder (ii) Types of ROMs **07**
- Q.4 (a)** Draw a logic diagram of master-slave flip-flop and explain timing relationships in a master-slave flip-flop. **07**
- (b)** Answer the following questions: **07**
- 1 Obtain an 8×1 multiplexer with a dual 4-line to 1-line multiplexers having separate enable inputs but common selection lines. Use block diagram construction.
 - 2 Explain 3-stage switch-tail ring counter.
- OR**
- Q.4 (a)** Explain concept of shift registers and discuss 4-bit bidirectional shift register with parallel load. **07**
- (b)** Explain BCD ripple counter with timing diagram. Also draw a block diagram of a 3-decade decimal BCD counter. **07**
- Q.5 (a)** Explain control logic with sequence register and decoder with diagram in detail. **07**
- (b)** Answer the following questions: (3+2+2) Marks **07**
- 1 What is scratchpad memory?
.
 - 2 Write instruction-code formats.
.
 - 3 What is the difference between hard-wired control and microprogram control?
.
- OR**
- Q.5 (a)** Write brief note on "Status register" and explain block diagram of an 8-bit ALU with a 4-bit status register. **07**
- (b)** Classify microoperations most often encountered in digital systems and explain any one in detail. **07**
