

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-III Remedial Examination May 2011****Subject code: 130701****Subject Name: Digital Logic Design****Date: 27-05-2011****Time: 10.30 am – 01.00 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** Answer the following **14**
- (i) Draw symbol and construct the truth table for three input Ex-OR gate.
 - (ii) What is the principle of Duality Theorem?
 - (iii) Explain briefly: standard SOP and POS forms.
 - (iv) What are Minterms and Maxterms?
 - (v) Define: Noise margin, Propagation delay
 - (vi) Give comparison between combinational and Sequential logic circuits
 - (vii) What is race-around condition in JK flip-flop?
- Q.2** (a) (i) Explain NAND and NOR as universal gates (04) **07**
- (ii) Convert decimal 225 to binary, octal and hexadecimal (03)
- (b) (i) Implement Boolean expression for Ex-OR gate using NAND gates only (04) **07**
- (ii) Convert decimal 8520 into BCD, excess-3 code and Gray code. (03)
- OR**
- (b) (i) Simplify the following Boolean function using K-map **07**
- $F(w, x, y, z) = \sum(1, 3, 7, 11, 15)$ (04)
- with don't care conditions $d(w, x, y, z) = \sum(0, 2, 5)$
- (ii) Draw logic diagram, graphical symbol, and Characteristic table for clocked D flip-flop (03)
- Q.3** (a) Design a combinational circuit whose input is four bit binary number and output is the 2's complement of the input binary number. **07**
- (b) Design a full-adder with two half-adders and an OR gate **07**
- OR**
- Q.3** (a) Design a BCD to decimal decoder **07**
- (b) What is multiplexer? Implement the following function with a multiplexer: **07**
- $F(A, B, C, D) = \sum(0, 1, 3, 4, 8, 9, 15)$
- Q.4** (a) Write short note on: Read Only Memory (ROM) **07**
- (b) A combinational circuit is defined by functions: **07**
- $F_1(A, B, C) = \sum(3, 5, 6, 7)$
- $F_2(A, B, C) = \sum(0, 2, 4, 7)$
- Implement the circuit with PLA having three inputs, four product terms and two outputs
- OR=**
- Q.4** (a) Give classification of counters and explain asynchronous **07**

- 4-bit binary ripple counter
- (b) Explain briefly: 07
 (i) logic and shift micro-operations
 (ii) fixed-point binary data and floating-point data
- Q.5** (a) Draw block diagram of a 4-bit arithmetic logic unit. Design an adder/subtractor circuit with one selection variable S and two inputs A and B .when S = 0 circuit performs A+B, when S = 1 circuit performs A – B by taking the 2's complement of B 07
- (b) Draw and explain block diagram of microprograme control. 07
- OR**
- Q.5** (a) Simplify the following Boolean function using tabulation Method and draw logic diagram using NOR gates only 07
 $F(w,x,y,z) = \sum(0,1,2,8,10,11,14,15)$
- (b) Explain working of master-slave JK flip-flop with necessary logic diagram , state equation and state diagram 07

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