GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-III Regular / Remedial Examination December 2010

Subject code: 130701   **Subject Name: Digital Logic Design**

Date: 15 /12 /2010   **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 **(a)** Convert the following Numbers as directed: 07
- (1) $(52)_{10}$ = ($)_2$
- (2) $(101001011)_2$ = ($)_{10}$
- (3) $(11101110)_2$ = ($)_8$
- (4) $(68)_{10}$ = ($)_{16}$

(b) Reduce the expression: 07
- (1) A+B(AC+(B+C')D)   (2) (A+(BC)')'(AB'+ABC)

Q.2 **(a)** Simplify the Boolean function: 07
(1)$F(w,x,y,z) = \sum (0,1,2,4,5,6,8,9,12,13,14)$
(2)$F(w,x,y)   = \sum (0,1,3,4,5,7)$

(b) Explain with figures how NAND gate and NOR gate can be used as Universal gate.   07

OR

(b) Simplify the Boolean function: 07
- (1) F = A'B'C'+B'CD'+A'BCD'+AB'C'
- (2) F =A'B'D'+A'CD+A'BC
  d=A'BC'D+ACD+AB'D'   Where "d " indicates Don't care conditions.

Q.3 **(a)** With logic diagram and truth table explain the working of 3 to 8 line decoder.   07

(b) With logic diagram and truth table explain the working JK Flipflop.Also obtain its characteristic equation. How JK flip-flop is the refinement of RS flip-flop?   07

OR

Q.3 **(a)** Design a counter with the following binary sequence: 07
0, 4,2,1,6 and repeat. Use JK flip-flops

(b) With logic diagram and function table explain the operation of 4 to 1 line multiplexer.   07

Q.4 **(a)** What is the function of shift register? With the help of simple diagram explain its working. With block diagram and timing diagram explain the serial transfer of information from register A to register B.   07

(b) With respect to Register Transfer logic, explain Interregister Transfer with necessary diagrams.   07

OR

Q.4 **(a)** With logic diagram explain the operation of 4 bit binary ripple counter. Explain the count sequence. How up counter can be converted into down counter?   07

(b) Prepare a detailed note on: Instruction Codes.   07

Q.5 **(a)** What is scratchpad memory? With diagram explain the working of a processor unit employing a scratchpad memory.   07

(b) Briefly explain control organization. With diagram explain control logic with one flip-flop per state.   07

OR

Q.5 **(a)** Draw the block diagram of a processor unit with control variables and explain its operation briefly.   07

(b) With simple diagram explain the working of control logic with sequence register and decoder.   07

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