Code No: 07A3EC16 **Set No.1**

II B.Tech. I Semester Regular Examinations, November -2008
DIGITAL LOGIC DESIGN
(Common to Computer Science & Engineering,Information Technology and Computer Science & Systems Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Convert the following number with indicated bases to decimal [4×2=8]
   i. $(1\ 0\ 1\ 1\ 1\ 1)_2$ =
   ii. $(A\ \ 3\ \ B)_{16}$ =
   iii. $(2\ \ 3\ \ 7)_8$ =
   iv. $(4\ \ 3)_5$ =
   (b) Obtain the 1's and 2's complements of the following binary numbers [4×2=8]
   i. 1 1 1 0 1 0 1 0 =
   ii. 0 1 1 1 1 1 1 0 =
   iii. 1 0 0 0 0 0 0 0 =
   iv. 0 0 0 0 0 0 0 0 =

2. (a) Simplify the following Boolean expression to a minimum number of literals.
   i. F = (B $\overline{C}$ + $\overline{A}$ D) (A $\overline{B}$ + C $\overline{D}$)
   ii. F = WYZ + XY + X $\overline{Z}$ + YZ
   (b) Express the following function in sum of minterms and product of maxterms. F(A, B, C, D) = $\overline{B}$ D + $\overline{A}$ D + BD [8+8]

3. Implement the following Boolean function with NAND gates
   F (x,y,z) = Σ (1,2,3,4,5,7). [16]

4. Design a code converter that converts BCD to excess - 3 code. [16]

5. (a) Discuss indetail about sequential circuit.
   (b) Construct a JK flip-flop using a D flip-flop, a 2-to-1 multiplexer and inverter. [8+8]

6. (a) Design a serial Adder in shift registers.
   (b) Write a HDL behavioral description of shift register. [8+8]

7. (a) Explain about internal construction of 4 × 4 RAM
   (b) Design a combinational circuit using a ROM. The circuit accepts a 3-bit number and generates an output binary number equal to the square of the input number. [8+8]

8. Explain about SR Latch with example. [16]

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Code No: 07A3EC16 **Set No.2**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Convert the following numbers. [4×=8]
   i. $(53)_{10} = (\quad)_2$
   ii. $(231)_4 = (\quad)_{10}$
   iii. $(1\ 1\ 0\ 1\ 1\ 0\ 1)_2 = (\quad)_8$
   iv. $(4D.56)_{16} = (\quad)_2$

   (b) Add and subtract in binary [4×=8]
   i. 1 1 1 1 and 1 0 1 0
   ii. 1 1 0 1 1 0 and 1 1 1 0 1
   iii. 1 0 0 1 0 0 and 1 0 1 1 0
   iv. 1 1 0 1 0 0 1 and 1 1 0 1 1

2. (a) Implement the following Boolean function using AND, OR and inverter gates. F = xy + $\overline{x}\ \overline{y}$ + $\overline{y}$ z.

   (b) Using the rules of boolean algebra, simplify the expressions that follow to the fewest total number of literals. [8+8]
   i. f = A$\overline{B}$ + ABC + A$\overline{C}$D
   ii. f = B + AD+BC + [B+A(C+D)]^1

3. Simplify the following Boolean function using four-variable map.
   F (w, x, y, z) = Σ (1, 3, 7, 11, 15) + d(0, 2, 5). [16]

4. (a) Explain carry propagation in parallel adder with a neat diagram.

   (b) What is a decoder? Construct a 4×16 decoder with two 3×8 decoders. [8+8]

5. A Sequential circuit with two D flip-flops A and B, two inputs x and y and one output z is specified by the following next-state and output equation. [16]
   $A(t+1) = \overline{x}y + xA$
   $z = B$.
   $B(t+1) = \overline{x}B + xA$

   (a) Draw the logic diagram of the circuit.

   (b) List the state table for the sequential circuit.

   (c) Draw the corresponding state diagram.

6. (a) Write about the HDL behaviral description of a 4-bit shift register.

(b) Write about serial adder. [8+8]

7. Explain about error detection and correction with example. [16]

8. (a) Write a procedure for analysing an asynchronous sequential circuit with SR latch.

   (b) Explain in detail about debounce circuit. [8+8]

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Code No: 07A3EC16 **Set No.3**

II B.Tech. I Semester Regular Examinations, November -2008
DIGITAL LOGIC DESIGN
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Perfprm the following binary multiplication operations
   i. $100010 \times 001010 =$
   ii. $001100 \times 011001 =$
   iii. $000100 \times 010101 =$
   (b) Write the one's and two's complements of the following example.
   i. 0011001
   ii. 1110011
   iii. 111111. [10+6]

2. (a) State and explain the Duality principle with example.
   (b) Given the Boolean function
   $F = x\overline{y}z + \overline{xy}z + \overline{w}xy + w\overline{x}y + wxy$
   i. Obtain the truth table of the function
   ii. Draw the logic diagram using the original Boolean expression
   iii. Simplify the function to a minimum number of literals using Boolean algebra.
   [6+10]

3. Find all the prime implicatiants for the following Boolean functions and determine which are essential.
   $F(A, B, C, D) = \Sigma(0, 2, 3, 5, 7, 8, 10, 11, 14, 15)$ [16]

4. (a) What is meant by encoder?
   (b) Design a 4 - input priority encoder. [4+12]

5. Write the HDL behavioral description of a
   (a) D flip - flop
   (b) F flip - flop. [8+8]

6. (a) Design a Serial Adder.
   (b) Write a HDL behavioural description of shift register. [8+8]

7. (a) Explain about internal construction of 4×4 RAM.

(b) Design a combinational circuit using a ROM. The circuit accepts a 3-bit number and generates an output binary numbers equal to the square of the input number.

[8+8]

8. (a) Explain the difference between asynchronous and synchronous sequential circuits.

(b) Write about Hazards in sequential circuits. [8+8]

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Code No: 07A3EC16 **Set No.4**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Find the decimal equivalent of the following two's complement numbers.
   i. 11111
   ii. 10001
   iii. 01010
   iv. 10011
   v. 10101
   (b) Explain about error Detecting code with example. [10+6]

2. (a) Simplify each of the following expressions
   i. $ABC\overline{D} + \overline{A}\,\overline{B}CD + C\overline{D}$
   ii. $(A + \overline{B})\,(\overline{A} + \overline{B} + D)\,(\overline{B} + C + \overline{D})$
   (b) Explain about positive and Negative logic in binary signals. [8+8]

3. Obtain
   (a) Sum of product and
   (b) Product of sum expressions for the function given below
   $F\,(A\,,\,B\,,C\,,\,D) = \Sigma\,(0, 1, 2, 5, 8, 9, 10)$ [16]

4. (a) Implement a Boolean function
   F (x, y, z)= Σ (2, 4, 6) with a Multiplexer.
   (b) Explain about Tri - State gates in digital systems. [8+8]

5. Design a sequential circuit with two JK flip - flops A,B with one input X and one out put Y.
   A (t + 1) = Ax + Bx
   B (t + 1) = $\overline{A}x$
   Y = $A\overline{x} + B\overline{x}$. [16]

6. (a) Design a serial Adder using shift register.
   (b) Write a HDL behavioral description of shift register. [8+8]

7. (a) Explain about internal construction of 4×4 RAM with neat diagram.
   (b) Design a combinational circuit using a ROM. The circuit accepts a 3- bit number and generates an output binary number equal to the square of the input number.
   [8+8]

8. (a) Explain the difference between asychronous and synchronous circuit.
   (b) Define fundamental - mode operation.
   (c) Explain the difference between stable and unstable states.
   (d) What is the difference between an internal state and a total state.[4+4+4+4]

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