Comilla University
Faculty of Engineering
Department of Computer Science and Engineering
Final Examination - 2015

Course Code: CSE 213
Session: 2013 - 2014

Course Title: Digital Logic Design
Semester: 2nd Year 1st Semester

[Answer any Five of the following questions. Figures in the right-hand margin indicate full marks.]

Time: 3 Hours

Full Marks: 60

Please write parts of a question serially. Writing anything on the question paper is strictly prohibited.

1. a) What is number system in computer science? Draw a block diagram of a digital computer.   3
    b) i) Performs $101.110_2 \times 10.1_2$ ii) Performs $101.1110_2 + 10010.1_2$ 4
    c) Define r's complement and (r-1)'s complement.   1
    d) Using 1's complement, Subtract M − N where N = 1000100 & M = 10101000   2
    e) Convert $(75A1)_{16}$ to equivalent octal number.   2

2. a) Convert the BCD number 10111101 to binary.   2
    b) What is BCD? Add the BCD numbers: 10100101 + 00110011   3
    c) Determine the decimal values of the 2's complement number 10101101.   2
    d) Convert the gray code 110111010011 to binary number..   2
    e) Subtract 284_{16} from BCD.   3

3. a) Obtain the weighted binary code for the base-12 digits using weights of 5421.   4
    b) If A = 0 1 1 0 1

       B = 1 0 1 1 0   are two digital wave forms.

       Find the output wave form of i) (A+B)'   ii) B.A   iii) B'+A   iv) A'   4
    c) Determine the odd-parity bit generated when the message consists of the ten decimal digits in the 8, 4, -2, -1 code.   4

4. a) Write the use of Karnaugh map? Use a Karnaugh map to minimize the following SOP expression :   4

$$\overline{M}N\overline{R}\overline{S} + \overline{M}\,\overline{N}RS + \overline{M}NR\overline{S} + MNR\overline{S} + \overline{N}\,\overline{R}\overline{S} + MN\overline{R}\overline{S} +$$
$$M\overline{N}R\overline{S} + \overline{M}NR\overline{S} + M\overline{N}R\overline{S}$$

    b) A NOR gate can function as a negative AND gate; prove it.   2.5
    c) Apply the binary numbers 1110 and 1001 to the comparator input and determine the logic level.   2.5
    d) Draw a logic diagram of a decimal to BCD encoder.   3

5. a) What is reflected code? Simplify the following expression using Boolean Algebra   1+2

$$\overline{WXY + Z}$$

    b) Draw the logic circuit for the expression $F = A'B + B(C + D)'$.   2
    c) Find the complement of the function $F = x' + (y + z)(y' + z')$. Prove that $X+XY=X$.   3
    d) Express the following function in sum of minterm and a product of maxterm.   4
$$F(A, B, C, D) = D(A' + B) + B'D.$$

6. a) Define Multiplexer with block diagram. 2

   b) Implement the following function with a multiplexer: $F(A,B,C)= \Sigma(1,3,5,6)$ when select bit are A and B. 4

   c) Differentiate between decoder and encoder. Design a 3-to-8 line decoder. 2+4

7. a) Define shift register. Write the basic data movements in shift registers. 3

   b) Determine the timing diagram of 4-bit serial in parallel out shift register where the register initially contains all 1's. 4

   c) Show the steps when 1011 being entered into the serial in serial out shift register. 3

   d) How shift register is used as a keyboard encoder? 2

8. a) Differentiate between combinational circuit and sequential circuit with block diagram. 3

   b) Define flip-flop. Explain the clocked RS flip-flop with necessary diagram. 6

   c) What do you mean by binary counter? Why asynchronous counter is referred to as ripple counter? 3

Good Luck !