Sem-IV Logic circuits Inst. Bhom 30/5/09

Con. 2960–09. (OLD COURSE) VR–3615

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.

1. (a) Explain the differences between combinational and sequential circuits. 5
   (b) Give comparison of various logic families. 5
   (c) What are the hazards in combination logic circuits ? Explain with suitable example. 5
   (d) What is multiplexer ? Draw and explain 4 : 1 MUX using logic gates. 5

2. (a) Convert following numbers : 8
   (i) $(89{\cdot}75)_{10} \longrightarrow (?)_8$
   (ii) $(12345)_{10} \longrightarrow (?)_{16}$
   (iii) $(23{\cdot}23)_8 \longrightarrow (?)_{16}$
   (iv) $(ABAB{\cdot}IF)_{16} \longrightarrow (?)_2$

   (b) Perform following operations :– 8
   (i) 73 – 10 using 2's complement method
   (ii) 10 – 73 using 2's complement method
   (iii) 9 – 3 using 9's complement method
   (iv) 3 – 9 using 9's complement method.

   (c) What is gray code ? Explain one applicaiton of gray code. 4

3. (a) Why NAND and NOR gates are referred as universal gates ? Implement X-NOR gate using only NAND gates and only NOR gates. 10

   (b) Show that $\overline{A\overline{B} + ABC + A(B + \overline{A}B)} = A\overline{B}$ 5

   (c) Show that – 5
   $AB + \overline{A}C = AB + \overline{A}C + BC$

4. (a) Simplify and Implement using logic gates – 10
   $f = \Sigma\,(2, 5, 7, 15) + D\,(6, 9, 13)$

   (b) Simplify using Quine-McCluskey method 10
   $f = \Sigma\,(2, 3, 6, 7, 8, 9, 10, 12) + D(13)$.

5. (a) Design Binary to Gray code converter. 10
   (b) Design full adder using logic gates. 10

6. (a) Convert SR flip-flop to D flip-flop. 10
   (b) Design MOD-10 asynchronous Ripple counter. 10

7. (a) Design MOD-5 synchronous counter using JK flip-flop. 10
   (b) What is Ring counter ? Design Ring counter using D-flip-flop. 10