Mansoura University
Faculty of Engineering
Department: Computers and Control Systems Engineering

Course: Digital Design (1)
Code : CSE3114
Time : 3 hours
Date : 14/1/2014

Question (1)

(a) Write the missing numbers

i. $(257)_8 = (\ldots)_2 = (\ldots)_{16} = (\ldots)_{10}$

ii. $(732)_{10} = (\ldots)_5 = (\ldots)_7 = (\ldots)_9$

iii. $(A63)_{16} = (\ldots)_{10} = (\ldots)_8 = (\ldots)_3$

b) i. List the digits from $(650)_7$ to $(1100)_7$

ii. List the digits from $(110)_3$ to $(1100)_3$

iii. Write the first 20 decimal digits in base 6

c) Subtract the following numbers using r's complement

i. $(38067)_9 - (58800)_9$

ii. $(549661)_{10} - (28700)_{10}$ **[20 marks]**

Question (2)

(a) implement the following function:

$F(X, Y, Z) = \Sigma(1, 3, 6, 7)$ **using**

I- NAND gates ONLY.
II- Multiplexer (8*1)
III-Decoder (3*8) + OR gate
IV- NOR gates ONLY.
V- Multiplexer (4*1)

(b) compare between full adder and full subtractor **[20 marks]**

Question 3

a) Prove that full adder can be implemented by using two half adder and OR gate

b) Design a combinational circuit that accepts a three-bit number and generates an output binary number equal to the square of input number.

c) Design a BCD-to-excess-5 code converter, by using
1- Logic gates 2- MSI

d) Design a combinational circuit that has two inputs numbers each one with two bits. The output is determine by the following table

First number	Output
00	Second number + 3
01	Second number * 2
10	Second number * second number
11	Zero

- Obtain the truth table
- Find the simplified output function in sum of products.
- Find the simplified output function in product of sums.
- Implement the circuit by NAND gates ONLY.
- Implement the circuit by NOR gates ONLY. **[30 marks]**

Question 4

a) Design a three-bit magnitude comparator

b) Design a five-bit binary adder

c) Design 8*1 multiplexer

d) Design 8*3 Encoder

e) Design 3*8 Decoder **[30 marks]**

With all best wishes
Dr. Sabry F. Saraya