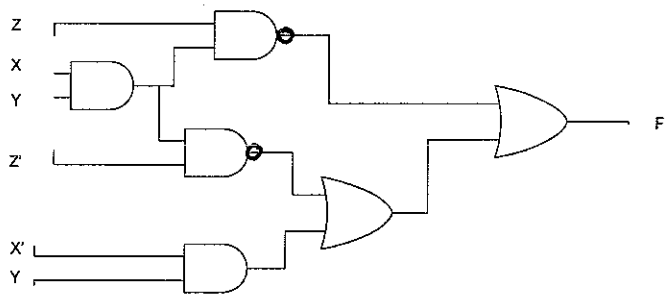
Course: Digital Systems Design		Course Number: COEN312/2	Section: F
Examination: Midterm	Date: Oct. 15, 2011	Time: 1 hour 15 min.	# of pages: 1
Instructor: Dr. M.R. Soleymani			
Books and Material: Only one crib sheet allowed, no calculator allowed.			
Special Instructions: Try all questions.			

1) Using Boolean Algebra minimize:

$$F = (A + A'B)(B + AB') + AB'. \qquad \text{(3 Marks)}$$

2) For the following circuit,
   a. Draw the truth table (3 Marks).
   b. Simplify the logic using K-map (3 Marks).



3) Simplify the function F with the don't care condition d :

$$F(w,x,y,z) = \sum(5,7,13,15)$$
$$d(w,x,y,z) = \sum(4,6,12,14). \qquad \text{(3 Marks)}$$

4) Express the complement of $F(x,y,z) = \sum(0,3,7)$
   a. In sum-of-minterms form (2 Marks).
   b. In product of maxterms form (2 Marks).
5) Design (with minimum number of gates) a circuit with four inputs A, B, C and D and an output F such that F is equal to 1 if the number represented by ABCD is divisible by 3 or 5 (or both). (4 Marks).
6) Implement:

$$F = x'y + xz + y'z'$$

   a) with OR, AND and NOT gates (1 Marks).
   b) With NOR gates only (2 Marks).
   c) With NAND gates only (2 Marks).