

Course: Digital Systems Design	Number: COEN312/4	Section: W
Examination: Midterm	Date: Feb. 14, 2007	Time: 1 Hr. 10 min.
Instructor: Dr. M.R. Soleymani		# of pages: 1
Books and Materials: No material, no calculator allowed		
Special Instructions: Try all questions.		

- 1) Using Boolean Algebra minimize:

$$F = x'yz + xy + xyz' \quad (4 \text{ Marks}).$$

- 2) Implement the following function:

$$F = AB + BC + B'C'$$

- a) Using AND, OR and NOT gates (2 marks).
b) Using NAND gates only (3 Marks).

- 3) Give the minimal sum of products form for:

$$F(A, B, C, D) = \sum(2, 3, 6, 7, 8, 9, 12, 13) \quad (4 \text{ Marks})$$

- 4) Simplify the following function F , with the don't-care conditions d :

$$F(x, y, z) = \sum(2, 3, 4, 5, 6)$$

$$d(x, y, z) = \sum(0, 1, 7). \quad (3 \text{ Marks}).$$

- 5) Design a combinational circuit with three inputs x , y and z and one output such that the output is 1 when the binary value of the inputs is greater than 3 and the output is zero otherwise (4 Marks).
- 6) Implement an XOR gate using four (4) NAND gates only (5Marks).
Note: If you use more than 4 NAND gates you get 3 marks. However, you should not use any gates other than NAND.