ECE 301 Digital Electronics

NAND & NOR Function Implementation

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OBJECTIVE

To understand the practical implications of DeMorgan's Theorem.
Understand that logic functions can be implemented utilizing only NAND and NOR gates.

PREPARATION

Design and construct the circuit.

PROCEDURE

1. Build an AND gate from a NOR gate and two inverters. Verify its operation. (Hint: Apply the theorems and properties of Boolean algebra including DeMorgan's Theorem.)
2. Construct the Karnaugh Map for the following truth table and simplify.
3. Implement the function in both a NAND and NOR only design.
4. Build and verify that the circuit operates according to the truth table.

minterms	**Input Variables**				**Output**
	A	B	C	D	$F(A,B,C,D)$
0	0	0	0	0	0
1	0	0	0	1	0
2	0	0	1	0	0
3	0	0	1	1	0
4	0	1	0	0	0
5	0	1	0	1	1
6	0	1	1	0	1
7	0	1	1	1	1
8	1	0	0	0	1
9	1	0	0	1	1
A	1	0	1	0	1
B	1	0	1	1	1
C	1	1	0	0	1
D	1	1	0	1	1
E	1	1	1	0	1
F	1	1	1	1	1