JEE 160 Spring 2003 Exam 2 3/27/03

Name:

1. Derive the excitation table for the three input flip-flop with the following characterstic table: (25 points)

A	B	C	Q_{t+1}
0	0	0	Q_t
0	0	1	$\overline{Q}_t$
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	$\overline{Q}_t$
1	1	1	Q_t

2. A vending machine can accept a nickle, dime, and quarter. Design a Moore model state diagram that accumulates the amount of coins inserted into the machine. Use the code “00” for nothing, “01” for a nickle, “10” for a dime, and “11” for a quarter as possible inputs. The machine only accumulates up to 30 cents and doesn't return change. When 30 cents (or more) is inserted into the machine your state diagram should output a “1” for one cycle and be prepared for another series of inserted coins. (25 points)

3. Design a “gray code / binary” 3-bit counter. There is one input, X, that selects gray code counting when “1” and binary when “0”. The gray code sequence is 000, 001, 011, 010, 110, 111, 101, 100. Use a JK-type flip flop for the most significant state bit followed by a T-type flip flop and D-type flip flop. Draw a state diagram, state table, K-maps, and sum-of-products or product-of-sums equations. Do not draw a circuit. (25 points)

4. Derive the state table and state diagram for the circuit below. (25 points)