EGE-534 HW #2 *Dr. Izadi*

Name:_____

Problem 1 (15 Points)
Design a self-dual of a full-adder circuit.

Problem 2 (10 Points)
Design a totally self-checking checker with 7 inputs.

Problem 3 (20 Points)
Consider a random-access memory that has an 8-bit data.

a) Determine the P matrix such that the error code computed by your Single Error Correcting Hamming code specifies the bit position of the error.
b) Design a circuit for such an encoder using basic gates.
c) How you would modify the SEC code you have defined above in order to obtain an SEC/DED code.

Problem 4 (10 Points)
Convert 0 to 15 to RNS using modules [3,5,7]. Within this range would you say a single fault is detectable or not. Justify your answer

Problem 5 (20 Points)

a. Using full adders and basic gates, design a 3N code encoder, where N is a 4-bit binary number.
b. Design a circuit to detect an error in the above 3N code.

Problem 6 (20 Points)
Consider a low-cost residue code based on module 7.

a. Show how do you obtain residue-7 check bits of $X_7\ X_6\ X_5\ X_4\ X_3\ X_2\ X_1\ X_0$ using recursive addition technique?
b. What is the theoretical base for this easy encoding process? Hint: use the weights of bit groups.

Due 6/11/07