L8 practice problems

1. Design a combinational logic circuit that converts a 4-bit Excess-3 code into a BCD code. Your design needs to accept only those inputs that produce valid BCD codes. Use K-map method for simplification and make use of any don't care conditions.

   Hint: this circuit has 4 inputs and 4 outputs. To fulfill the design, a Boolean expression must be obtained for each output.

   An excess-3 code is obtained by adding the decimal value 3 to a BCD code. For example, decimal 0 is 0000 in BCD, which is 0011 in excess-3. See partial truth table below.

   Partial truth table:

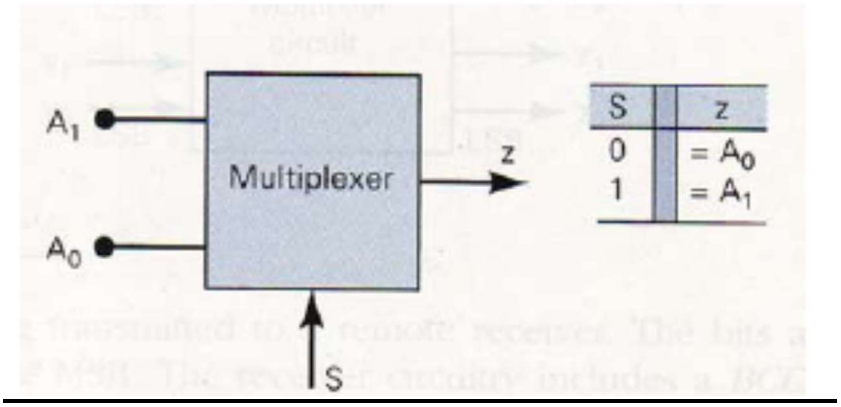
Input				Output			
Excess-3 code				BCD code			
0	0	1	1	0	0	0	0
0	1	0	0	0	0	0	1
0	1	0	1	0	0	1	0
1	1	0	0	1	0	0	1

2. Problem 4.7 from Tocci 9th Ed.
   A 4-bit binary number is represented as A3, A2, A1, A0 where A0 is the LSB. Design a logic circuit that will produce a High output whenever the binary number is greater than 0010 and less than 1000.

   Note: otherwise the circuit produces a LOW output.

   Design typically means a Boolean expression must be obtained for the circuit output. With the expression, a logic circuit diagram may be drawn if needed.

3. Problem 4-35 from Tocci 9th Ed.
Design a logic circuit that has two signal inputs A1 and A0 and a control input S so that it functions according to the requirements given in the figure below. This circuit is a multiplexer which will be covered in the MSI syllabus.



4. Modify the circuit obtained in Question 3 such that it now has an active-high enable input EN whose effect is shown in the new truth table:

Inputs		Output
EN	S	Z
0	X	0
1	0	A0
1	1	A1

X = “don’t care”, i.e. 0 or 1

You may describe the modification with words or sketch a diagram to illustrate