

Assignment 03

This assignment must be hand-written. Show ALL steps in ALL questions.

Make sure that your circuit is efficient, meaning you should use the lowest number of components. You may use external gates if required.

Question 1

Build a circuit that implements the 1's complement number system using encoder(s) and decoder(s).

Question 2

Implement the following boolean function using **a)** single 16:1 mux **b)** single 8:1 mux

$F(A,B,C,D) = \sum(0,1,2,7,8,10,11,13, 15)$. Use external gates if required.

Question 3

Implement the following boolean function using **a)** 4x16 decoder(s) only **b)** 2x4 decoder(s) only

$F(A,B,C,D,E) = \sum(0,1,2,7,8,10,11,13, 15,18,21,24,25)$. Use external gates if required.

Question 4

Design a 13-person voter counting system using full and parallel adders.

Question 5

Consider A is a 4 bit number. Design A-3 (A minus 3) using a 4 bit parallel adder. Use external gates if required.

Question 6

Design a BCD to Excess-6 code converter using parallel adder.

Question 7

You have to construct the truth table and internal circuit diagram for a **4x2 priority encoder**.

The priority is given in the following manner:

- If the number of 1 in a binary input is even, then priority will be given to the MSB line.
- If the number of 1 in a binary input is odd, then priority will be given to the LSB line.