

Assignment

1. Given a library of 2-input AND, NOT and 2-input XOR gates, synthesize the function $f(A,B,C,D)$ as shown in the Karnaugh map using minimum number of gates of the library.

$AB \backslash CD$	00	01	11	10
00	1		1	
01		1	1	
11		1		1
10		1	1	

2. Design a full adder circuit using 4*1 multiplexer.

3. Consider the multiplication of two 2-bit integers a_1a_0 and b_1b_0 to get a 4-bit output $c_3c_2c_1c_0$. Design a circuit for deriving the bit c_2 using only 2-input NAND gates.

4. Perform BCD addition and subtraction of the following data:

I) 55 - 32

II) 32 + 13

5. You are required to design a 4-bit prime number checker. Note that 0 and 1 are not prime. Design the circuit using a single $4 \rightarrow 1$ multiplexer and a minimal number of AND, OR or NOT gates, if needed.
6. Design a combinational logic circuit that takes an unsigned 2-bit integer as input and computes its square.