HOMEWORK # 6 (Due to 7th Of June at 16:00)

Q1) Implement the following Boolean function with a 8x1 multiplexer, a 2-to-4-line decoder and two 2-input OR gates. Note that the complement inputs are not available.

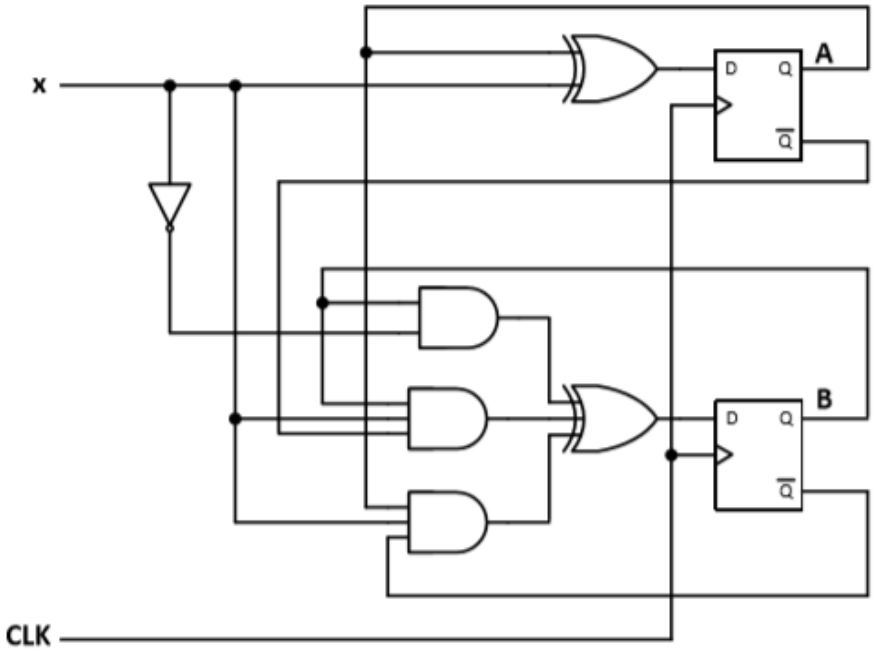
F(A,B,C,D,E)= Σ(0,7,10,13,16,17,18,19,21,22,28,30)

Q2) Mod-4 counter is a sequential circuit that has two flip-flops A and B and one input x. It consists of a combinatorial logic connected to the D flip-flops, as shown in Figure below. Analyze the circuit:

a) Derive the next state and output equations.

b) Derive the state table of the sequential circuit.

c) Draw the corresponding state diagram.



Q3) For a given Boolean function F(w, x, y, z)= Σ (1,4,5,6,12,14,15) which has the don't care conditions d(w, x, y, z)= (3,7,11)

a) Determine the sum of products (SOP).

b) Implement F with only NAND gates.

c) Determine the product of sums (POS).

d) Implement F with only NOR gates.

Q4) Design a combinational circuit that converts a 4-bit gray code to a 4-bit binary number. Implement the circuit using exclusive-OR gates.

Q5) Draw the state table and the state diagram of the sequential circuit shown below: