

Institute of Computer Technology
B. Tech Computer Science and Engineering
Subject: Computer Organization (2CSE205)

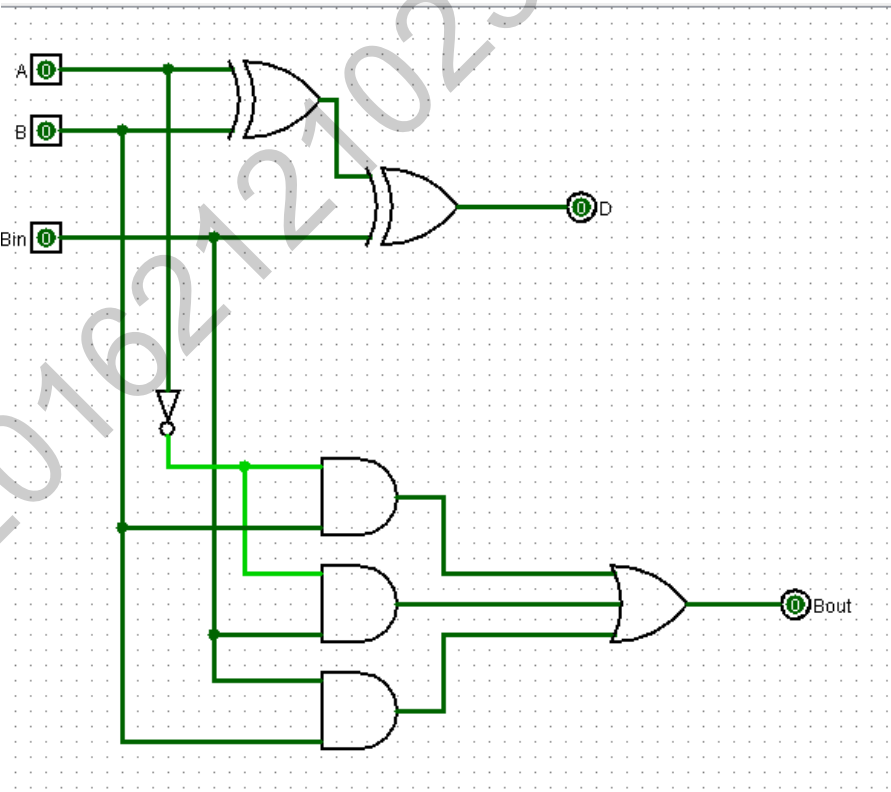
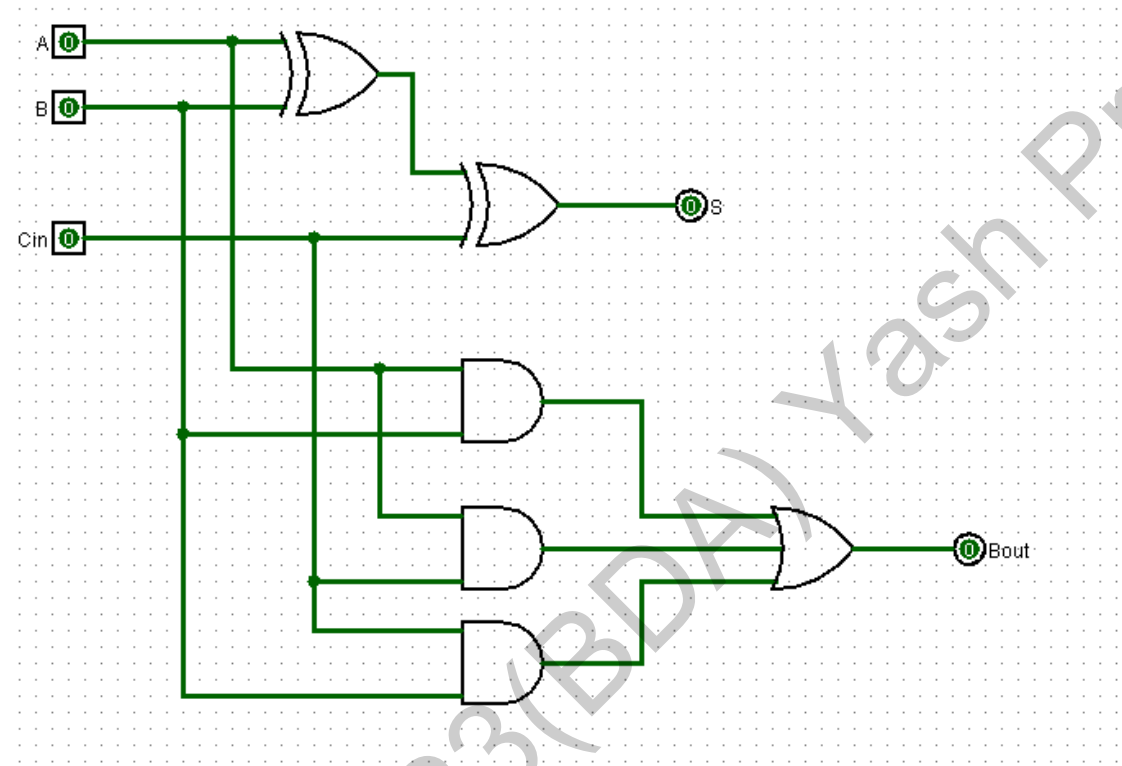
PRACTICAL-1

AIM: - Introduction of Tool Logisim and revision on basic Logic gates

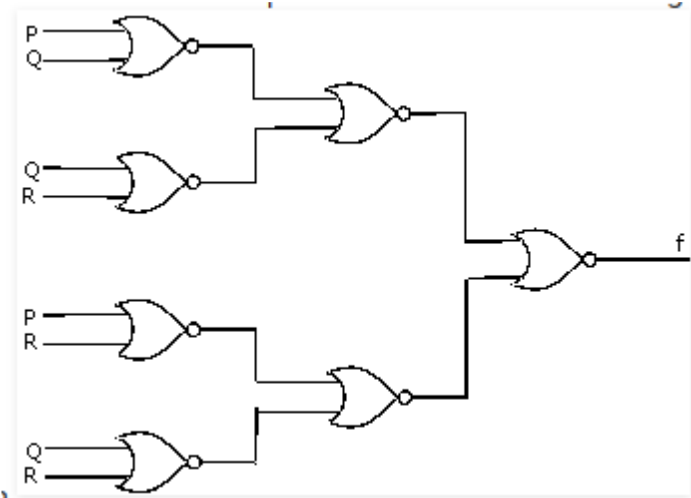
Exercise: -

1. Build Logical Circuit for Full Adder/ Subtractor using Logisim tool.

ANS:



2. What is the Boolean expression for the output f of the combinational logic circuit of NOR gates given below?



ANS:

$$\begin{aligned} &= \{ [(P+Q)' + (Q+R)']' + [(P+R)' + (Q+R)']' \}' \\ &= [(P+Q)' + (Q+R)']'' [(P+R)' + (Q+R)']'' \\ &= [(P+Q)' + (Q+R)'] [(P+R)' + (Q+R)'] \\ &= (P'Q' + Q'R')(P'R' + Q'R') \\ &= [Q'(P'+R')][R'(P'+Q')] \\ &= Q'R'(P'+R')(P'+Q') \\ &= Q'R'(P'+Q'R') \\ &= (P'Q'R' + Q'R'*Q'R') \\ &= P'Q'R' + Q'R' \\ &= Q'R'(P'+1) \\ &= Q'R'*1 = Q'R' \end{aligned}$$

3. Given f1, f3 and f in canonical sum of products form (in decimal) for the circuit given circuit:



- A) $\sum m(4, 6)$
- B) $\sum m(4, 8)$
- C) $\sum m(6, 8)$
- D) $\sum m(4, 6, 8)$

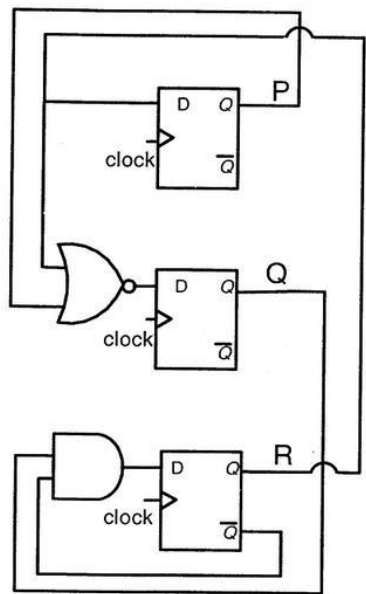
ANS:

$f1 * f2 + f3 = f$

$\Sigma m(4,5,6,7,8) * f2 + \Sigma m(1,6,15) = \Sigma m(1,6,8,15)$

By logically solving or by using the set theory method we can get the answer which is **option(c) $\Sigma m(6,8)$**

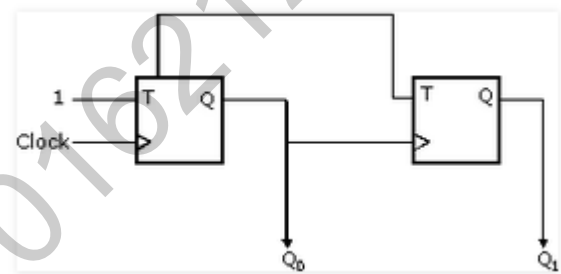
4. Consider the following circuit involving three D-type flip-flops used in a certain type of counter configuration. If at some instance prior to the occurrence of the clock edge, P, Q and R have a value 0, 1 and 0 respectively, what shall be the value of PQR after the clock edge?



SOLUTION

Input for 1st flip flop is R=0 so $(P+1) = 0$
Input for 2nd flip flop is $(R+P)' = 1$ so $(Q+1) = 1$
Input for 3rd flip flop is $(Q+R)' = 1$ so $(R+1) = 1$
Therefore, Answer is 0, 1, 1 for P, Q, R respectively.

5. In the sequential circuit shown below, if the initial value of the output Q1Q0 is 00, what are the next four values of Q1Q0?



SOLUTION

For first flip flop if T=1 and Q0=0 then $(Q0+1) = 1$ and so on
For second flip flop if T=1 and Q1=0 then $(Q1+1) = 1$ and so on
Next for values will be 1, 0, 1, 0 for both Q0, Q1.