RAMAIAH UNIVERSITY OF APPLIED SCIENCES

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18ETCS002041

Laboratory 1

Introduction to Logisim and Circuit Development

1. Introduction and Purpose of Experiment

   Students will learn to use Logisim simulator to simulate logic circuits and implement them using appropriate ICs

2. Aim and Objectives

   Aim: To use Logisim to simulate logic circuits and implement them

   Objectives: At the end of this lab, the student will be able to

   - Use Logisim to simulate logic circuits
   - Choose appropriate ICs to implement the logic circuits
   - Implement the logic circuits using the ICs and hardware kit

3. Experimental Procedure

   a. Draw the truth tables and circuit diagrams for the following expressions.
      1. $Y = A{\sim}BC + {\sim}AB{\sim}C$
      2. $W = BC + {\sim}BC$
      3. $O = {\sim}ABC + A{\sim}BC + ABC$
      4. $X = {\sim}AB + {\sim}AB{\sim}C + {\sim}ABCD + {\sim}AB{\sim}C{\sim}D$
      5. $F = {\sim}WXYZ + {\sim}WXY{\sim}Z + WXYZ + WXY{\sim}Z$

   b. Use Logisim to generate the truth tables and circuit diagrams for the above expressions.

   c. Implement the first three expressions in the non-minimized form and verify the truth tables. Show the output to the course leader.

   d. Do you see any limitations in the simulator and/or the hardware kit? Discuss how these can be overcome.

   Your document should include:
   - Handwritten truth tables and circuit diagrams for the expressions
   - Logisim screenshots
   - Answer to 3(d)

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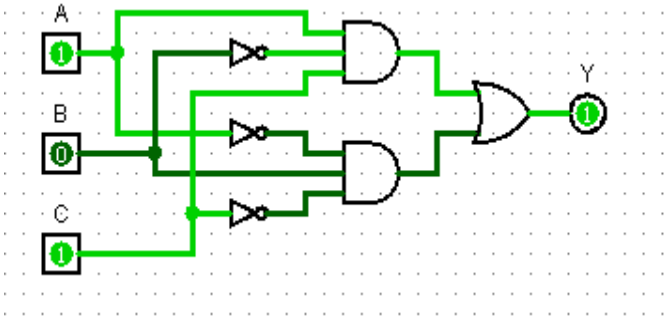
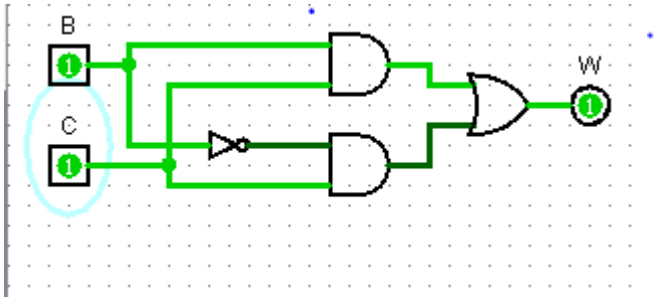
Solutions for above questions using Logisim



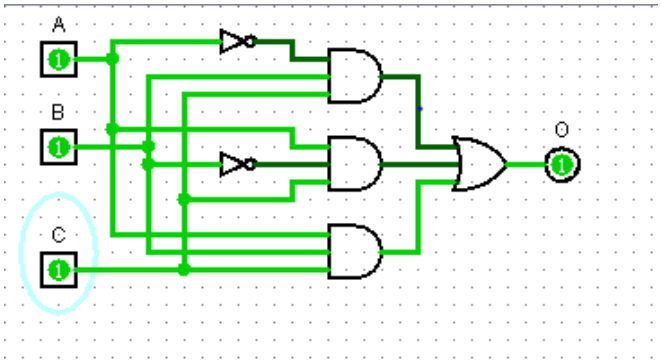
A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

Fig 1 solution for $Y = A{\sim}BC + {\sim}AB{\sim}C$



B	C	W
0	0	0
0	1	1
1	0	0
1	1	1

Fig 2 solution for $W = BC + {\sim}BC$



A	B	C	O
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

Fig 3 solution for $O = {\sim}ABC + A{\sim}BC + ABC$

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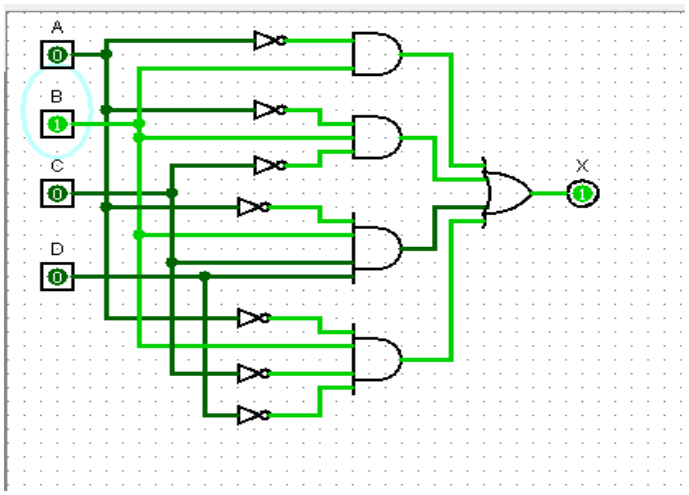
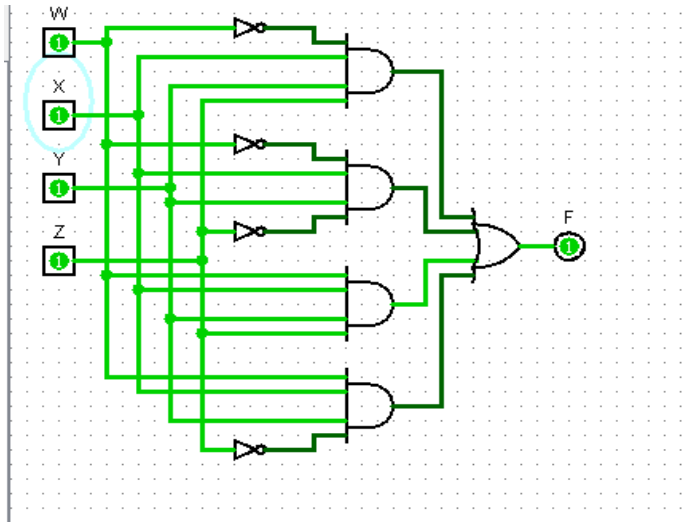


A	B	C	D	X
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

Fig 4 solution for $X = \sim AB + \sim AB \sim C + \sim ABCD + \sim AB \sim C \sim D$



W	X	Y	Z	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1

Fig 5 solution for $F = \sim WXYZ + \sim WXY \sim Z + WXYZ + WXY \sim Z$