Technical University of Denmark

31342 Introduction to Programmable Logic Controllers

Exercise 4

Logics

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Instructor:

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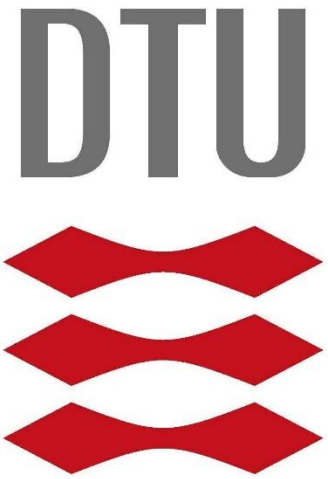
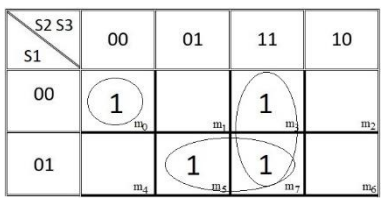


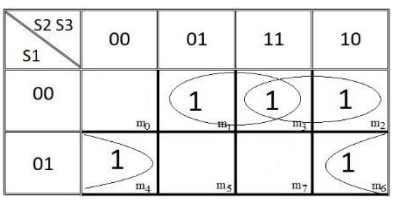
Spring, February 27, 2019

Task 1: Logic Functions:

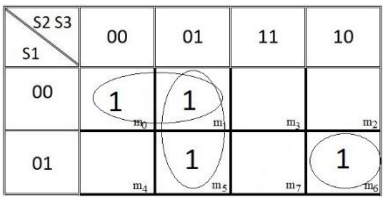
The Karnaugh map method is considered to implement the truth table.



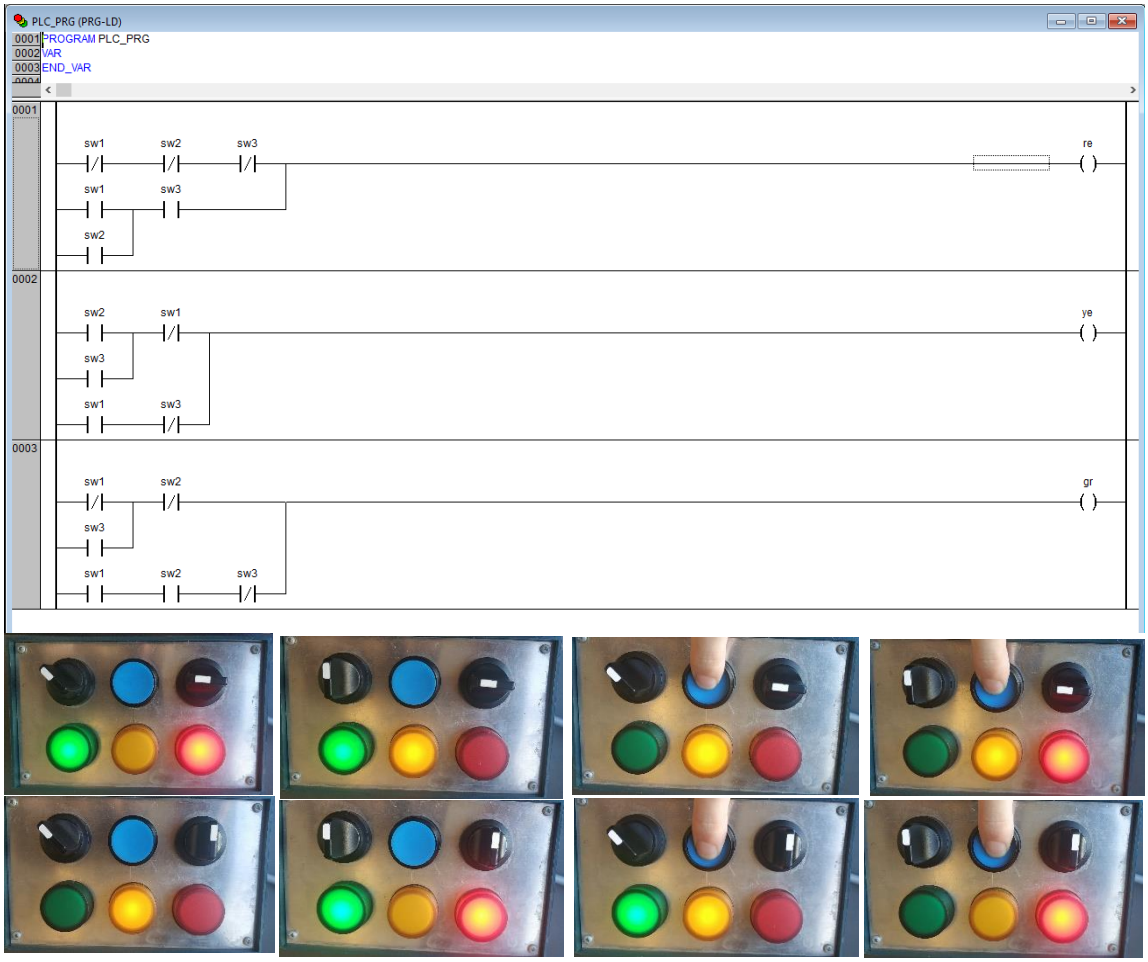
Re=S3(S1+S2)+S1' S2' S3'



Ye= S1'(S2+S3)+S1 S3'



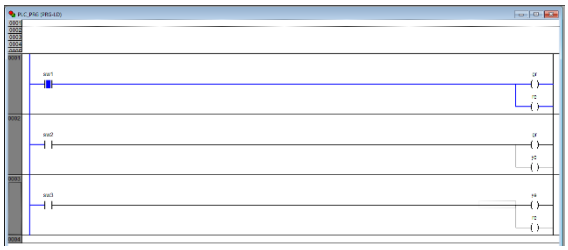
Gr= S2'(S1'+ S3)+ S1 S2 S3'

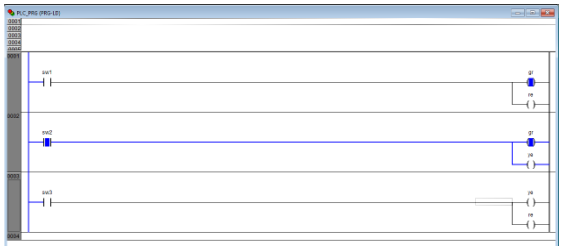


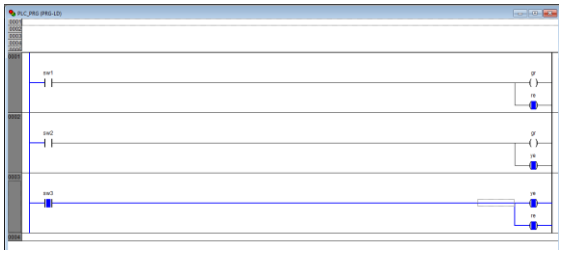
When the solution is converted to Function Block Diagram using the conversion functionality described in the introduction of the assignment document, the obtained result is correct and it is same as in the Ladder Diagram one.

Task 2: Priority of Networks:

The implementation of this functionality cannot be achieved by the solution in the assignment document since the last assignments of the output are valid and preferred by the PLC platform. When sw1 is activated, nothing happens; since the assignments of the red and green light are done by sw2 and sw3. And sw2 is only able to turn on the green light since the last assignment of the green light is done by sw2. Sw3 is able to turn on the yellow and red light.

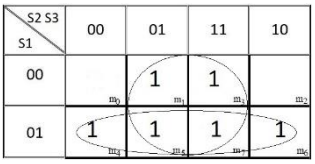




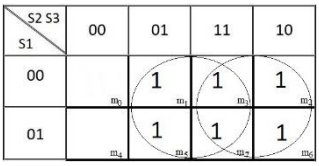



This problem can be solved by forming the truth table of the lights and applying the K-map method to find the light function in terms of the switches.

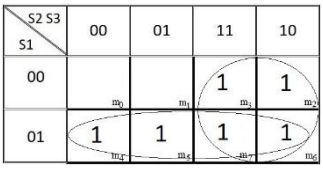
S1	S2	S3	Re	Ye	Gr
0	0	0	0	0	0
0	0	1	1	1	0
0	1	0	0	1	1
0	1	1	1	1	1
1	0	0	1	0	1
1	0	1	1	1	1
1	1	0	1	1	1
1	1	1	1	1	1



Re=S1+S3



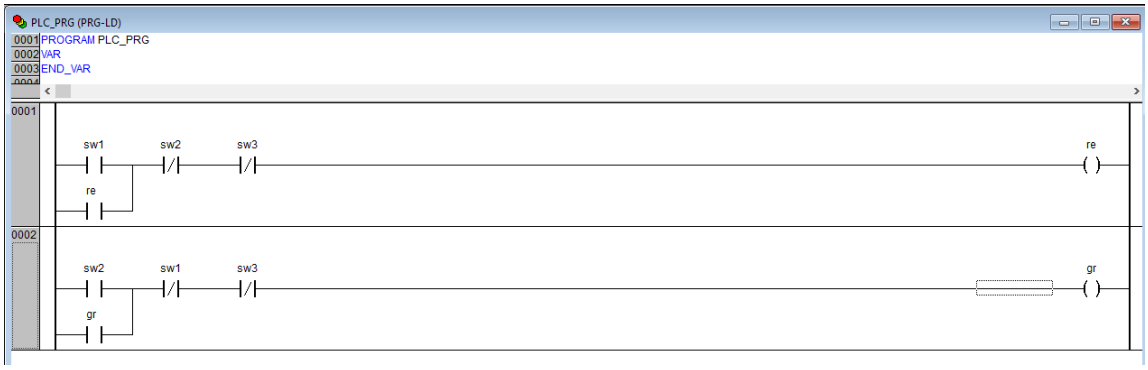
Ye=S2+S3



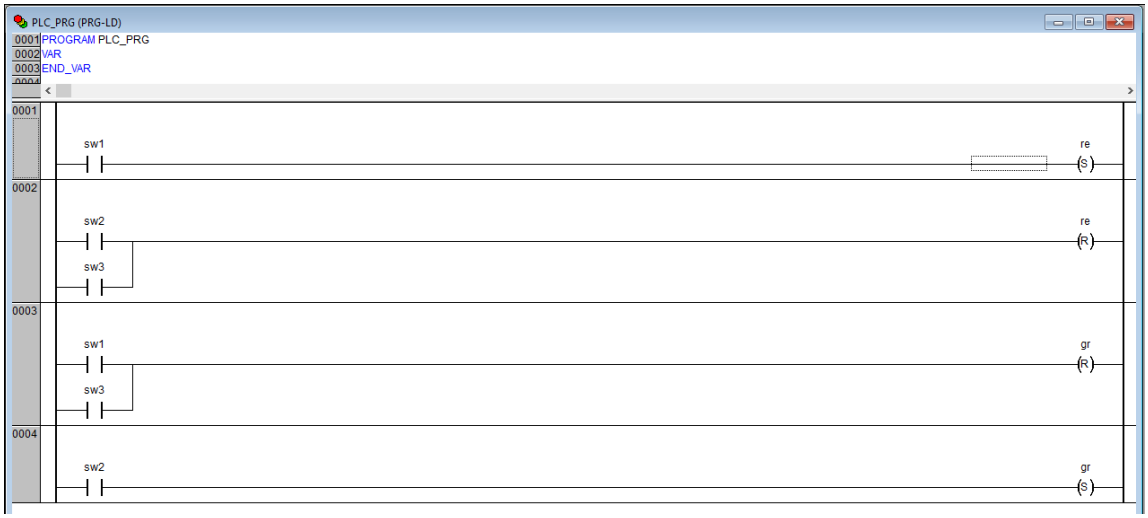
Gr=S1+S2

Task 3: Retentive Coils:

In the first solution for the implementation of a control logic of the conveyor system, normal coils are used with the latches that are shown in the lecture. The emergency switch is added in series connection to the latch; when it is high, the lights turn off. And the video of the implementation is attached in the DTU-inside with the name Task3.1.



In the second solution for the implementation of a control logic of the conveyor system, retentive coils are used. The emergency switch is added in parallel connection to the switch which resets the light's output; when it is high, the lights turn off. And the video of the implementation is attached in the DTU-inside with the name Task3.2.



The implementation of this control logic of the conveyor can be done by one switch, if the time of reaching to the second point is known. The pulses can be sent according to the timing. This solution requires the combination of Ladder Diagram and Function Block Diagram: For the pulses, FBD can be used as done in the previous exercise and for the assignment of the lights, LD can be used.