CUKUROVA UNIVERSITY

ELECTRICAL-ELECTRONICS ENGINEERING

EEE 419 PROGRAMMABLE LOGIC CONTROLLERS LABOROTORY EXPERIMENT 1

LOGIC STACK OPERATIONS

Object: In this experiment basic logic operations will be introduced.

PRELIMINARY WORK

P1. Write ladder diagram programs for each logic function given below.

1) K1=S1*S2
2) K2=S1+S2
3) K3= S1'*(S2+K3)*S3'
4) K4=X1*X3 + X1*X4 + X2*X3 + X2*X4
5) Q0.0=(I0.0)[(I0.1)[(I0.2) + (I0.3)*(I0.4)'] + (Q0.0)*(I0.5)'[(I0.3)*(I0.2)+(I0.4)']]

P.2 Implement the two latch configurations.

Figure 1:

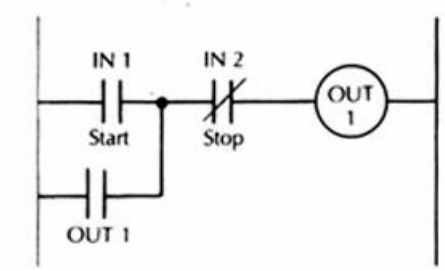
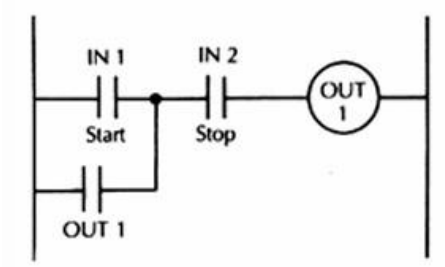


Figure 2:



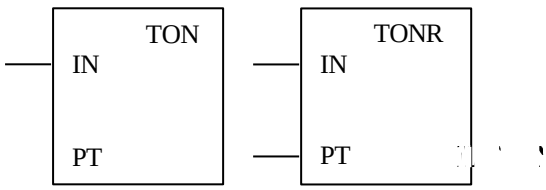
EXPERIMENTAL PROCEDURE

E.1 Verify the program which is written in P.1 using S7-200 micro PLC or GX Works3

E.2 Verify the program which is written in P.2 using S7-200 micro PLC or GX Works3

EEE 419 PROGRAMMABLE LOGIC CONTROLLERS LABORATORY
EXPERIMENT 2
TIMERS

Object: In this experiment S7-200 PLC timers and the timer instruction will be introduced. The S7-200 provides two different timer instructions: the On-Delay Timer (TON) and the Retentive On-Delay Timer (TONR). The two types of timers (TON and TONR) differ in the ways that they react to the state of the enabling input. Both TON and TONR timers time up while the enabling input is on; the timers do not time up while the enabling input is off, but when the enabling input is off a TON timer automatically resets and a TONR timer does not reset and holds its last value. To reset TONR timer the R(reset) instruction is used.



Operands: TON Txxx,PT

TONR Txxx,PT

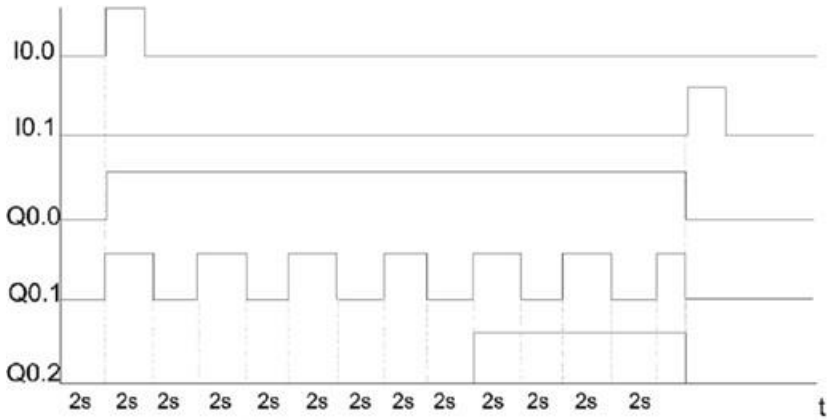
Txxx: timer number

PT: an integer time delay value

PRELIMINARY WORK

P.1 Write a PLC program which energises the output Q0.0(Q0.0=1) after 10 seconds of input(I0.0) was energised.(for 10 second delay use Txxx=T37, PT=100).

P.2 Write a PLC program, using timers, to produce the waveforms given below at the output named Q0.0, Q0.1, Q0.2.



EXPERIMENTAL PROCEDURE

E.1 Verify the program which is written in P.1 using S7-200 micro PLC or GX Works3

E.2 Verify the program which is written in P.2 using S7-200 micro PLC or GX Works3

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EXPERIMENT 3

COUNTERS

In this experiment S7-200 and Mitsubishi-FX5U counters and counter instructions will be introduced. There are two types of counters: Count Up counter (CTU) and Count Up/Down counter (CTUD).

The Count Up instruction counts up to the maximum value on the rising edges of the Count Up (CU) input. When the current value (Cxxx) is>= to the Preset Value (PV), the counter bit (Cxxx) turns on. The counter resets when the reset input(R) turns on.The Count Up/Down instruction counts up on rising edges of the Count Up input. It counts down on the rising edges of the Count Down (CD) input. When the current value (Cxxx) is >= to the Preset Value(PV), the counter bit(Cxxx) turns on.

OBJECT FOR S7-200:

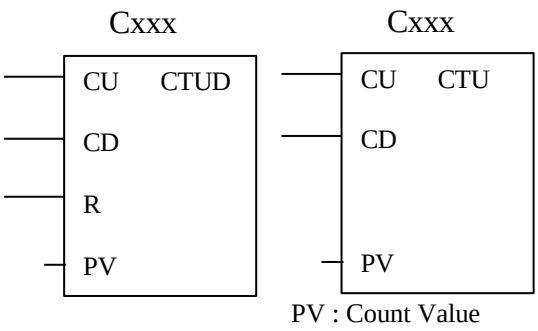
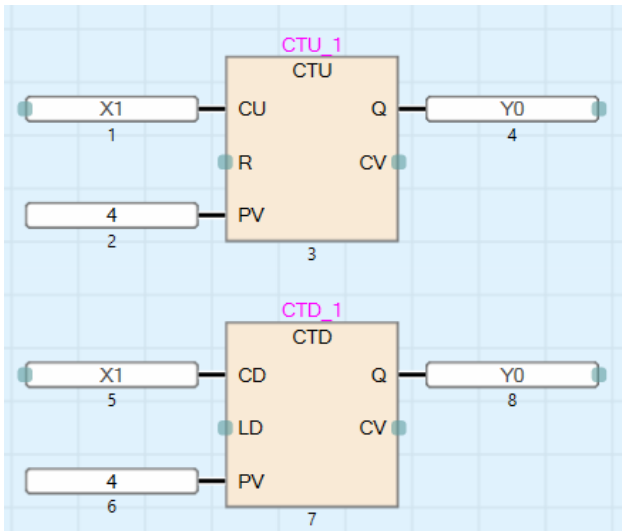


Fig.1. Counter function blocks for S7-200.

OBJECT FOR FX5U:



PT: Count Value

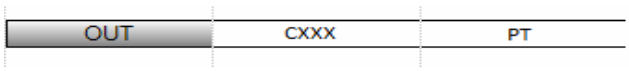


Fig.2. Counter function blocks for FX5U.

PRELIMINARY WORK

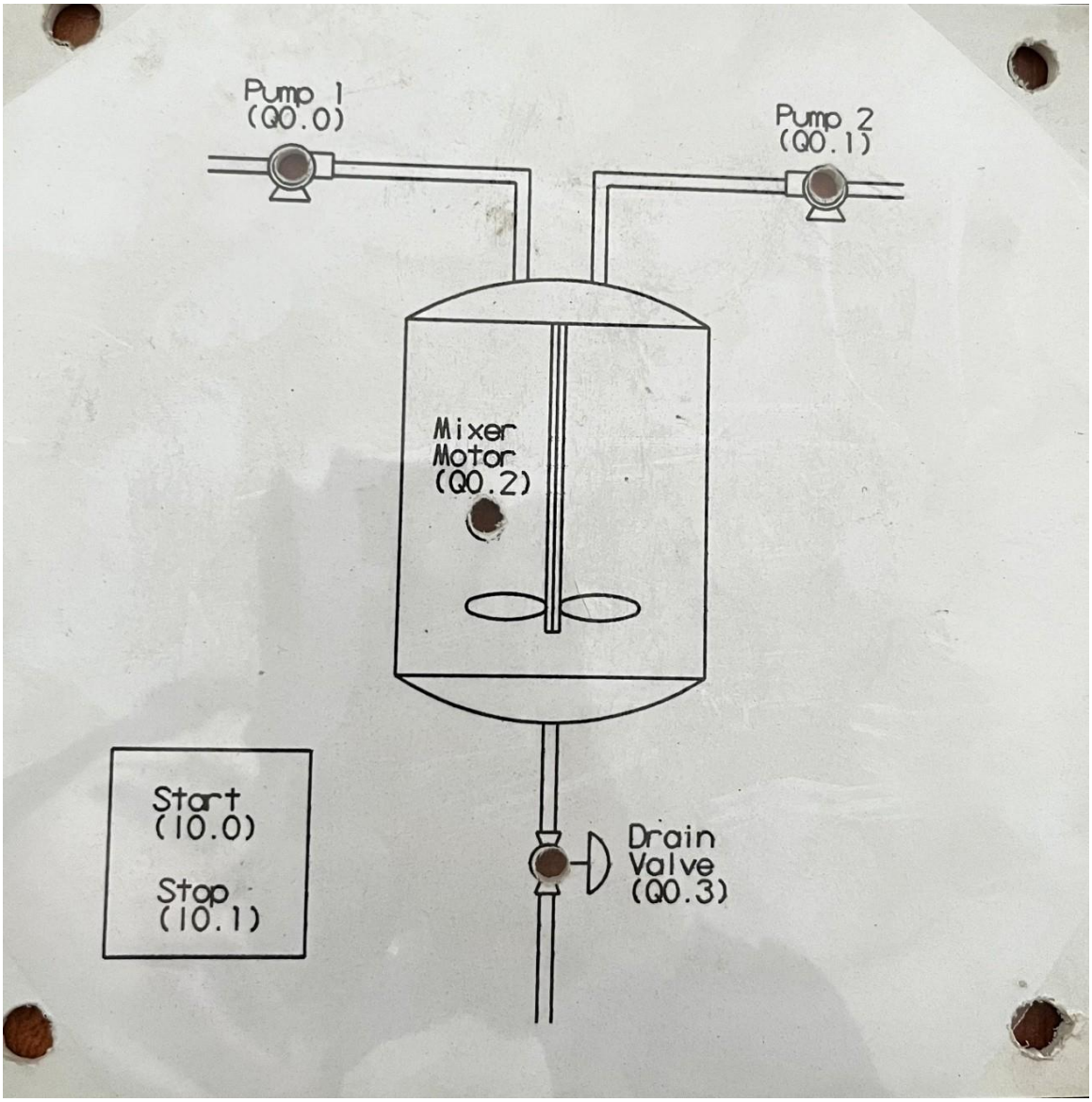
Design a system using the tasks given below:

- When the push button (X0 – I0.0) is depressed and released, the bell (Y0- Q0.0) will ring for 3 seconds.
- When the bell stops, the conveyor (Y1 – Q0.1) will start working.
- The sensor (X2- I0.2) located on the conveyor will stop the conveyor after sensor counts 6 bottles on the conveyor.
- (X1-I0.1) is the emergency stop button, that stops the process at any time.

EXPERIMENTAL PROCEDURE

E.1 Verify the program which is written in P.1 using S7-200 micro PLC or GX Works3

EXPERIMENT 4



PRELIMINARY WORK

Referring to the figure above, design the following system:

The system sequentially pumps two different liquids using Pump 1 and Pump 2. The mixed liquid is then agitated using a mixer motor. Finally, a drain valve is activated to discharge the entire mixture.

- Pump 1 runs for 10 seconds.
- Pump 2 runs for 10 seconds.
- After these operations, the mixture is mixed for 20 seconds with the mixer motor.
- Then, the drain valve is operated for 20 seconds to empty the mixture.
- The Start (I0.0) button starts the system.
- The Stop (I0.1) button stops the system at any time.

EXPERIMENTAL PROCEDURE

E.1 Verify the program which is written in P.1 using S7-200 micro PLC or GX Works3

EXPERIMENT 5

LOGIC TO LADDER DIAGRAM CONVERSION AND USE OF CONTROL RELAYS

AIM: In this experiment logic to ladder diagram conversion will be introduced. In addition use of control relays will be studied.

PRELIMINARY WORK

1) Logic diagram into ladder diagram.

2) Use control relays for auxiliary outputs to save from real output points.

X=Q0.1 **a=I0.0**

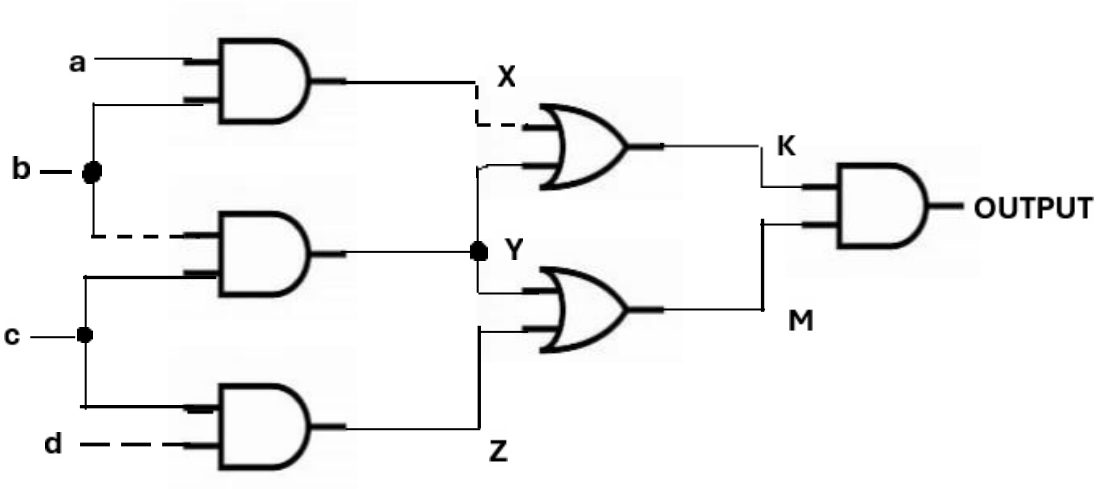
Y=Q0.2 **b=I0.1**

Z=Q0.3 **c=I0.2**

K=Q0.4 **d=I0.3**

M=Q0.5

OUTPUT=Q0.0



EXPERIMENTAL PROCEDURE

E.1 Verify the program which is written in P.1 using S7-200 micro PLC or GX Works3