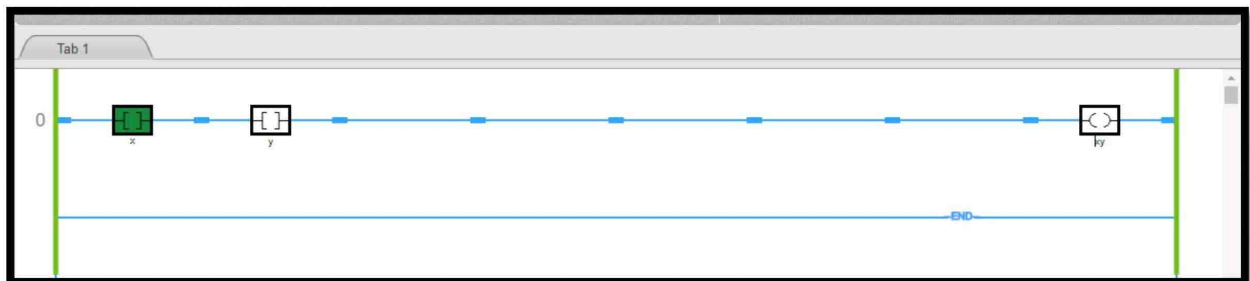# ASSIGNMENT NO : 5

## Implementing the logic gates using ladder programming.

❖ Console:

Run 0 created..
New Element added..
New Element added..
Rung 1 created..
New Element added..
New Element added..
New Element added..
Program is Compiled Successfully
Run Mode Deactivated
New Loop added..
New Element added..
Program is Compiled Successfully
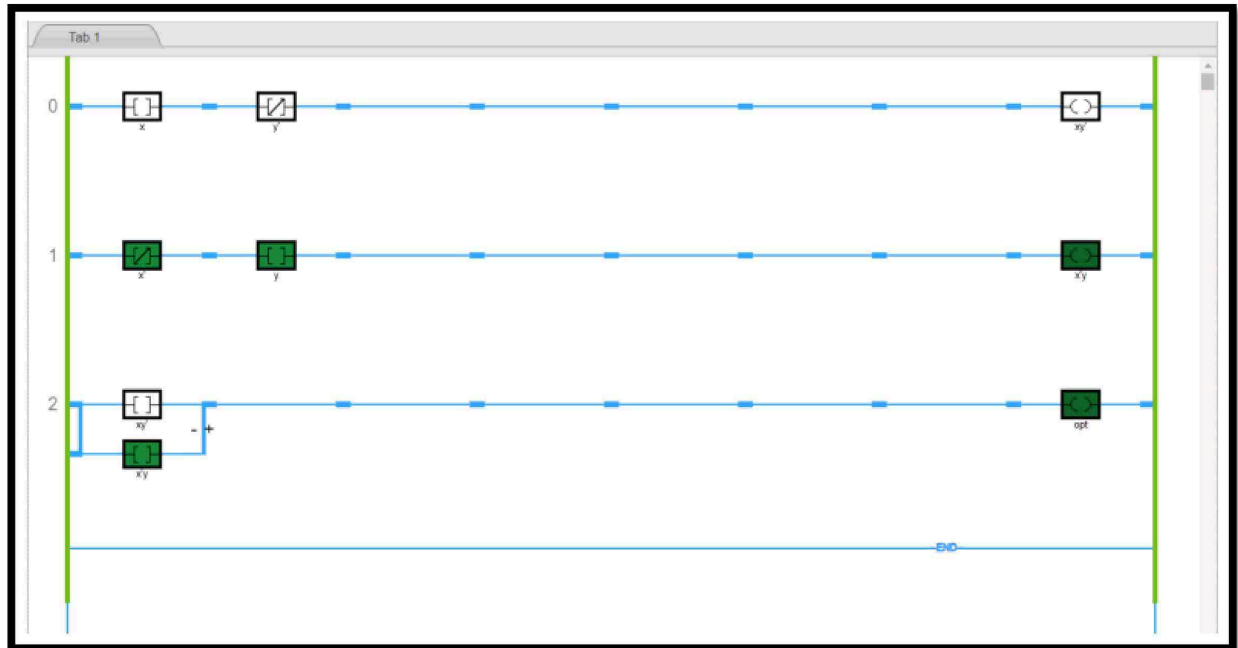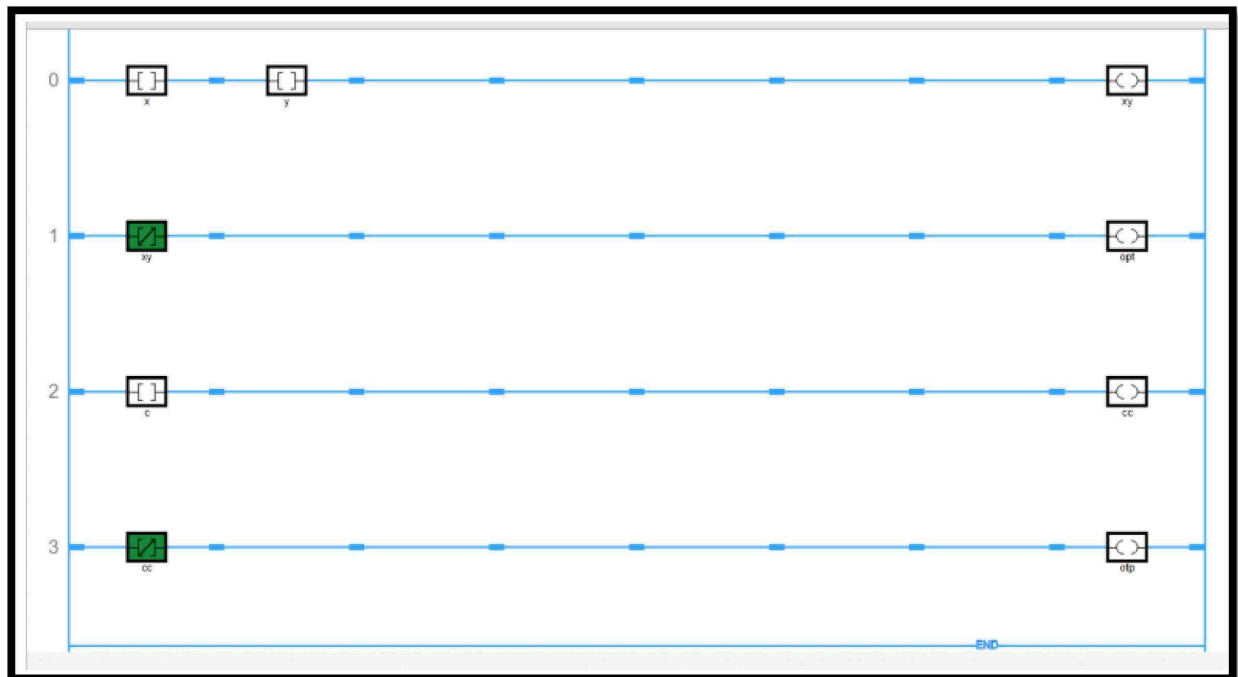Run Mode Deactivated
Program is Compiled Successfully

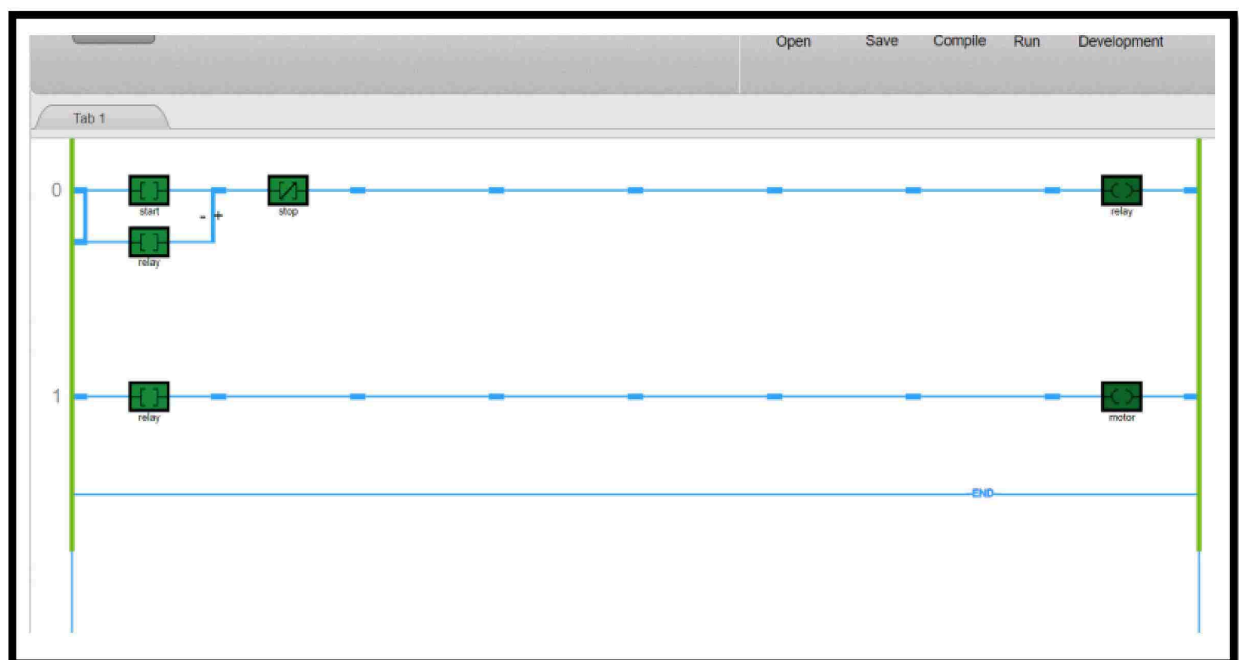## AND gate:

OR gate:
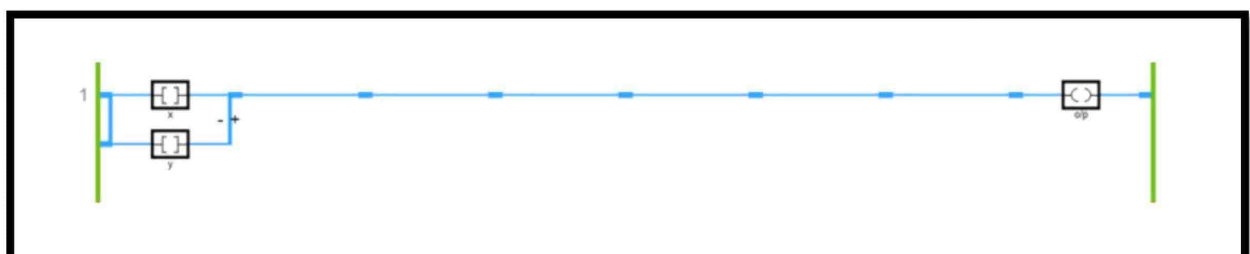
XOR gate:

NAND and NOT gate:

NOR gate:

Ladder Program:

3/6/22

Assignment No: 5

142103005
Pallavi Gaikwad.

Q1. What is industrial automation explain with automation pyramid.

answer Industrial Automation is the control of machinery & processes used in various industries by autonomous systems through the use of technologies like robotics & computer software.

The automation pyramid classifies the different layers of industrial automated production plants. It is divided into 6 layers.

- **Level 0 (lowest level):**
  Process level with sensors & actuators for collecting production data & executing commands, respectively. On this level, parallel wiring is typical.

- **Level 1 :**
  field level acting as the interface between the production process & central level.

- **Level 2:**
  Control level carrying the IT structure for controlling the production process by means of an ICS.

- **Level 3 :**
  (Process) management level for the monitoring, operational purposes as well as the recipe management via a process management system, eg. SCADA.

- **Level 4:**

    Operational management level including MES, MIS or LIMS serving as interfaces for the detailed production planning, quality management as well as data collection, material management & KPI documentation.

- **Level 5 (highest level):**

    Company level for, the general production planning & order management via the ERP system.

Q2. What are PLC languages. Explain all 5 languages with example for each.

Answer 1. PLC is an electronic device used for Automation of industrial process.

2. A PLC program consists of a set of instructions either in textual or graphical form, which represents the logic to be implemented for specific industrial realtime applications.

3. PLC are basically of two types, which are further sub-divided into several types, which are as follows:

1. **Textual list (IL):**

    IL contains instructions with each instruction on a new line with any comments you might want to annotate at the end of each line. It uses menmonic codes such as LD (Load), AND, OR, etc.

Example :   142103 005

```
LD        Tag 1
ST        Times1 . IN
GOTO      mark 1
CAL       Timer 1 C
          PT := tIn1
          ET :=> tout 1)
LD        Timer 1. Q
ST        Timer 2. IN
mark 1:
LD        Tag - 2
AND       230
OR        3
```

- **Structured Text (ST) :-**

The language is textual based language structured text is high-level language like (PASCAL)
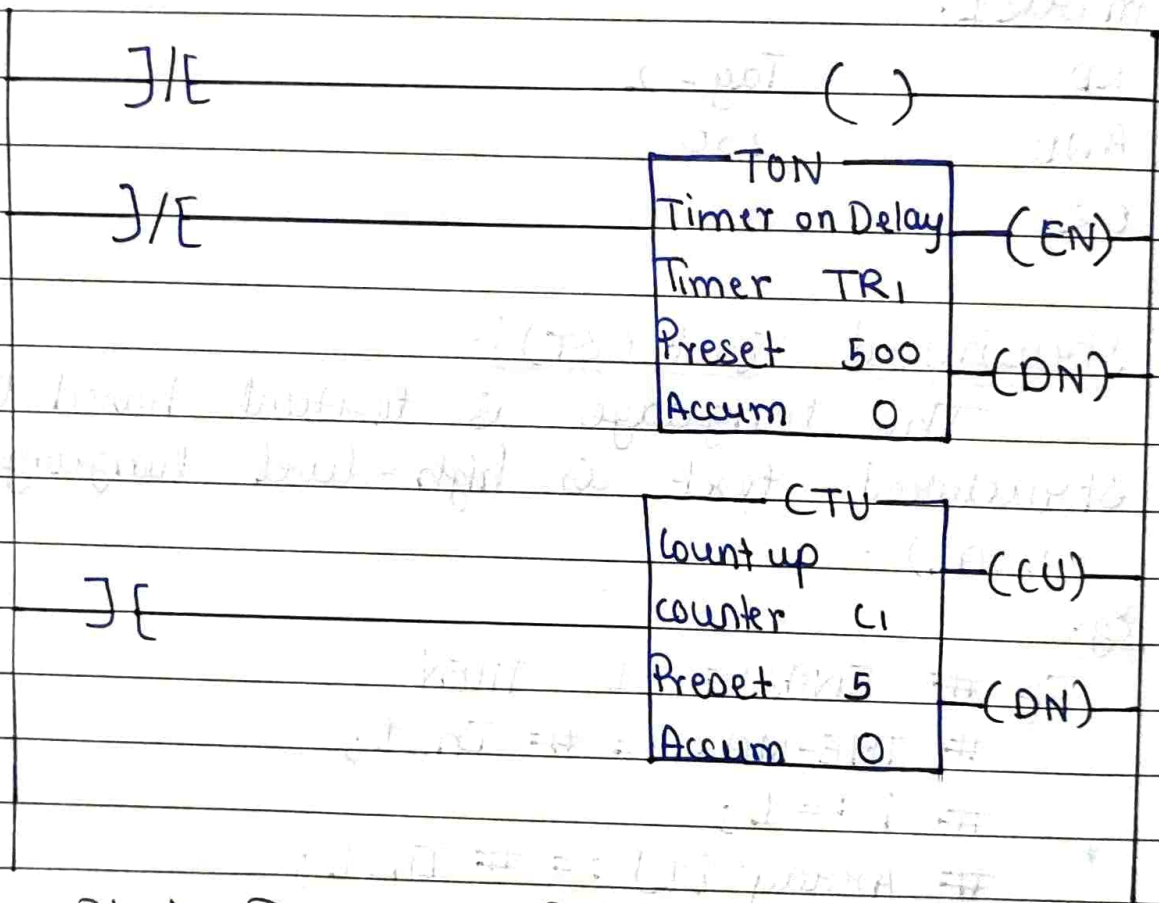
Eg.

```
If # ENABLE = 1  THEN
    # THE-MAX := # In_1;
    # i := 1;
    # Array [1] := # In_1;
    # Aray [2] := # In-2;
    # Aray [3] := # In-3;
    # Array [4] := # In-4;
    # Array [5] := # In-5;
END If;
```

2. Graphical Language

- Ladder Diagrams (LD):-

    LD utilizes internal logic to replace all, except the physical devices, that need an electrical signal to activate them. you can program all the necessary i/p conditions to effect the o/p conditions , whether logical or physical.

]/[		( )
]/[	**TON** Timer on Delay Timer TR1 Preset 500 Accum 0	(EN) (DN)
][	**CTU** Count up counter C1 Preset 5 Accum 0	(CU) (DN)

- Function Block Diagram (FBD):

    FBD describes a f^n between i/ps and o/ps that are connected in blocks by connection lines. They are developed to create a system that you could set up many of the common, repeatable tasks; such as counters, timers, etc.
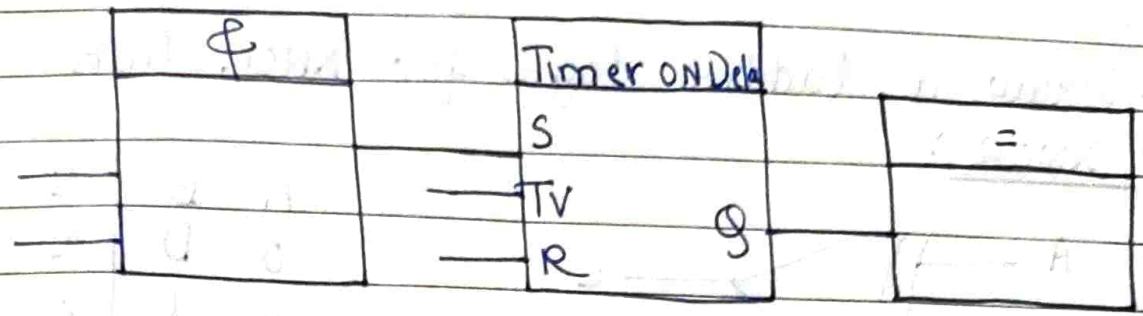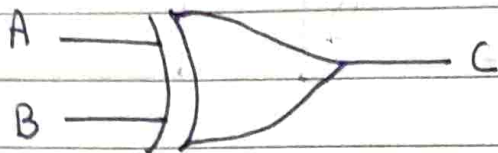
- ## Sequential Function chart (SFC):

In SFC, we use steps & transitions to achieve our end results. Steps act as a major function in our program, Transitions are the instructions that we use to move from one step to another step by setting conditions of true or false. SFC can have multiple paths.
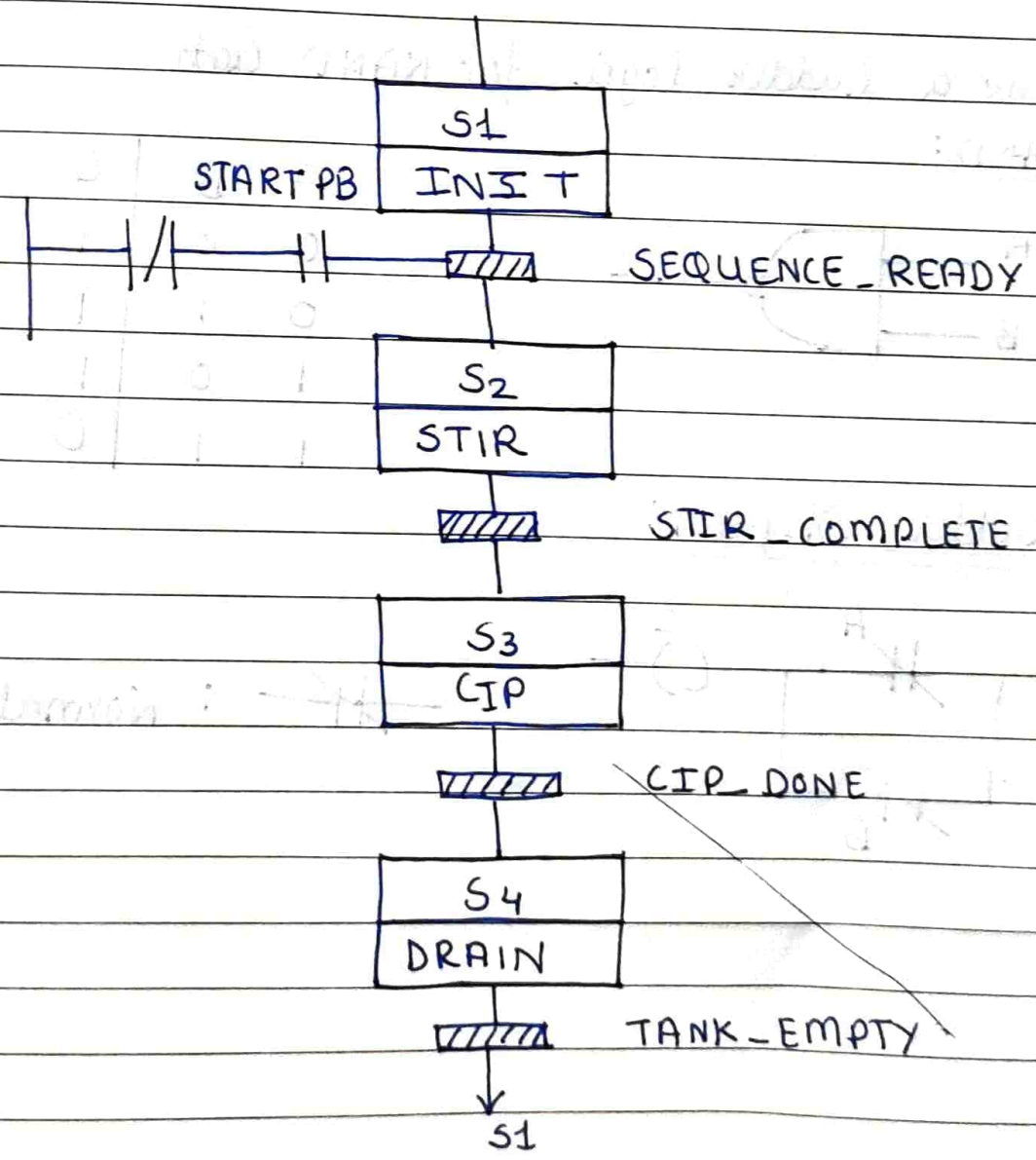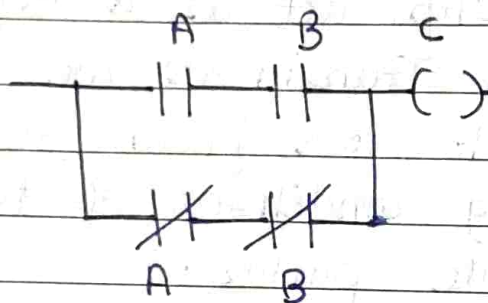
Q3. Draw a ladder logic for XNOR Gate

answer XNOR:

A ——⟩⟩⊃— C
B ——⟩⟩

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

- Ladder Diagram:

A   B   C
—||—||—( )—

⊣⊢   ⊣⊢
A   B

⊣⊢ : Normally open
⊬ : Normally clossed

Q4. Draw a ladder logic for NAND Gate

answer NAND:

A ——⊃o— C
B ——
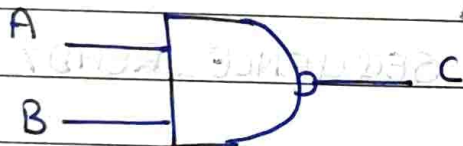
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

- Ladder Diagram:

     A   C
—⊬——————( )—

  ⊬
  B

⊬ : Normally closed.