

KARNATAK LAW SOCIETY'S
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(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

(APPROVED BY AICTE, NEW DELHI)

Department of Electrical and Electronics



Course Activity on
Automation and Robotics

Program: Open Elective

Semester: 5

Course Title: PLC and SCADA

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Guide

NIKHIL SIR

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Introduction

Automation and Robotics play a pivotal role in enhancing efficiency, productivity, and precision across various industries. Programmable Logic Controllers (PLC) and Supervisory Control and Data Acquisition (SCADA) systems are integral components of automation, providing real-time control and monitoring capabilities. This report aims to explore the significance of PLC and SCADA in automation and robotics, their functionalities, applications, and future trends.

Programmable Logic Controllers (PLC)

Definition and Basics

- PLCs are digital computers designed for industrial automation.
- They execute control functions based on user-defined programs.
- Commonly used for controlling machinery and processes in manufacturing plants.

Functionality

- Input/Output (I/O) handling: Interface with sensors and actuators.
- Program execution: Execute logic based on user-programmed instructions.
- Communication: Exchange data with other devices for coordinated control.

Applications

- Manufacturing: Control of production lines, machinery, and assembly processes.
- Energy: Monitoring and controlling power generation and distribution.
- Automotive: Automation of assembly lines and quality control.

Advancements

- Integration with IoT: PLCs are evolving to connect with the Internet of Things for enhanced data exchange and analytics.
- Cloud integration: PLCs are increasingly utilizing cloud platforms for remote monitoring and maintenance.

Supervisory Control and Data Acquisition (SCADA)

Definition and Basics

- SCADA systems are used for centralized monitoring and control of industrial processes.
- Collect, process, and present real-time data for decision-making.

Functionality

- Human-Machine Interface (HMI): Visualization of processes through graphical interfaces.
- Data acquisition: Gather information from PLCs and sensors.
- Alarm handling: Immediate notification of abnormal situations for quick response.

Applications

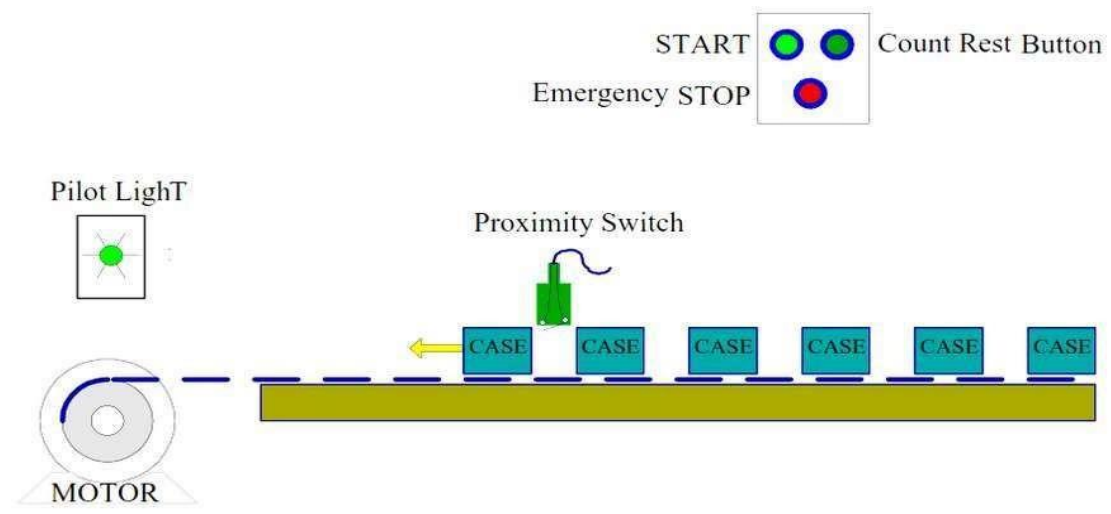
- Oil and Gas: Monitoring and controlling pipelines and refineries.
- Water Treatment: Supervising water distribution and purification processes.
- Transportation: Managing traffic control systems and railway operations.

Advancements

- Cybersecurity: Growing emphasis on securing SCADA systems against cyber threats.
- Integration with Machine Learning: SCADA systems are incorporating machine learning algorithms for predictive maintenance and process optimization.

Problem statement 01:

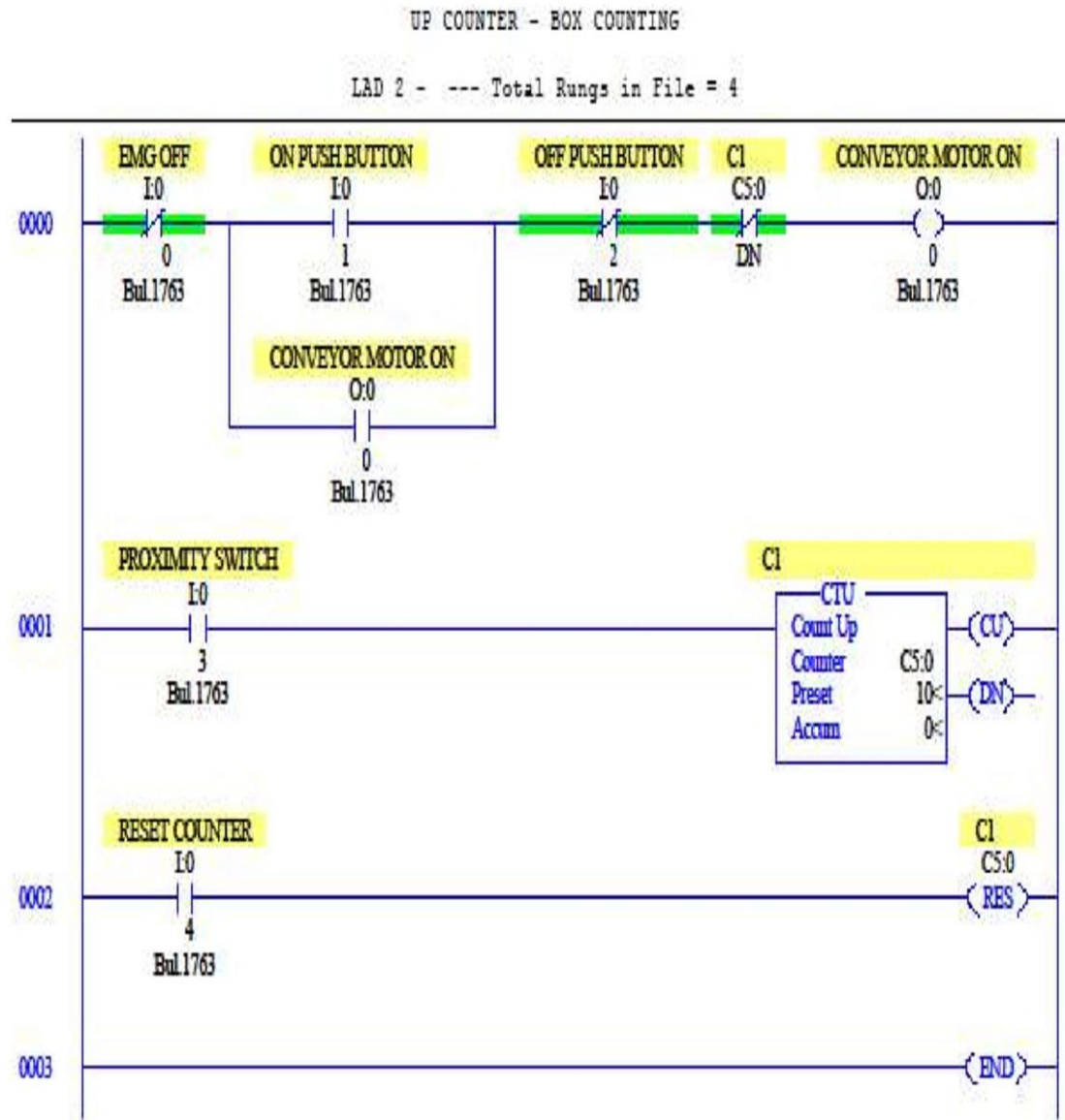
Write a ladder programme for UP Counter Box Counting?



Sequence of Operation

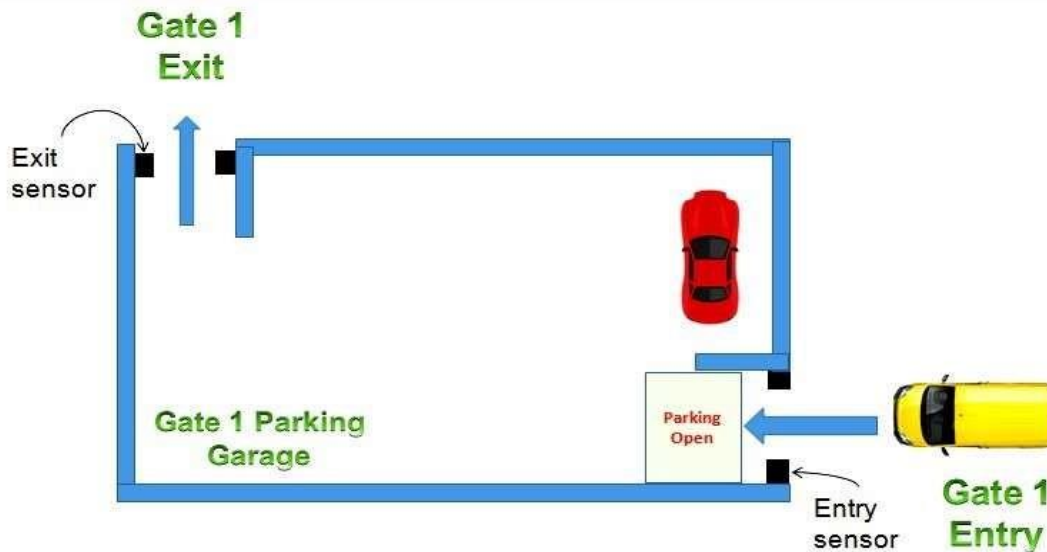
1. The Start button is pressed to start the conveyor motor.
2. Cases move past the proximity switch and increment the counter's accumulated value.
3. After a count of 10, the conveyor motor stops automatically.
4. The conveyor motor can be stop manually without losing the accumulated count.
5. The accumulated count of the counter can be reset using the

Solution:



Problem statement 02:

Write a ladder programme for Car Parking?



Sequence of Operation:

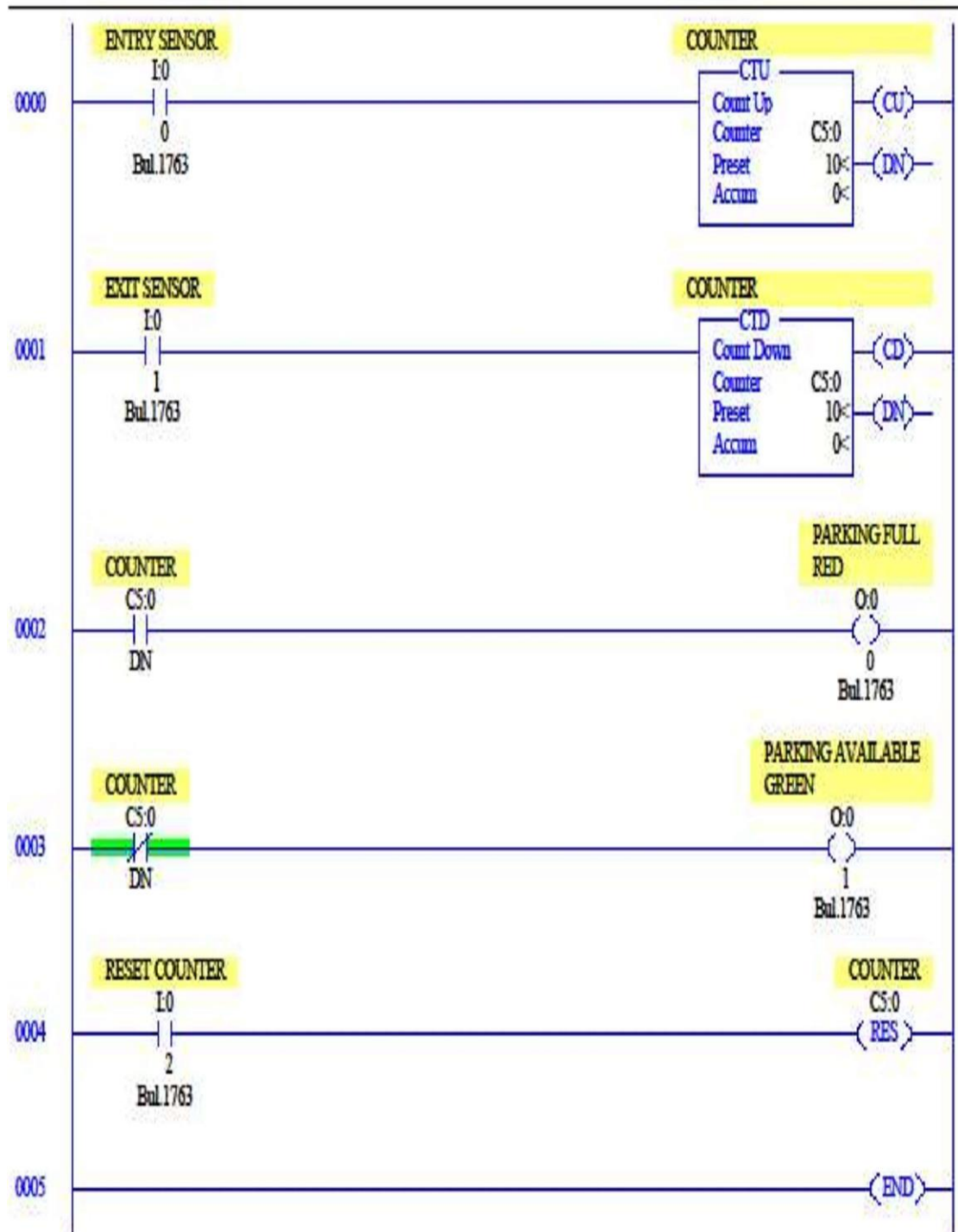
1. As a car enters, the enter switch triggers the up counter output instruction and increments the accumulated count by 1.
2. As a car leaves, the exit switch triggers the down counter output instruction and decrements the accumulated count by 1.
3. Because both the up- and down-counters have the same address, C5:0, the accumulated value will be the same in both instructions.
4. Whenever the accumulated value of 10 equals the preset value of 10, the counter output is energized by the done bit to light up the Lot Full sign (Red Light).
5. When the accumulated value is less than the preset value, it will light up the Lot Available (Green Light).
6. A reset button has been provided to reset the accumulated count.

The sequence should be written with correct address.

Solution:

CAR PARKING - UP DOWN COUNTER - EXAMPLE

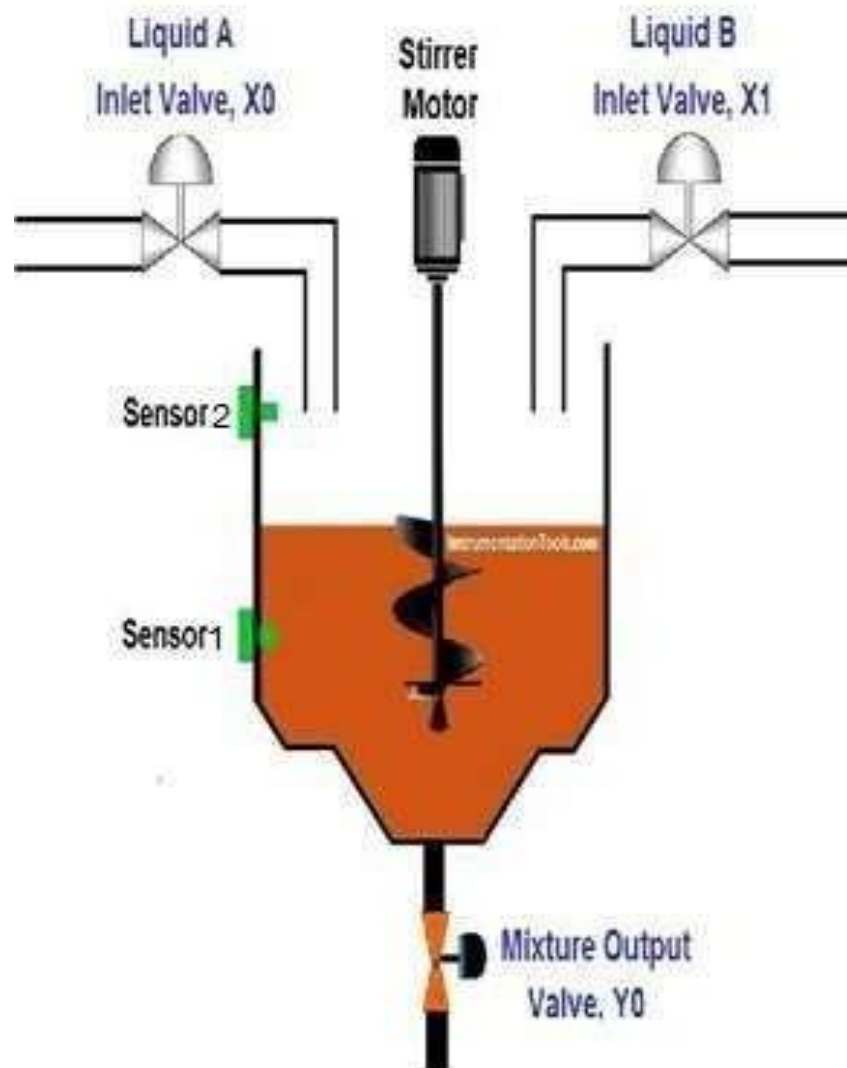
LAD 2 - --- Total Rungs in File = 6



Problem Statement 03:

Write Ladder Programme for below examples?

The automatically infusing the container with liquids A and B in order when START is pressed. When it reaches the set level, mix the two liquids evenly, then open the valve to let out the mixture.

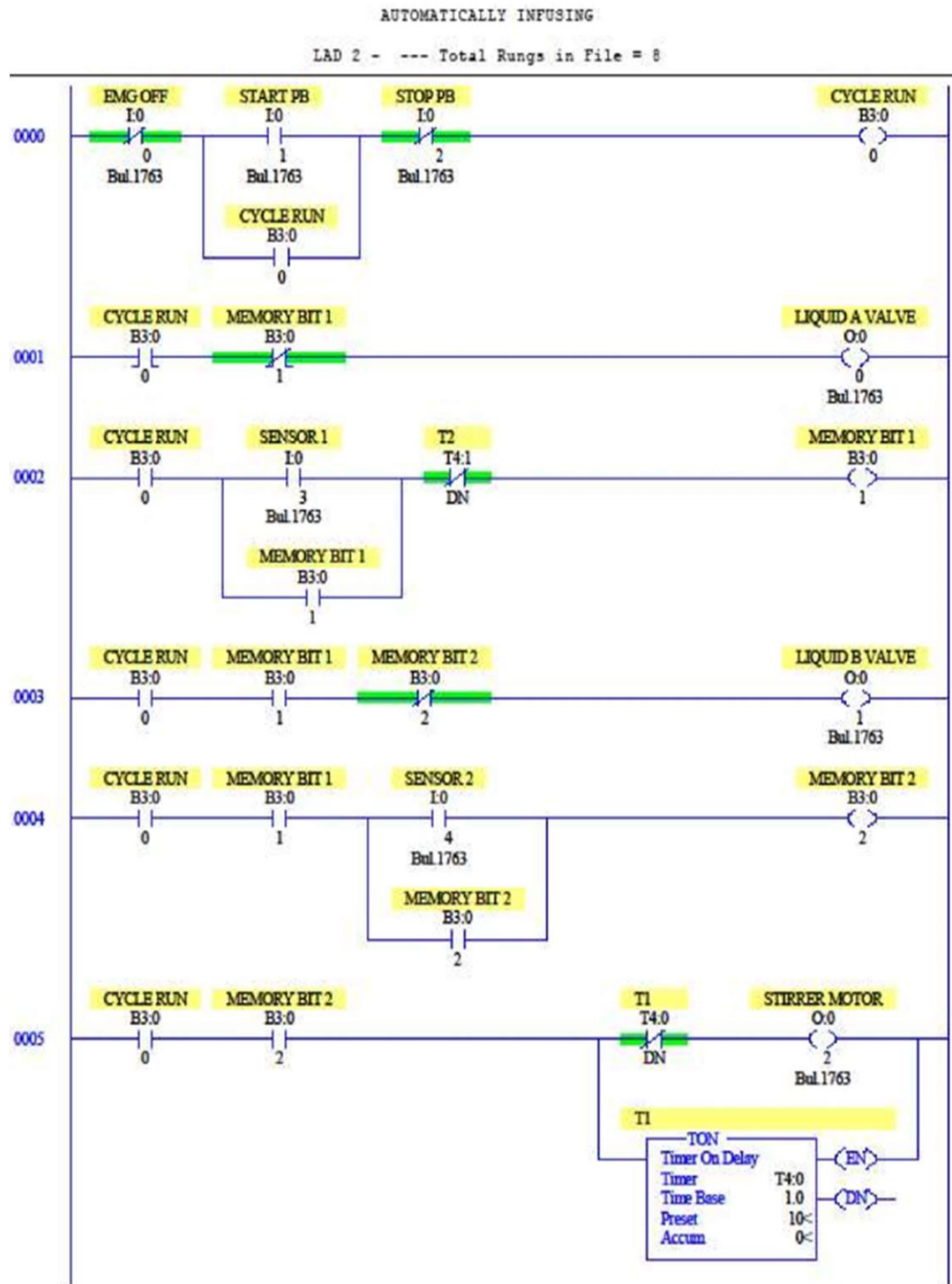


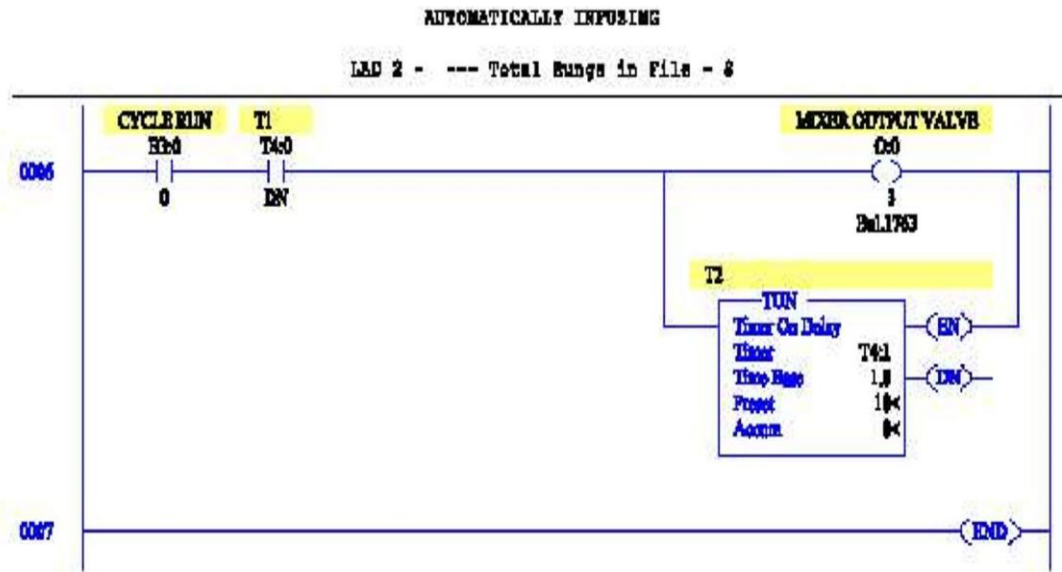
Sequence Of Operation:

1. Assume the tank is empty starting of the cycle.
2. Start the cycle with the Start push button. Liquid A valve should be ON till Sensor 1 activates.
3. Liquid B valve should be ON once Sensor 1 activates, till Sensor 2 activation.
4. After Sensor 2 activation, the Stirrer motor should be ON for 10sec for the stirring process.
5. After stirring , the Mixture output valve should open for 10sec.
6. Continue the process till brakes the cycle using the push button.

The sequence should be written with correct address.

Solution :





Future Trends

Edge Computing in Automation:

- Increased use of edge computing for real-time data processing at the source.

Artificial Intelligence in Robotics:

- Integration of AI algorithms for adaptive and intelligent robotic systems.

5G Connectivity:

- Utilization of high-speed, low-latency 5G networks for improved communication between PLCs, SCADA, and robotic systems.

Conclusion:

In conclusion, PLCs and SCADA systems play pivotal roles in automating and enhancing efficiency across various industries. Their integration with robotics further amplifies the capabilities of automated systems. As technology continues to advance, the future holds exciting possibilities for the convergence of automation, robotics, and intelligent control systems.