



# Department of Electrical Engineering

**Subject: Industrial Electronics**

Spring: 2019-20

Date: 26/06/2020

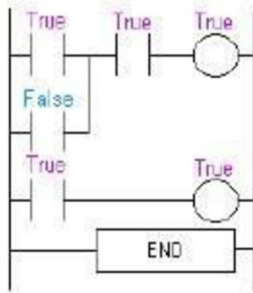
Instr: Sir, Sana Ullah

**ID: 13045**

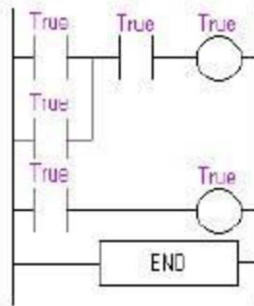
**Student Name: Muhammad Numan Asad**

**Question No 1.**

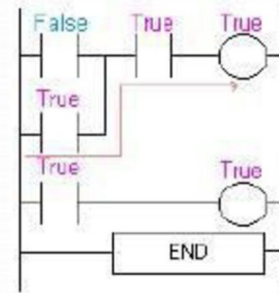
A. Consider a lubricating oil tank in Industrial Plant having 2 sensors, one is put near to the bottom and one near to top, to fill the tank, motor A will pump oil to tank until the high level sensor turns on, at that point the motor A turns OFF. Motor A is turned ON when the level fall below the low level sensor. Explain the states of PLC operating cycle with help of neat ladder diagrams.

**Answer:****Scan 1**

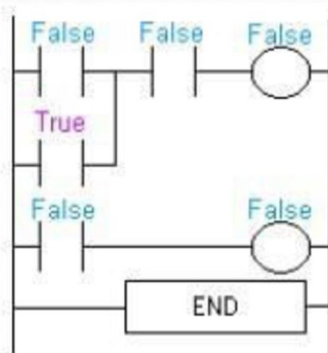
Initially the tank is empty. Therefore, input 0000 is TRUE and input 0001 is also TRUE

**Scan 2**

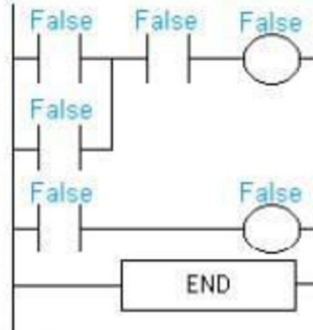
The internal relay is turned on as the water level rises.

**Scan 3**

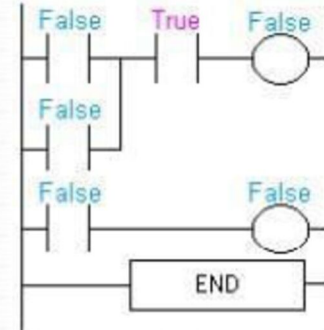
After scan 2 the oil level rises above the low level sensor and it becomes open. (i.e. FALSE)

**Scan 4**

After scan 4 the oil level rises above the high level sensor at it also becomes open (i.e. false)

**Scan 5**

Since there is no more true logic path, output 500 is no longer energized (true) and therefore the motor turns off.

**Scan 6**

After scan 6 the oil level falls below the high level sensor and it will become true again.

Q 2 Part (A)

Write some Benefits of Industrial Automation?

Answer:

\* Increasing productivity.

Increased productivity more unit/day =  
more money.

→ Products produced more consistently:  
Increased consistency = higher availability =  
increased consumer satisfaction.

A bottled soft drink such  
as a coke or a Pepsi always  
tastes the same no matter where  
or when you purchase it. Consumers  
count on this

→ Products produced more reliably.  
Robots can run 24 hours/day

without getting tired or bored.

Decreased Labor expenses:

Automation system reduce the amount of people needed to produce the goods.

Increasing safety in working condition.

Q2 Part B:

Briefly explain the components and function of SCADA system.

Answer:

Components of SCADA system:

Human Machine Interface:

It is an I/O device that allow a human operator to control the process data - this is achieved by linking SCADA databases and software program for providing management information like detailed schematics scheduled maintenance data diagnostics and logistic information. The operating personnel can also see the graphical representation of data.

## Supervisory System

This system act as a communication server b/w the HMI software in control room workstation and its equipment like PLCs, RTUs sensors etc.

### Remote Terminal unit

This system contains physical objects that are interfaced with Remote Terminal unit (RTUs). These electronic device and controlled by microprocesses and are used for transmitting recorded data to the supervisory system.

They also receive data from the master system in order to control the connected objects.

## Communication Infrastructure

Generally a combination of direct wired connection and radio is used in supervisory control and data Acquisition system

However SDH / SONET can also be used for larger system like railways and power station. Among the compact SCADA protocols few recognized and standardized protocols deliver information only when the RTUs are polled by the supervisory

Station.

SCADA Programming:

SCADA programming in HMI or master station is used for creating diagram and maps that provide vital information during process



or event failure. Most of the commercial supervisory control and data Acquisition system use standardized interfaces in programming.

### FUNCTIONS OF SCADA:

SCADA system are used to control and monitor physical process example of which are transmission of electricity transportation of gas and oil in pipelines water distribution traffic lights and other system and used the basis of modern society.

~~Q.1~~ Q.3 Part A:

Differentiate between Hardwired control system and PLC system?

Answer:

Hardwired control system:

The functions are determined by the physical wiring

changing the function means changing the wiring

can be contact making type

(relays, contactors) or electronic types (circuits)

## PLC System:

The functions are determined by a program stored in the memory.

The control function can be changed simply by changing the program.

consists of a control device to which all the sensors and actuators are connected.

Q3 Part: B:

What are the function of SCADA system?

Answer: SCADA of function system:

SCADA system are used in a variety of industries such as traffic system electric power utilities and mass transit system where equipment function must be closely monitored and controlled all automatically. SCADA system can collect data from sensors as well as send control signals back to the equipment

being monitored.

SCADA system perform several function

The three basic function are the monitoring control and user interface

function. The monitoring function collects data and send it back to the

central computer. The control function gathers data from monitoring sensors

processes it and send control signal back to the equipment according

to a prescribed software program

The user interface is often a

large control room where individuals can

monitor SCADA input and output responses in real time.

The End