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Subject  $\neq$  Industrial Electronics

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## Question - 1

Answer :-

We are controlling lubricating oil being dispensed from a tank. This is possible by using two sensors. We put one near the bottom and one near the top.

Here, we want the fill motor to pump lubricating oil into the tank until the high level sensor turns on.

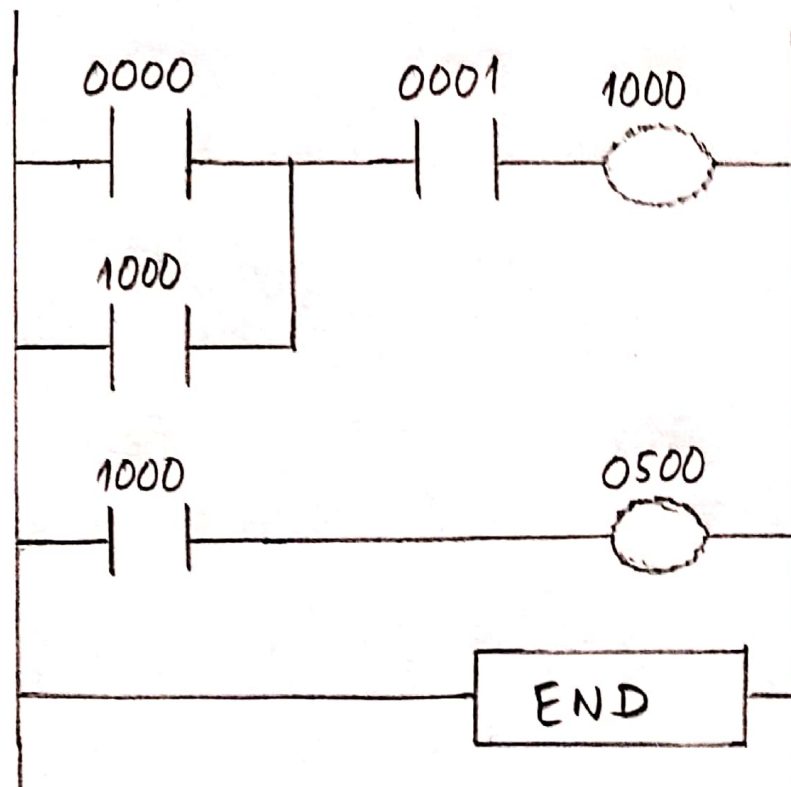
At the point we want to turn off the motor until the level falls below the low level sensor. Then we should turn on the fill motor and repeat the process.

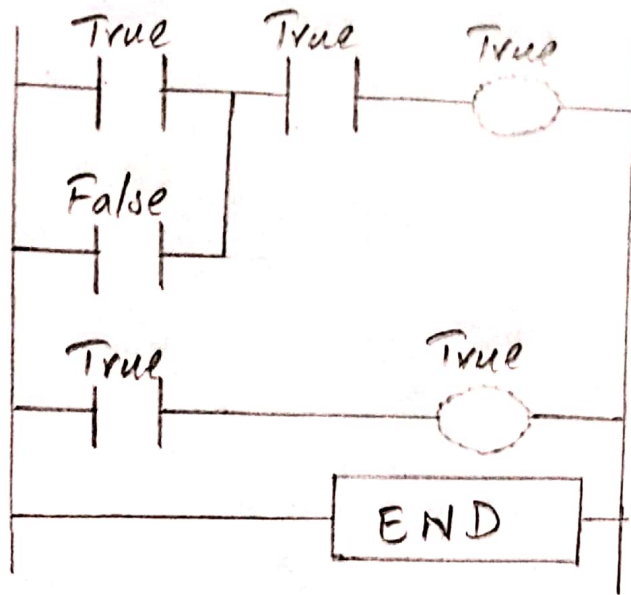
Inputs	Address
Low level Sensor	0000
High level Sensor	0001

Out put	Address
Motor	0500

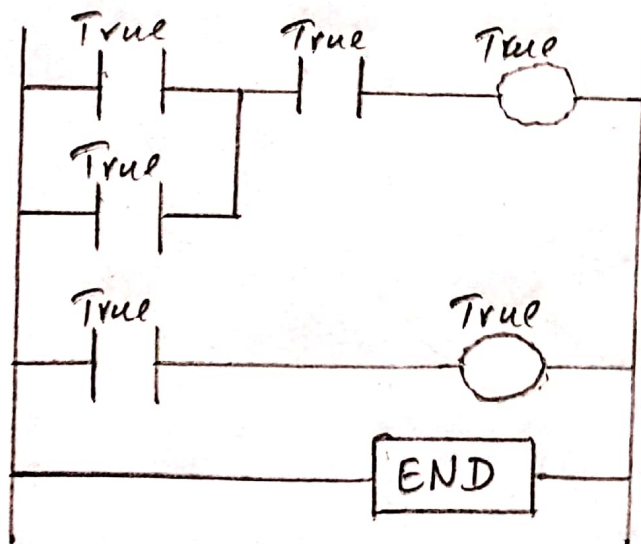
Internal Utility Relay	1000
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⇒ The Ladder Diagram:

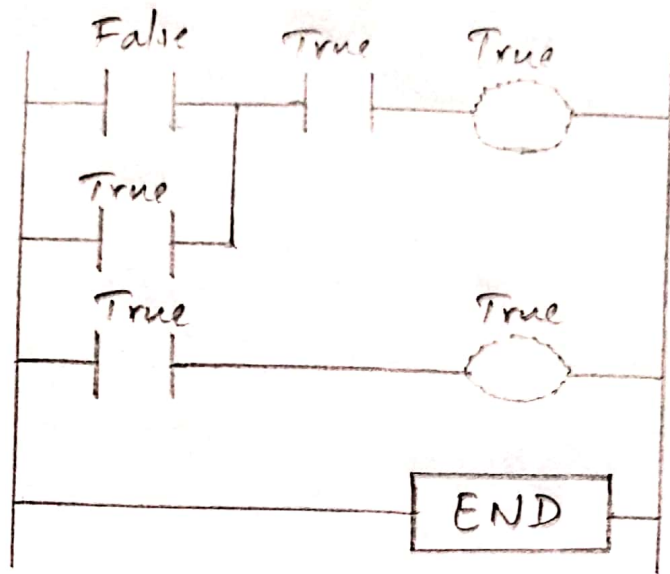




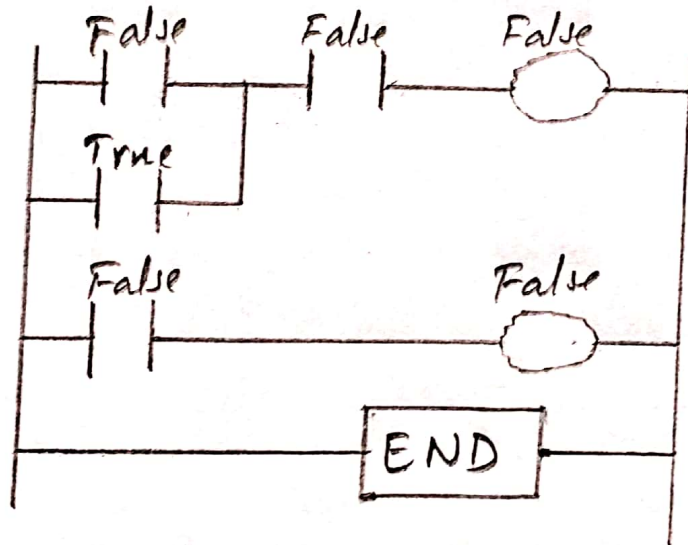
Initially the tank is empty.  
 Therefore, input 0000 is TRUE.  
 And 0001 is also TRUE.



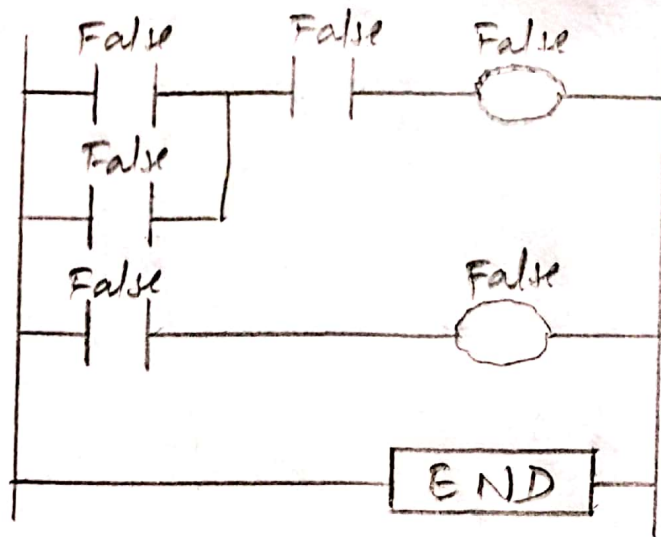
The internal relay is turned ON as the water level rises.



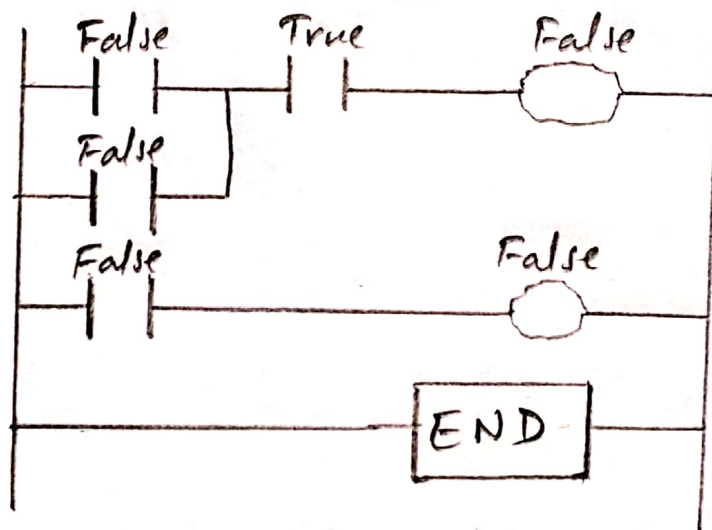
After Scan 2 the oil level rises above the low level sensor and it becomes open (i.e False).



The oil level rises above the high level sensor at it also become open. (i.e False)



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



The oil level falls below the high level sensor and it will become true again.

## Question-2

(A) part.

### Benefit of Industrial Automation:

\* Increase productivity:

→ Increase productivity → higher gained money  
⇒ more units/day and more money

\* Product produced more efficiently  
of consistently:

→ Increase consistency → higher quality →

Increase consumer satisfaction.

Example → A bottle soft drink switch  
as coke or pepsi always taste the  
same and consumer count.

\* Product produce more reliably:

→ Robots can run 24 hours/day without getting tired or bored.

\* Decrease Labor expenses:

→ Automated system reduce the amount of people needed to produce the good.

\* Increase Safety in working condition:



## Question - 2

(B) Part :

### \* Components of SCADA:

There are many parts or components of SCADA system. which include hardware, controllers, networks, user interface, communication equipments and software.

All together, the term SCADA refers to the entire central system. The central system usually monitors data from various sensors that are either in close proximity.

### \* Major Components of SCADA:

⇒ A collection of equipments that is provide the operator at remote location with enough information to determine the

Status of particular pieces of equipment or entire substation or a dynamic network and cause actions take place regarding that equipment or network without being physically present.

⇒ An arrangement for operator control and separation of remotely located apparatus using multiplexing techniques using a relatively small number of interconnecting channels.

⇒ Collecting Data from remote electrical equipment and controlling them through suitable communication medium.

## \* Functions of SCADA :

A SCADA system performs four functions.

- 1 - Data acquisition.
- 2 - Networked data communication.
- 3 - Data presentation.
- 4 - Control.

⇒ These functions are performed by four kinds of components :

⇒ Sensors :- (Either digital or analog) and control relays that directly interface with the managed system.

⇒ Remote telemetry Unit (RTUs) : These are small computerized units deployed in the field at specific sites and locations.

RTUs serve as local collection points for gathering reports from sensors and delivering commands to control relays.

⇒ SCADA master Units: These are larger computer consoles that serve as the central processor for the SCADA system. Master units provide a human interface to the system and automatically regulate the managed system in response to sensor inputs.

⇒ The Communication Network:

Communication network that connects the SCADA master unit to the RTUs in the field.

# Question-3

(A) part:

## Hardwired Control System

- \* The functions are determined by the physical wiring.
- \* Changing the function means changing the wiring.
- \* Can be contact-making type (relay, contractor) or electronic types (logic circuit)

## PLC System

- The functions are determined by a programme stored in the memory.
- The control function changed simply by changing the program.
- Consist of a control device to which all the sensors and actuators are connected.

## Question-3

(B) Part.

### ⇒ Function of SCADA:

- Centrally monitor and controls thousand of industrial equipment such as Motor, Valves, Pump, relay, sensor etc.
- Display current state of remote process. (Visualization).
- Display alarms / Event log.