IQRA National University, Peshawar
Department of Electrical Engineering
Spring 2020
Elective 5 (Power).
Elective 4 (Electronics).
Industrial Electronics
Terminal Examination

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<u>*Total Marks : 50*</u>
<u>*Attempt All Questions.*</u>

Question No 1.　10

    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. **CLO-3**

Question No 2　20
    A. Write some benefits of Industrial Automation **CLO-2**
    B. Briefly explain the components and functions of SCADA system **CLO-2**

Question No 3　20
    A. Differentiate between Hardwired control systems and PLC system **CLO-3**
    B. What are the function of SCADA systems **CLO-2**
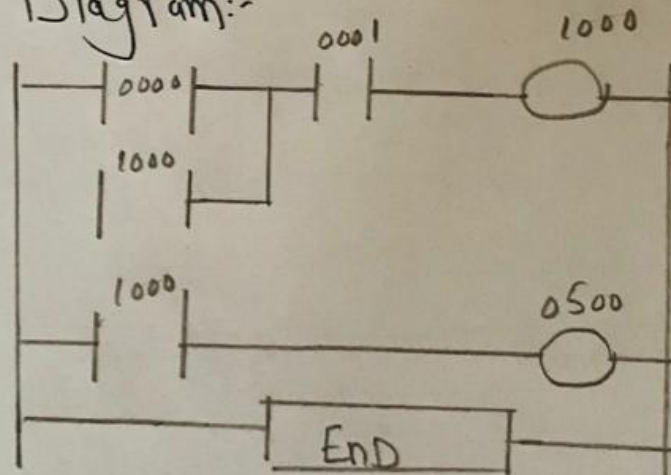
<u>*.Good Luck.*</u>

①

Name : Syed. M. Zahoor
    ID : 12595
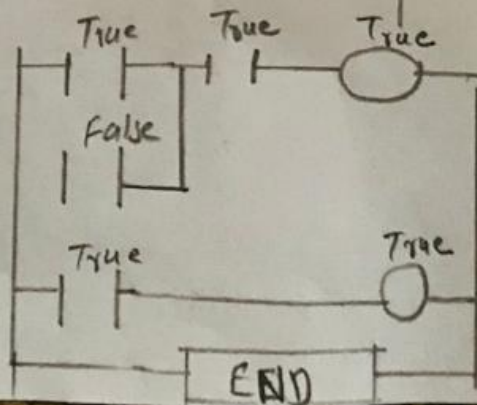
Question No 1

Ⓐ

Inputs	Address
Low level Sensor	0000
High level Sensor	0001

output	Address
Motor	0500

Internal unitity Relay
    1000
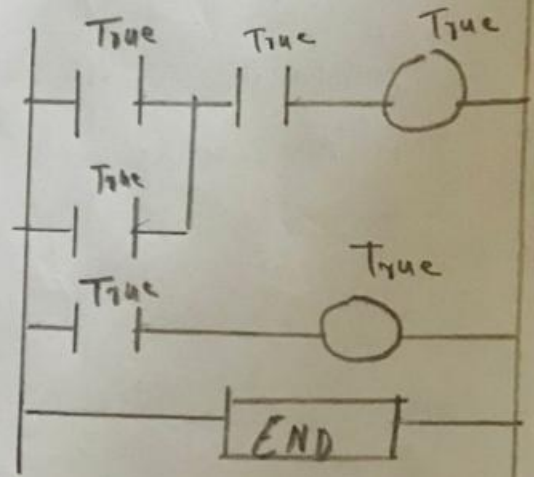
The Ladder Diagram :-

Scan 1 st

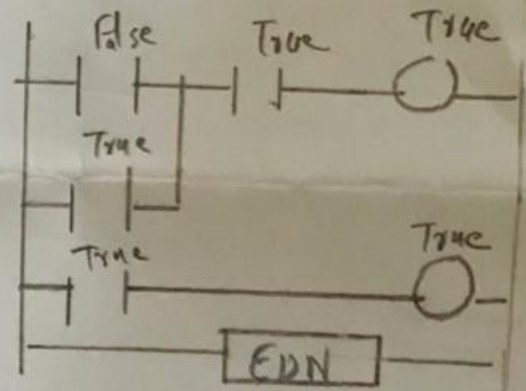Initially the tank is Empty. Therefore Input 0000 is True and Input 0001 is also True.

Scan2 :

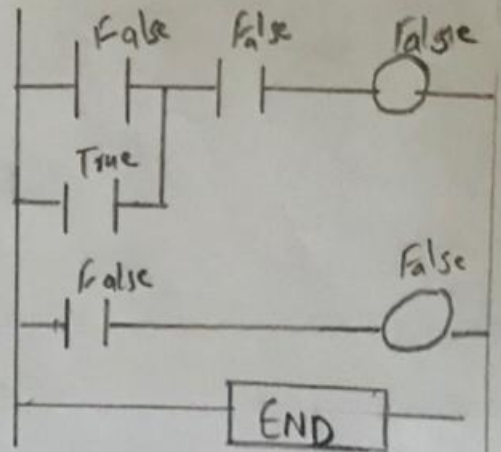The Internal relay is turned on as The water level rises

```
      True      True        True
   ──┤ ├──────┤ ├──────────( )──
      True
   ──┤ ├──
      True                 True
   ──┤ ├──────────────────( )──
                  ┌─────┐
   ───────────────┤ END ├───────
                  └─────┘
```

Scan 3 :

After Scan 2 the oil the level rises above The low level Senso and it becomes open (ie (FALSE)

```
      False     True        True
   ──┤ ├──────┤ ├──────────( )──
      True
   ──┤ ├──
      True                 True
   ──┤ ├──────────────────( )──
                  ┌─────┐
   ───────────────┤ EDN ├───────
                  └─────┘
```

Scan4 :

After Scan 4 the oil level rises above The high level Sensor at it also becomes open (ie false)

```
      False     False       False
   ──┤ ├──────┤ ├──────────( )──
      True
   ──┤ ├──
      False                False
   ──┤ ├──────────────────( )──
                  ┌─────┐
   ───────────────┤ END ├───────
                  └─────┘
```
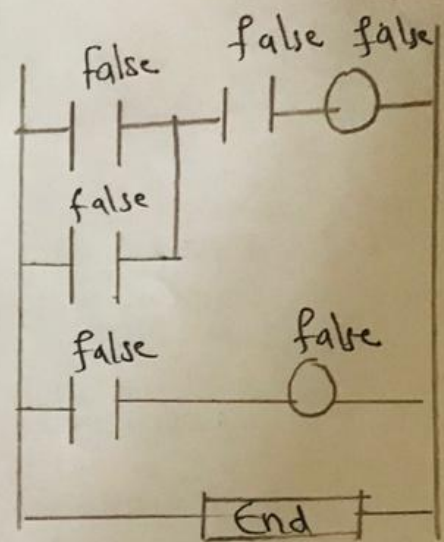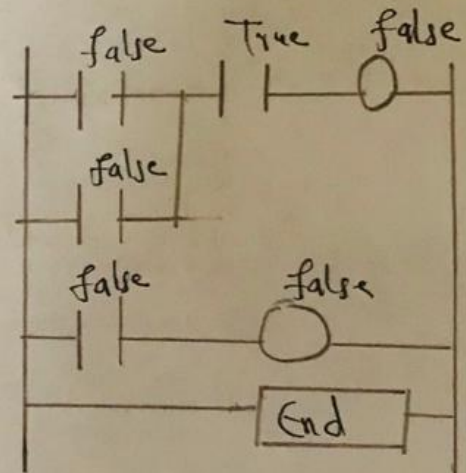
Scan 5:

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

false	false false
false	
false	false

End

Scan 6:

After Scan 6 the oil level falls below the high level Sensor and it will become true again.

false	True	false
false		
false	false	

End

Q2 Ⓐ Write Some benefits of Industrial Automation.

Ans:-

① Increasing Productivity:-
Increased Productivity = more units/day
= more money

② Products Produced more consistently:-
→ Increased Consistency = higher Quality = Increased Consumer Satisfaction.

Example:
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

③ Products Produced more reliably:-
→ robots can run 24 hours/day without getting tired or bored.

④ Decreased labor expenses:-
→ Automated system reduce the amount of people needed to Produce the goods.

* Increasing Safety in working conditions.

Q2(B) Briefly explain The Components and function of SCADA System.

Ans:- These functions are performed by four kinds of SCADA components:

① <u>Sensors</u> (either digital or analog) and control relays that directly Interface with the managed system.

② Remote terminal unit (RTUS):-

There are small computerized unit deployed in The field at specific sites and locations. RTUS serve as local collection point for gathering reports from sensors and delivering command to control relays.

③ SCADA master unit (MTUS):-

These are larger computer consoles that serve

as the central processor for the SCADA System. Master unit provide a human Interface to the System and automatically regulate the managed system in response to Sensor Inputs.

④ The communications networks that connects the SCADA master unit to the RTUs in the field.

Q13 Ⓐ Differentiate b/w hardwired control and PLC System.

Ans <u>Hardwired control System:-</u>

① The functions are determined by The Physical wiring.

② changing The function mean changing The wiring.

③ Can be contact-making type (relays contactors) or electronic type (logic circuits)

<u>PLC System:-</u>

① The function are determined by a Program stored in The memory.

② The control function can be changed Simply by changing The program.

③ Consist of a control device to which all the Sensors and actuators are connected.

Q3⑧ What are The function of SCADA System:

Ans function of SCADA System:

* Data acquisition :-

The basic Information of The Power System collected is called The Data Acquisition The data is collected by mean of CTs, PTs and transducers. It provides The telemetry measurement and Status Indication to The operator.

* Supervisory Control :-

It enables The operator to remotely control The devices. for Example Close of The circuit breaker.

* Tagging :-

It prevents The device from unauthorized operation. Means it authorizes The device to Perform The Specific operation.

◦ Alarms :

It Informs the operator about the unnecessary events and undesired conditions

※ Logging (Recording) :-

It logs all operation entry all alarms and other Information. In other words it keeps the record of all the events.

※ Load Shading :-

It provides both the automatic and manual control tripping of load during the emergency.

※ Trending :-

It plots the measurement on the selected time scale.