IQRA National University, Peshawar   Name: **RAFI UD DIN**
Department of Electrical Engineering
Spring 2020   Reg.No:_____12401_
Elective 5 (Power).   Instructor: Engr. Sanaullah Ahmad
Elective 4 (Electronics).
Industrial Electronics
Terminal Examination

Total Marks : 50
Attempt All Questions.

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**
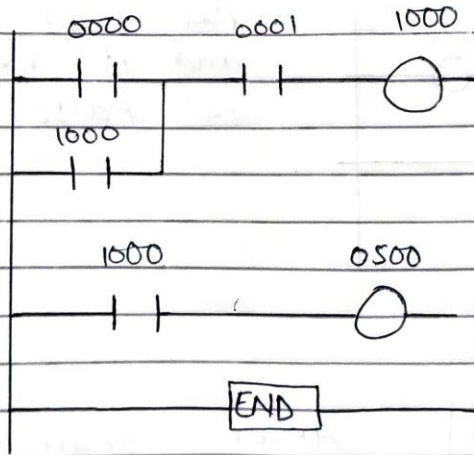
.Good Luck.

NAME   **RAFI UD DIN**
ID   **12401**

QNo1 A)

Ans:-

Input	Address
Low level Sensor	0000
High level Sensor	0001

Output	Address
Motor	0500

Internal Utility Relay
1000

The Ladder Diagram

```
         0000      0001      1000
      ────┤├───────┤├────────( )────
          1000
      ────┤├────


         1000                0500
      ────┤├───────────────( )────

               ┤END├
```

SCAN (1)

```
    True   True   True
   ──┤├─────┤├─────( )──
    False
   ──┤├──

    True          True
   ──┤├───────────( )──

         ┤END├
```
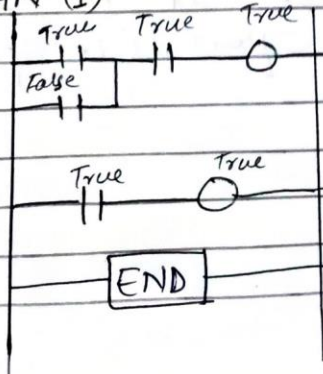
Initially the tank is empty therefore input 0000 is true and input 0001 is also true.

SCAN 2:-

```
  True    True    True
  --| |---| |----( )----
  True
  --| |--

  True          True
  --| |---------( )----


         [END]
```
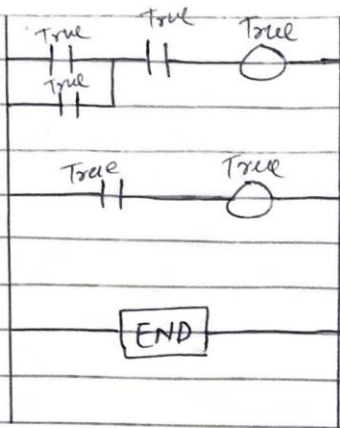
The internal is relay is turned on as the water level rise.

Scan 3:-

```
  False   True    True
  --| |---| |----( )----
  True
  --| |--

  True          True
  --| |---------( )----

         [END]
```
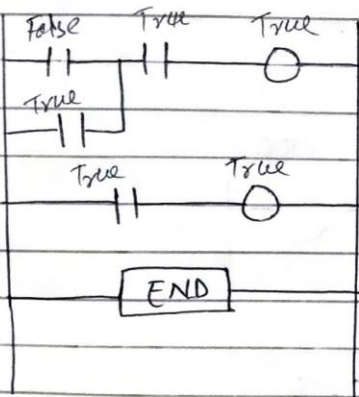
After scan 2 The oil level rise above the Low level sensor and it become open (ie) False.

Scan 4:-

```
  False  False  False
  --| |---| |----( )----
  True
  --| |--

  False       False
  --| |--------( )----


        [END]
```
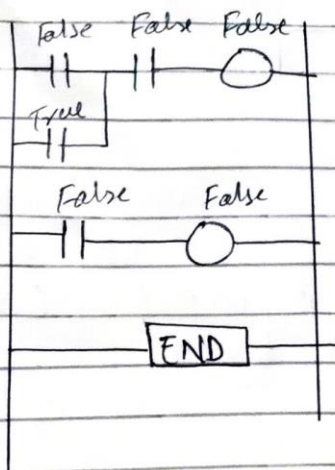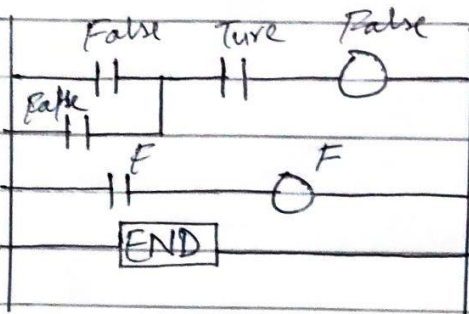
After scan 4 the oil level rise above the high level sensor at it also became open (ie false.)

Scan 5:-
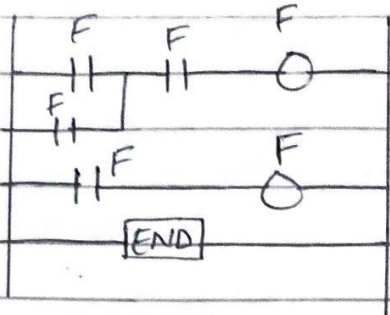
Since there is no more true logic path output is 0500 is no longer energized true and therefore the motor turned off.

Scan 6:-

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

QNo2

a) Write some benefits of industrial Automation?

Ans   Industrial Automation:-

→ Increasing productivity
        Increse productivity = more unit/
days = more money.

→ Product produced more consistently.
        Increse consistency = higher quality
    = Incresed consumer satisfaction.

→ Example:-
        A bottled soft drink such
as   a coke or a pepsi alway taste
the same no metter where or
when you purchase it. Consumer
count on this.

→ Product produced more reliable.

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

→ Decresed labor expence
        Automated system reduced The
amount of people needed to
produce the goods.

→ Increasing Safty in working Condation

Automation improves efficiency:-

Even your emploly of the month with his impeccable work ethic needs to take a break every now and then Robots work fasten then humans.

Automation makes manufacturing better Industrial automation not only makes manufacturing more propitable and more efficient it also optimize the entire procod. Machinery frees human to fine tuned process improve technologies and focuss on the work that can not be automated This leads to new innovative products increse customization and a batter consumer experience.

QNo 2

B) Components of SCADA:-

Human Machine interface:-

It is an input/output device that allows a human operate to control the process data - this is achieved by Linking SCADA database and software programe for providing mangment information linked detailed schematics. scheduled maintance data diagonistic and logistic information to operate personal can also see the graphical representation of data.

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

Remote terminal units: RTUs:-
~~Unite~~ these are small computerized unit ~~develop~~ deployed in the field at specific sites and locations. RTUs serve as local collection point for gathing reports from sensors and delivering commands to control relays.

SCADA master units (MTUs):-
These are large computer consoles that serves as the central procesing for the SCADA system Master unit provide a human interface to the system and automaticly regulate the managed system in response to sensor inputs.

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

Programable logic controllers
PLes find their use in the supervisory control and Data Acquistion system through sensors they are attaged to sensors in order to convert the sensor output signal into digital data.

Communication Infrastructure:-

Generally a combination of direct wired connection and radio is used in supervisory control and data a acquisition system However SDH/SONET can also be used for larger system like railway 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 programing:-

SCADA programing in HMI or master station is used for creating diagrams and maps that provide vital information durring process or event failure Most of the comercial supervisory control and data aequisition system used standerized interfaces in programing.

C language or derived programing language is generally used such as programing.

Function of SCADA systems:-

First the system you need to monitor are much more complex then just one machine with one output so a real life SCADA system needs to monitor hundreds or thousands of sensors. Some sensors measured inputs into the system (For example water flowing into reserviers) and some sensors measured outputs (like value pressure of water is release from the reserviour) Some of those sensors measured simple event that can be detected by straight forword on/OFF switch called discrete input (or digital input).

For Examples:-

In our simple model of widget fabricator the switch thats turn on the light would be discrete input in real life discrete input are used to measure simple state. Like weather equipment is on or off or tripwire alarms a power failure at a critical facility some sensors measure more complex statution where exit measurment is important.

Data Communications:-

In our simple model of the widget fabricator the network is just the wire leading from the switch to the panal light in real life you want to able to monitor multiple system from a central location so you need a communtion network to transport all the data colleting from your sensor-

The remote telemetry unit RTU is needed to provide an interface between the sensors and the SCADA network the RTU encodes sensors input into protocal format and forword them to the SCADA moster in turns the RTU recieve control command in protocol format frim the master and transmit electrical signal to the approiate control relay.

Data Presentation:-

The only display element in our model SCADA system is the light that comes on when the switched is activated this obviously would not do on a large scale you cannot track a lightboard of a thousand seprate lights and you dont want to pay someone simply to watch a lightboard.

The master presents a comprehensive view of the entire manged system and present more details in response to user requst. The moster performs data procssing on information gathered from sensor.

Controls-

Unfortunately our menature SCADA system monitoring the widget fabricator does not include any control

elemnts so lets add one. lets say
add one lets say the human operates
also has a button on his panel when
he press the button it activates as
switch on the widget fabricator That
brings more widget parts into the
fabricator.

QNo3

a) Hardwired Control Systems—

→ The function are determined by the physical wiring.

→ Changing the function mean changing the wire

→ Can be contact-Making type (relays, contractors) or ~~electried~~ electronic type. Logic circuits.

PLC Systems—

The function are determine by a programe stored in the memory

→ The control function can be changed simply by changing the programe

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

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