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...ent of Electrical Engineering

...pring 2020   **Reg.No:___5534_____**

...lective 5 (Power).   <u>Instructor:</u> **Engr. Sanaullah Ahmad**

...ctive **4** (Electronics).

...dustrial **Electronics**

Terminal Examination

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

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ID: 5534
Department: BE(E)
Subject: Industrial Electronics
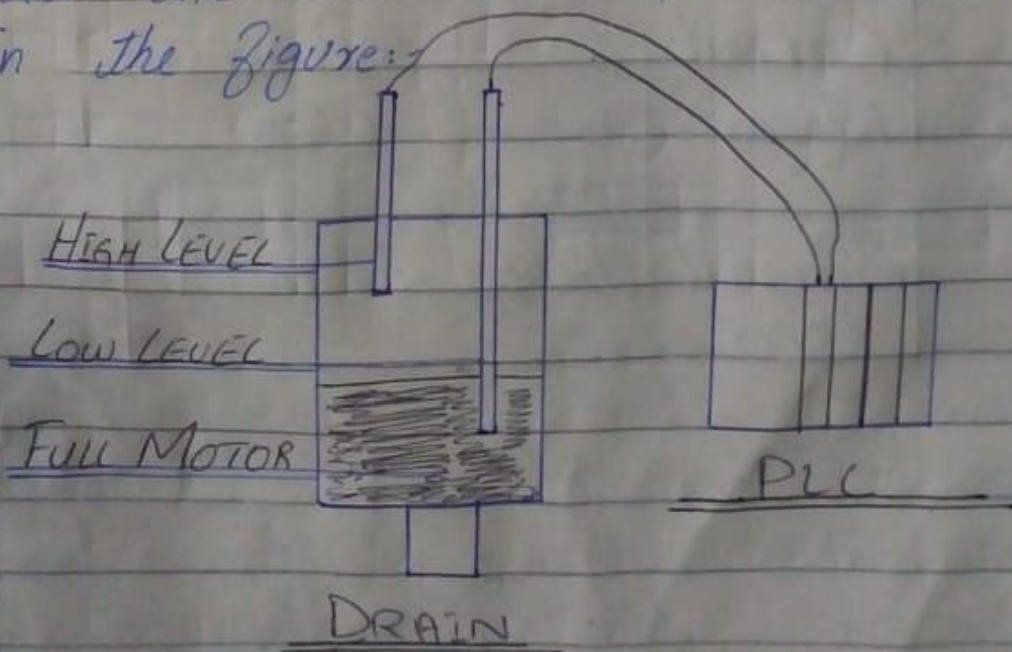**Teacher : Sir SanaUllah Ahmad**

QUESTION NO 1:-

Consider a lubricating oil tank in industrial plant having 2 sensors

.... with help of neat ladder diagrams:—

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 as shown in the figure:
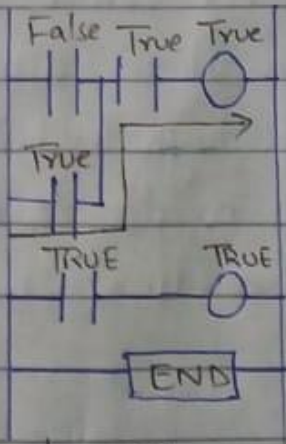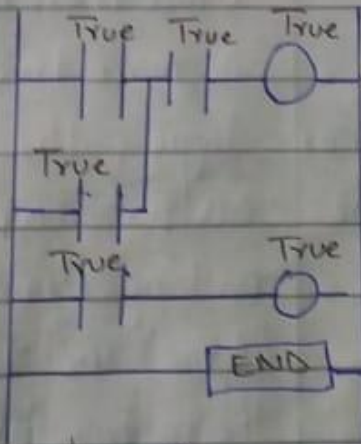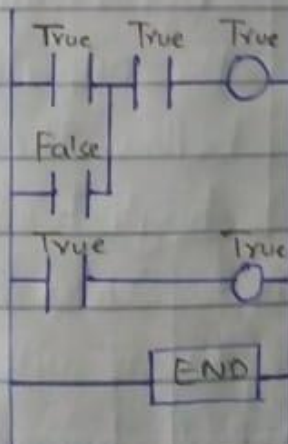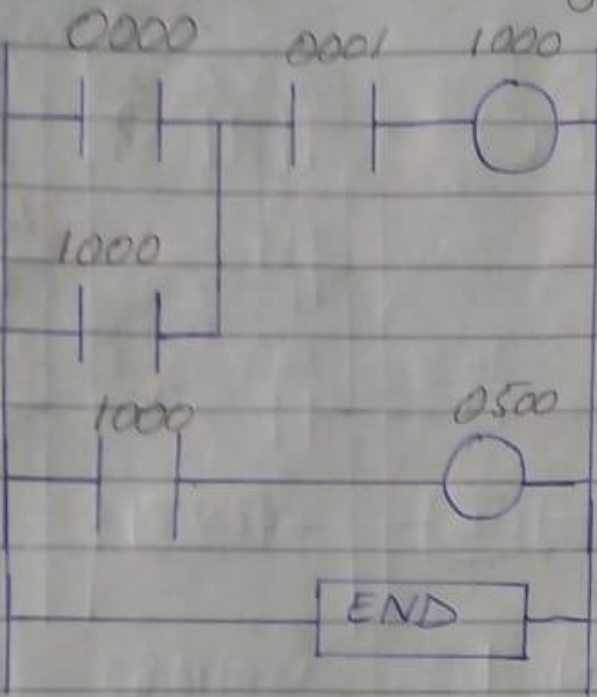
HIGH LEVEL

LOW LEVEL

FULL MOTOR

PLC

DRAIN

Here we want to fill motor to
Pump lubricating oil into the tank
until the high level sensors turns
on. At that point we Want to
turn off the motor until the
Level falls below the low sensor
Then we should turn on the
fill motor and repeat the process

Inputs	Address
Low level Sensor	0000
High level Sensor	0001

Output	Address
Motor	0500

Internal Utility Relay
1000

Ladder Diagram

```
        0000      0001    1000
    ─────┤├──┬───┤├────────( )─────
         1000 │
    ─────┤├───┤
         1000              0500
    ─────┤├────────────────( )─────

                    ┌──────┐
    ────────────────┤ END  ├────────
                    └──────┘
```

Scan Diagrams

Scan 1	Scan 2	Scan 3

```
  True  True  True        True  True  True       False True True
  ─┤├──┤├──┤├─( )──      ─┤├──┤├──┤├─( )──      ─┤├──┤├──┤├─( )──
  False                   True                    True  →
  ─┤├─                    ─┤├─                     ─┤├─┘
  True        True        True        True        TRUE        TRUE
  ─┤├────────( )──        ─┤├────────( )──        ─┤├────────( )──
     ┌─────┐                 ┌─────┐                 ┌─────┐
     │ END │                 │ END │                 │ END │
     └─────┘                 └─────┘                 └─────┘
```
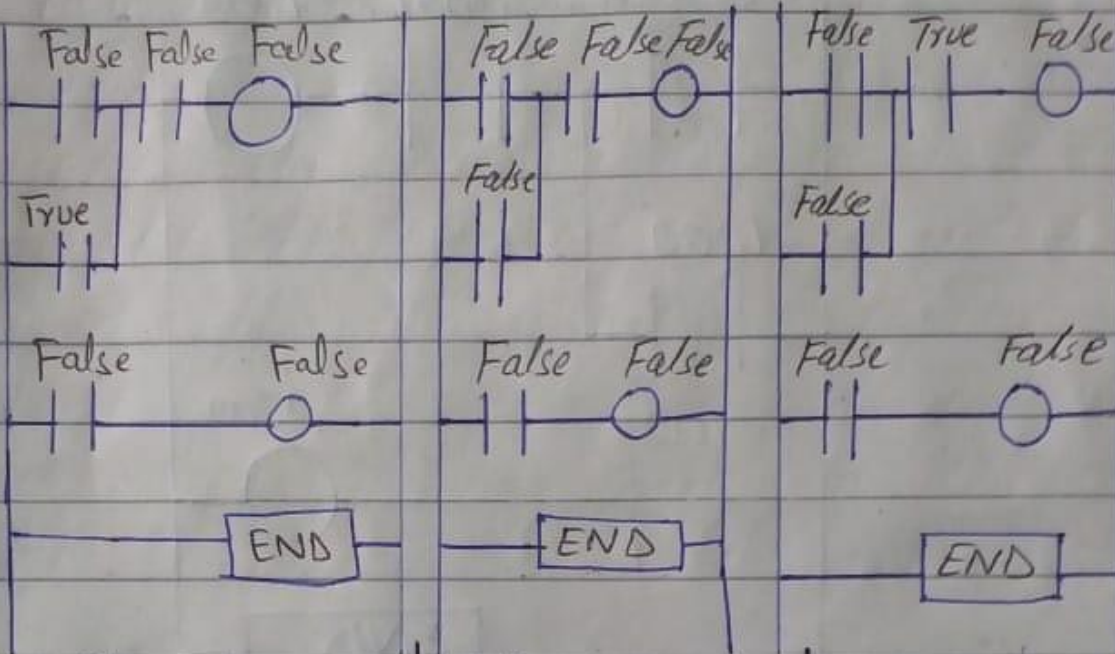
Scan 1	Scan 2	SCAN 3
Initially the tank is empty. Therefore input 0000 is true & input 0001 is also true	The Internal relay is turned on as the water level rises.	After scan 2 the oil rises above the low level sensor and becomes open (i-e false)

SCAN 4

After Scan 4 the oil rises above the high level sensor at it also become 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 falls bellow the high level sensor and it will become true again

Question No:- 2

Part(A)

Write Some benefits of industrial Automation:

Answer:-

BENEFITS OF INDUSTRIAL AUTOMATION

INCREASING PRODUCTIVITY:-

Increased productivity = more units / day = more money

PRODUCTS PRODUCED MORE CONSISTENTLY:-

Increased consistency = higher quality = increased cosumer satifaction

EXAMPLE:-

A bottle soft drink such as coke or a pepsi always tastes the same no matter where and when you purchase it. Consumer count on this

SAAD BIN TARIQ   ID 5534   Pg No# 2

PRODUCTS PRODUCED MORE RELIABLY:-

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

DECREASED LABOR EXPENSES:-

Automated Systems reduced the amount of people needed to poduced the goods.

Increasing Safety in working Condition

Part B

Briefly explain the components and functions of SCADA system

Ans: Components of SCADA

There are many parts or **components of SCADA** system, which include hardware (input and output), controllers, networks, user interface, communications equipment 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 or off site (sometimes miles away).
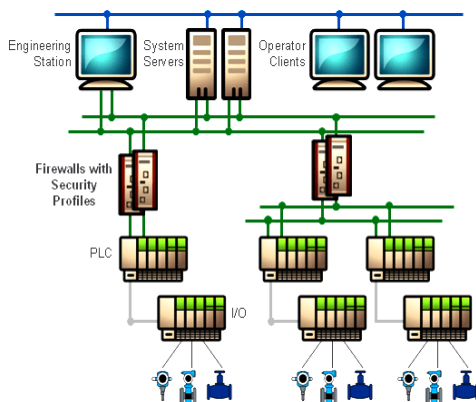

Functions of SCADA ;;A SCADA system performs four functions

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

These functions are performed by four kinds of SCADA components :

1. **Sensors** (either digital or analog) and control relays that directly interface with the managed system.

   2. **Remote telemetry units (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.

   3. **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.

   4. **The communications network** that connects the SCADA master unit to the RTUs in the field.
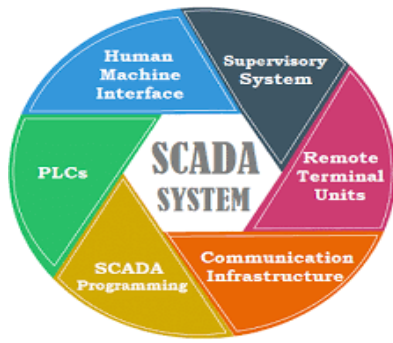
Question No:- 3

Part A:-

Differential between hardwired control system and PLC System:

HARD WIRED CONTROL SYSTEM:-

1) The functions are determined by the physical wiring.

2) Changing the function means changing the wiring

3) Can be contact-making type (relays, contractors) or electronic type (logic circuits).

PLC SYSTEM:-

1) The functions are determined by a program stored in the memory

2) The control functions can be changed simply by changing the program

3) Consists of a control device, to which all the sensors and actuators are connected.

Q3(b). What are the function of SCADA systems

Ans:

SCADA Functions

Centrally monitors and controls thousands of industrial equipment such as

- Motors,valves,pumps,relays,sensors,etc

Displays current state of remote process(visualization) Dislpays alarms/Events log