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subject: Industrial electronics

Assignment # 1

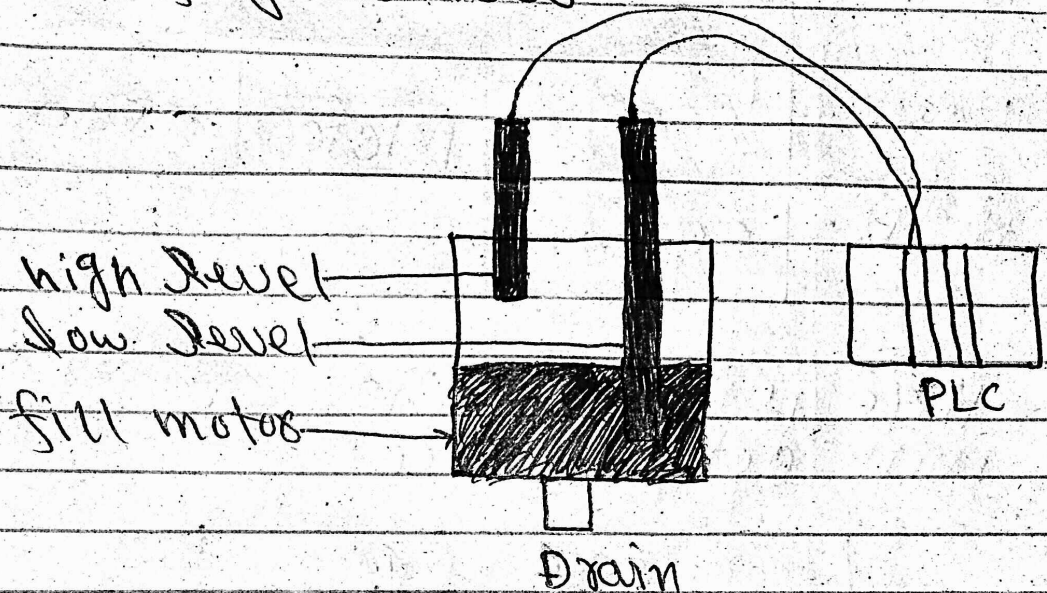
Submitted To: Sir Samaulah
Khan

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Q No 1:-

solution:-

Let's consider the following application: 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 fig below.



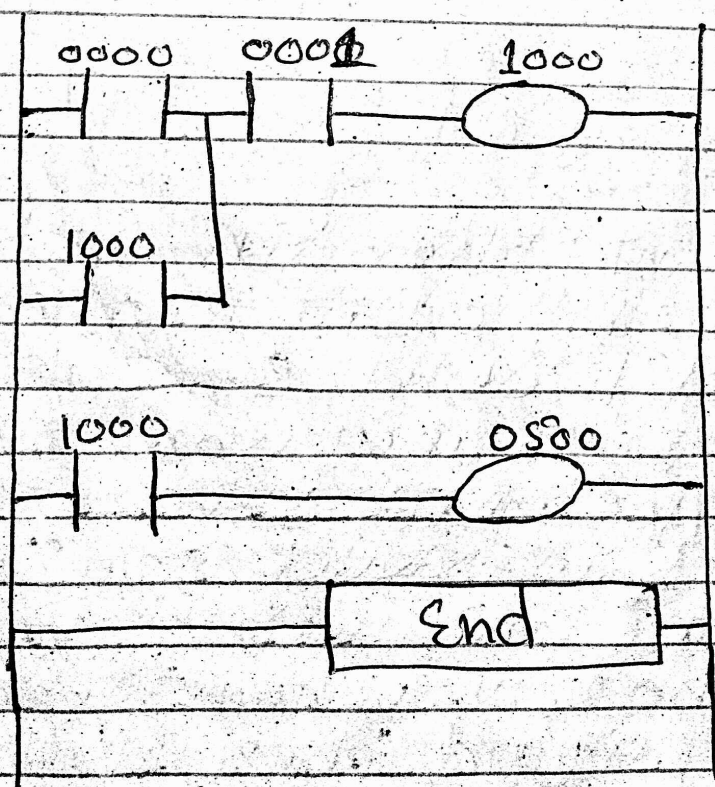
Dispensing oil from a tank.

Here, we want the fill motor to pump lubricating oil in to the tank until the high level sensor turns on. At that point we want to turn off the motor until the level falls below the low level sensor. When they are not immersed in liquid they will be on. When they are immersed in liquid they will be

be OFF. We will give each input and output device an address. This lets the PLC know where they are physically connected. The addresses are shown in the following table.

Input	Address	output	Address	Internal utility Relay
Low	0000	Motor	0500	1000
High	0001			

Here is what the Ladder Diagram will actually look like.

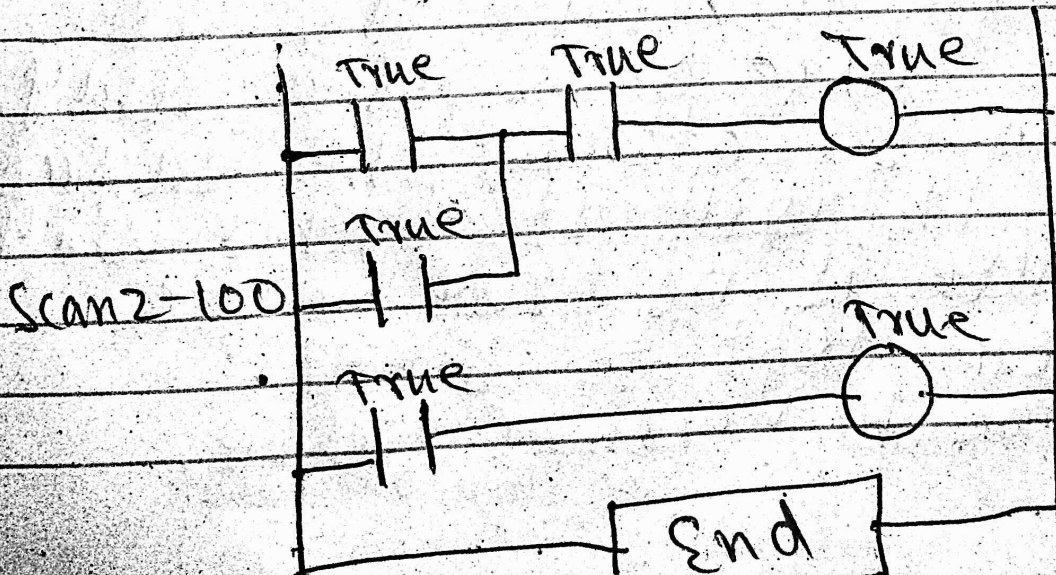
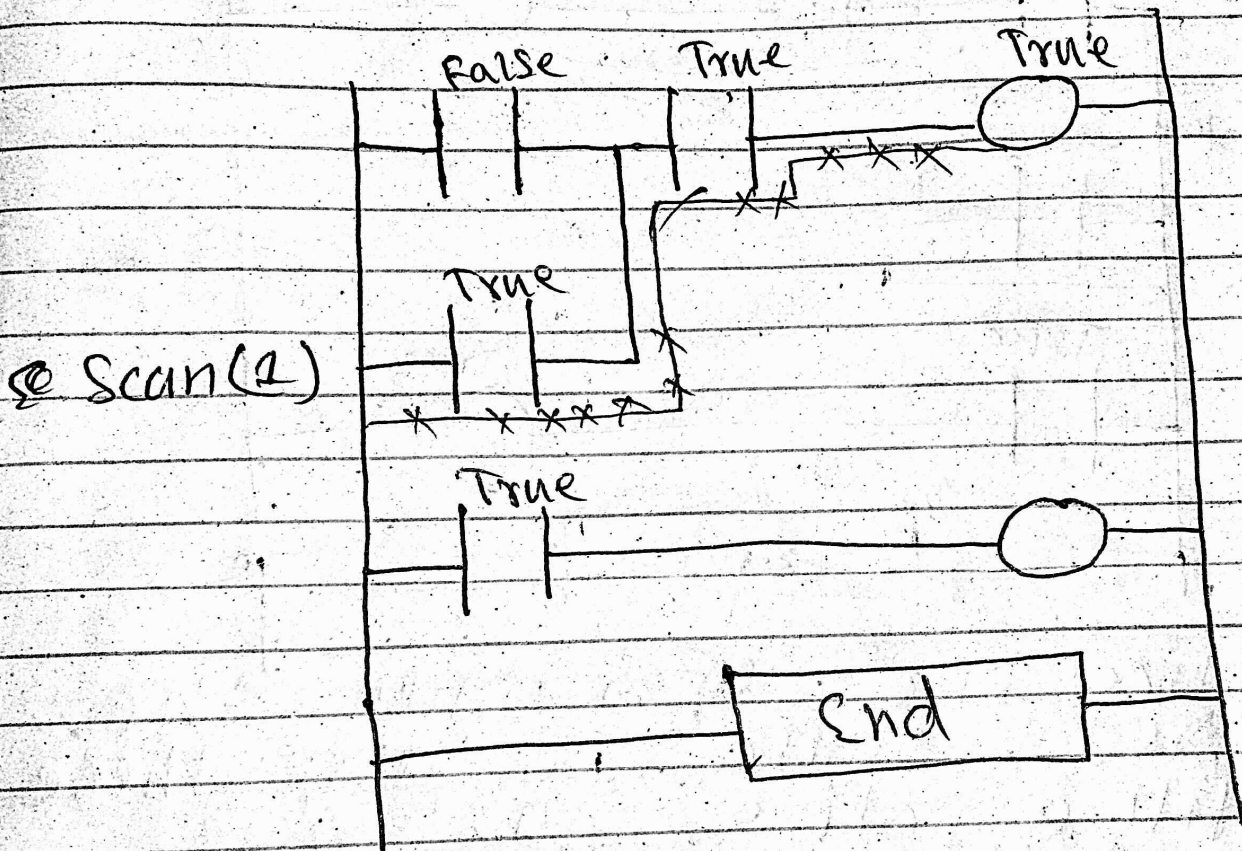


Program Scan

Lets ~~watch~~ watch

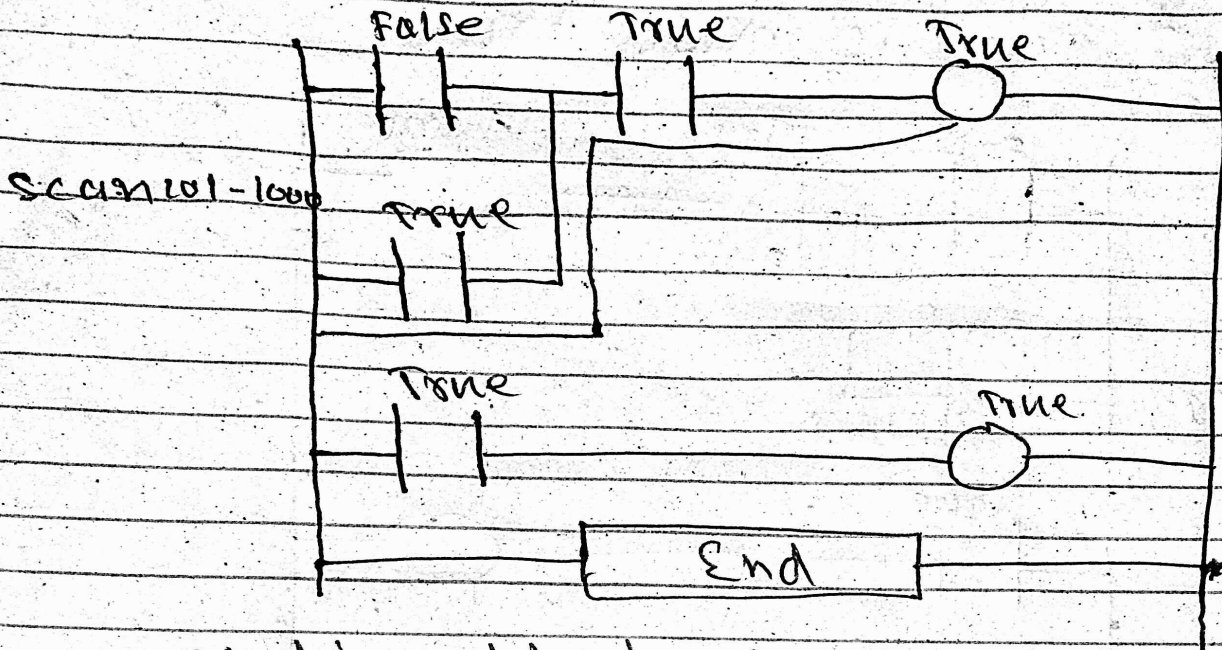
Lets watch what happens in this program scan by scan.

initially the tank is empty. therefore: input 0000 is true and input 0001 is also true.



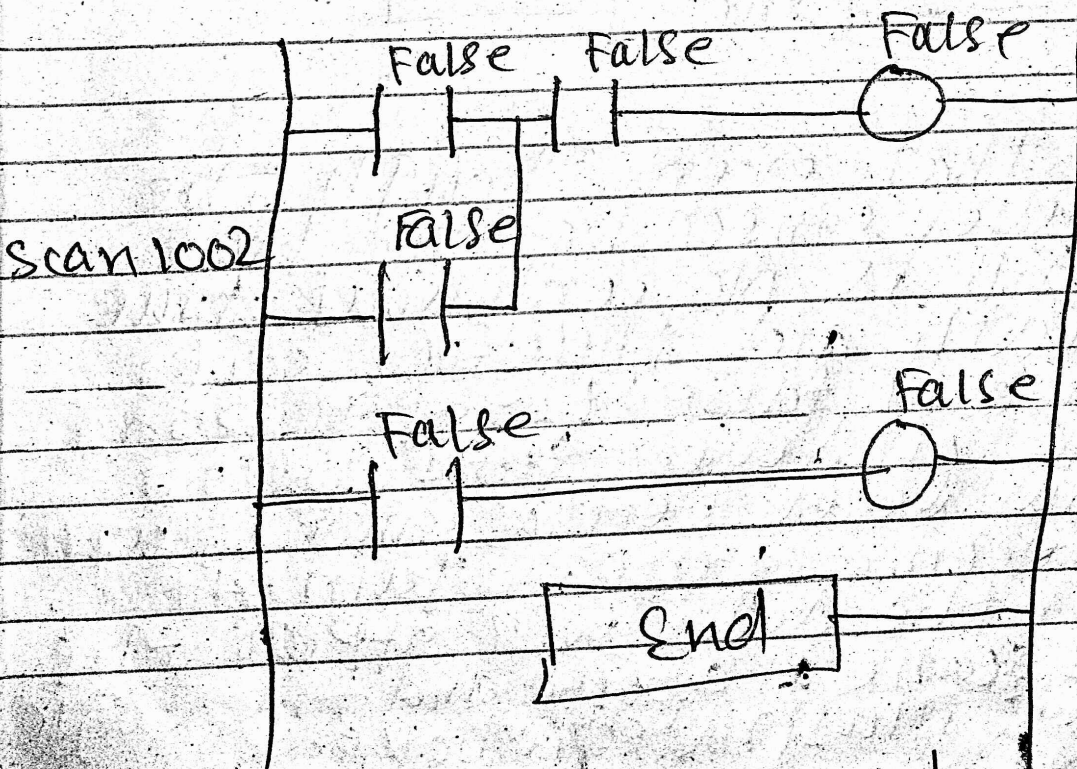
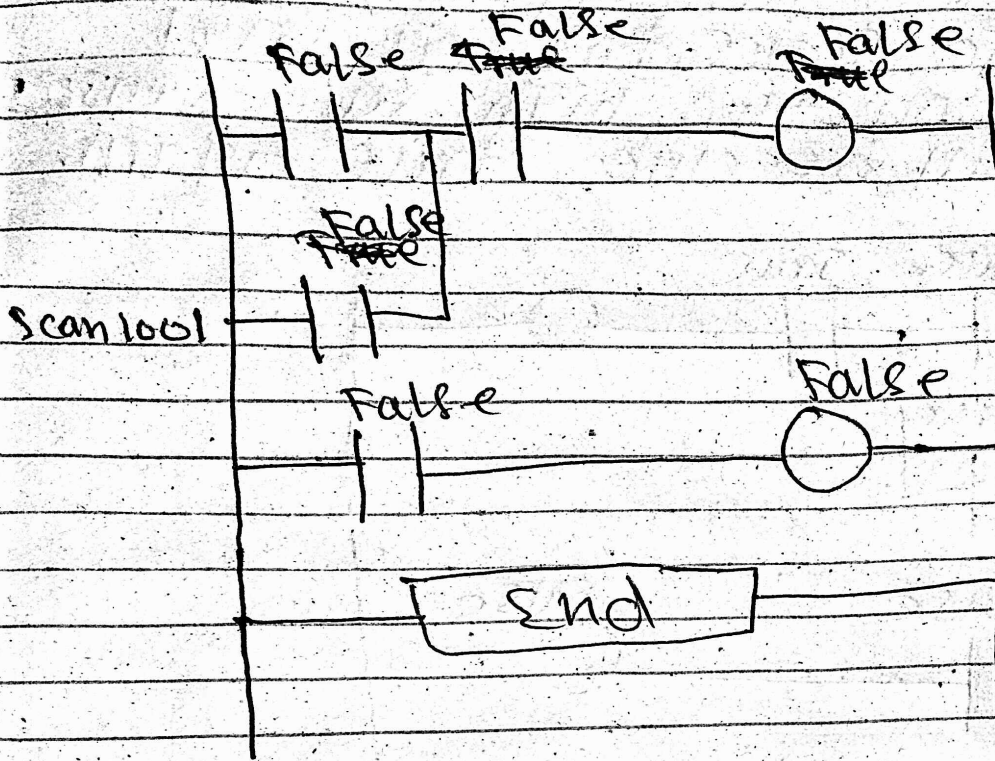
Gradually the tank fills because SC0 (fill motor) is ON.

after 100 scans the oil level rises above the low level sensor and it becomes open. (i.e. FALSE).

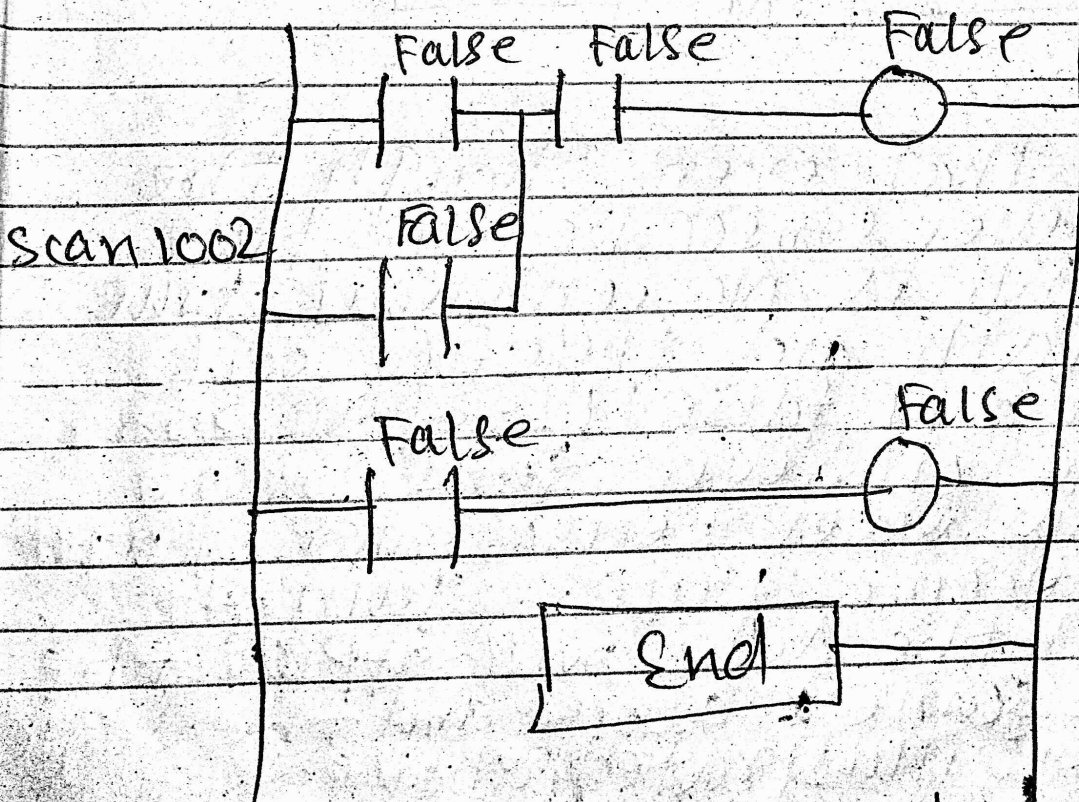
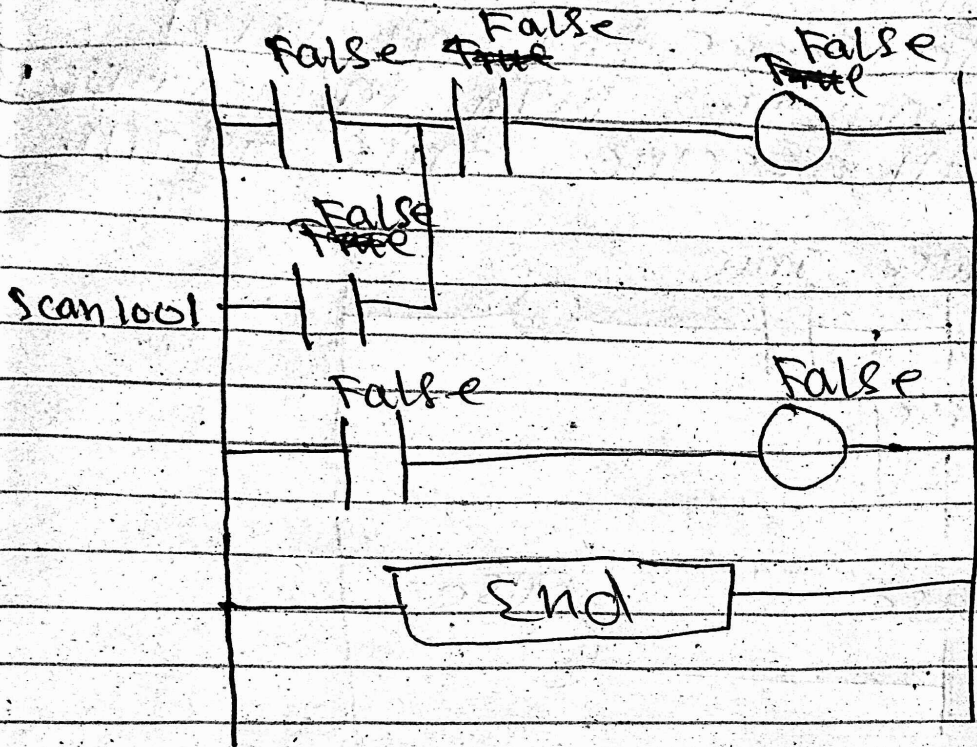


Notice that even when the low level sensor is false there is still a path of true logic from left to right. This is why we used an internal relay. Relay 1000 is latching the output (SC0) ON. It will stay this way until there is no true logic path from left to right. (i.e. when SC0 becomes false).

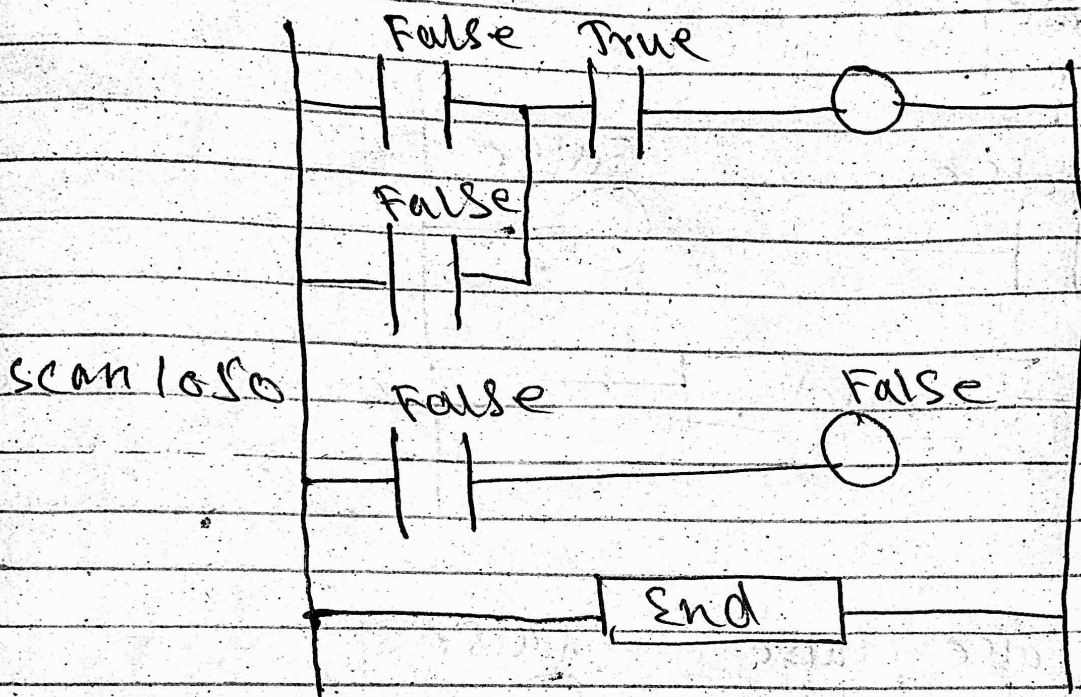
after 1000 scans the oil level rises above the high level sensors at it also becomes open (i.e. False).



after 1000 scans the oil level rises above the high level sensors at it also becomes open (i.e. False).



Since there is no more true logic path, output 500 is no longer energized (true) and therefore the motor turn off. After 1000 scans the oil level falls below the high level sensor and it will become true again.



Notice that even though the high level sensor became true there still is no continuous true logic path and therefore coil 1000 remains false. After 2000 scans the oil level falls below the low level sensor and it will also become true again. At this point the logic will appear the same as scan 1 above and the logic will repeat illustrated above.

Q No 20 (A) Write some benefits of Industrial Automation.

Ans:- Benefits of Industrial Automation

⇒ Increasing Productivity:

* Increased productivity = more units/day
= more money.

⇒ Product produced more consistently
→ increase 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 can count on this.

⇒ Product produced more reliably:

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

⇒ Decreased Labour expenses:

* Automated system reduces the amount of people needed to produce the goods.

⇒ Increasing safety in working condition

Q No 20 (B)

part (B) :- Brief explain the components and function of SCADA system ?

Ans: A SCADA system usually consists of the following main components.

- (1) Supervisory computers.
- (2) Remote terminal units
- (3) Programmable logic controllers
- (4) communication infrastructure
- (5) Human machine interface.

(1) Supervisory computers :-

This is the core of the SCADA system, gathering data on the process and sending control command to the field connected device. It control the execution of other routines and regulate work scheduling, input/output operation and similar function and regulates the flow of work in a data processing system.

(2) Remote Terminal Units:
the RTU connects to
physical components.

typically, an RTU converts
the electrical signal from the
equipment to digital values such
as the open/closed status from
a switch or valve or

measurement such as pressure
flow, voltage or current.

(3) PLC (Programmable Logic Controller)

A PLC is an industrial
computer control system that
continuously monitors the state
of input devices and make
decisions based upon a custom
program to control the state
of output devices.

(4) communication infrastructure
this connects the supervisory
computer system to the RTUs and
PLCs, and may use industry
manufactured and proprietary
and industry standard protocol.

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both RTUs, and PLC's operates autonomously on the near real time control of the process, using the last command given from the supervisory system.

(5) Human machine interface:-
The human machine interface is the operator window of the supervisory system. It presents plants information to the operating personnel graphically in the form of mimic diagram, which are a schematic representation of the plant being controlled, and alarm and events logging paper.

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=> Function of a SCADA system:-

=> 1) centrally monitors and controls thousands of industrial equipment, such as motors, valves, pumps, relays, sensors, etc.

=> 2) Display current state of remote process (visualization)

=> 3) Display Alarms/Events log.

Q No 38-

Part(A)

Differentiate b/w Hardwired control systems and PLC's system.

COMPARISON

Hardwired control system

PLC system

* The function are determined by the physical wiring

the function are determined by a program stored in the memory.

* Changing the function means changing the wiring

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

* can be contact-making type (relays, contactors) or electronic type (logic circuit).

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

Q No 03 Part (b):

Ans \Rightarrow

Function of SCADA Systems

\Rightarrow The SCADA system provides the following functions:

* Data acquisition \Rightarrow

\Rightarrow The basic information of the power system collected is called the data acquisition. The data is collected by means of CTs, PTs and transducers. It provides the telemetry measurement and status indication to the operator.

* SUPERVISORY CONTROL \Rightarrow

\Rightarrow It enable the operator to remotely control the devices. For example open and close of the circuit breaker.

★ TAGGING ⤴

⇒ It prevents the devices from unauthorized operation. Means it authorize the device to perform the specific operation.

★ ALARMS ⤴

⇒ It informs the operator about the unnecessary events and undesired conditions.

★ LOGGING (Recording) ⤴

⇒ It logs all the operations entry, all alarms and other information. In other words it keeps the records of all the events.

★ LOAD SHADING ⤴

⇒ It provides both the ~~events~~ automatic and manual control tipping of load during the emergency.

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TRENDING →

⇒ It plots the
measurement on the
selected time scale.