

Name # Shah Kaw Khan

Id # 13026

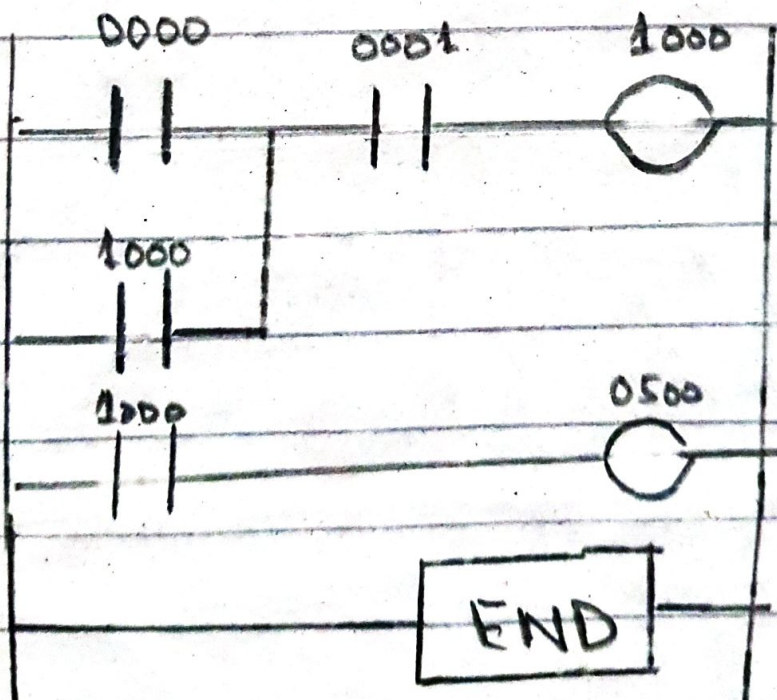
# Question No(1)

Input	Address
Low level sensor	0000
High level sensor	0001

Output	Address
Motor	0500

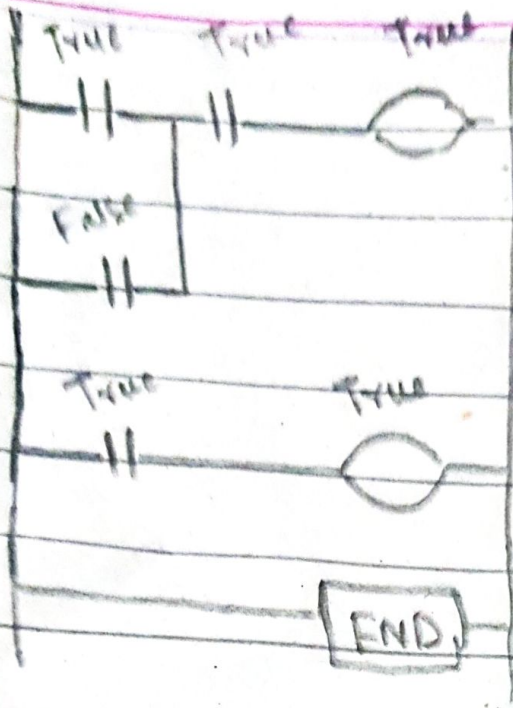
Internal Utility Relay  
1000

"The ladder diagram"



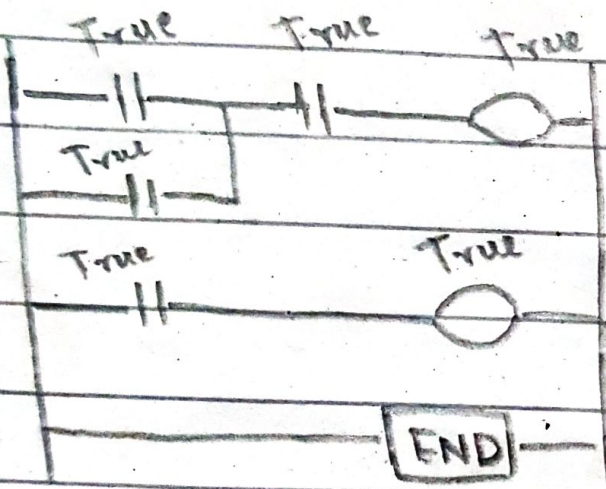


### Scan (1)



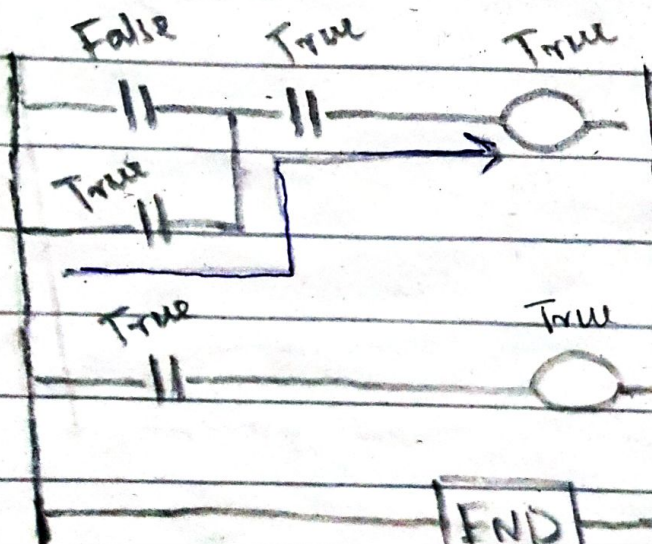
Initially the tank is empty. Therefore input 0000 is true and input 0001 is also true

### Scan (2)



The internal relay is turned on as the water level rise

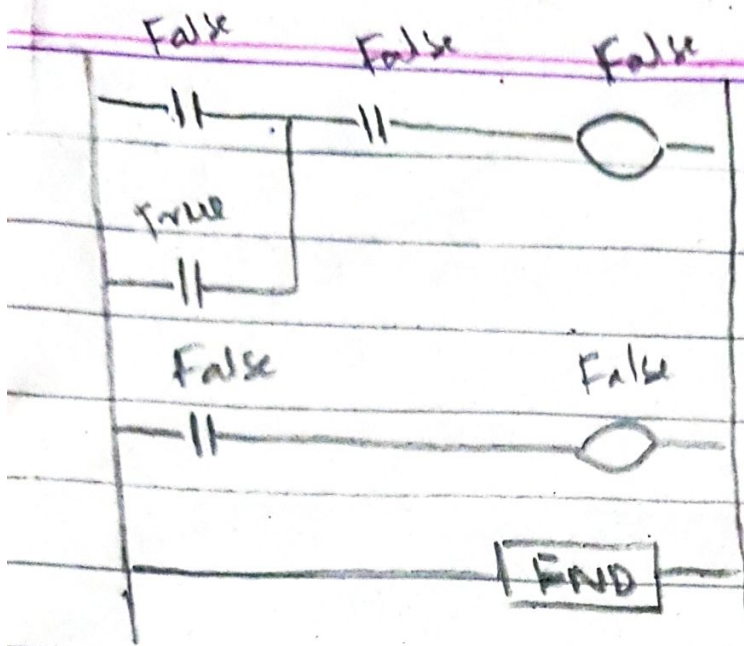
### Scan (3)



After Scan 2 the oil level rises above the <sup>low</sup> level sensor and it become open (i.e) False

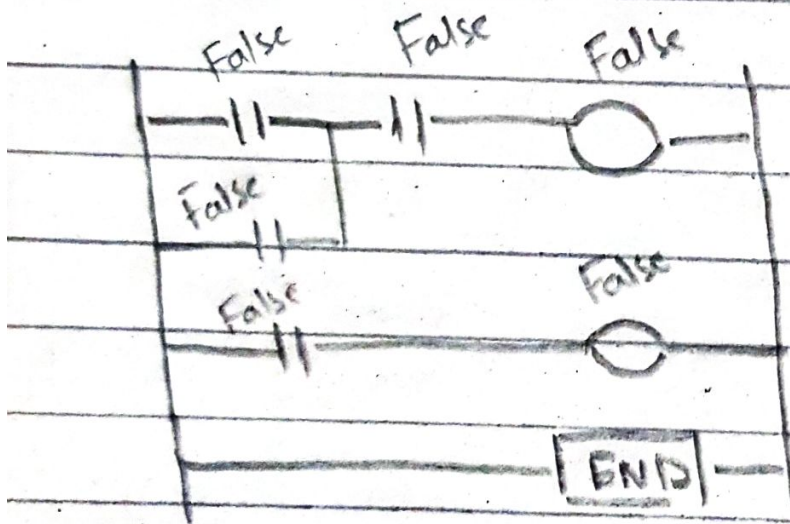


## "Scan (4)"



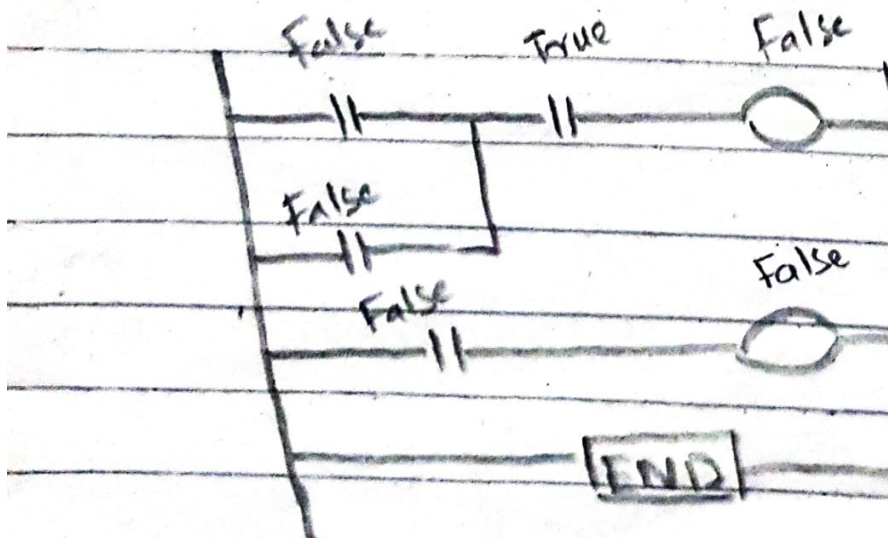
After Scan 4 the oil level rises above the high level sensor and it also become open (i.e false)

## Scan (5)



Since there is no more true logic path out put is no longer energized (true) and therefore the motor turn off.

## Scan (6)



After Scan '6' the level falls below the high level sensor and it will become true again



Q.2

A) part.

## Benefit of industrial automation:

\* Increase productivity

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

\* Product produced more efficiently and consistently

→ Increase consistency → higher quality → Increase consumer satisfaction

Example → A bottle soft drink such 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 conditions.



Q.2

B) part

## "Components of the SCADA System"

- \* Human Machine Interface
- \* Supervisory System
- \* Remote Terminal Units
- \* Programmable Logic Controller (PLCs)
- \* Communication Infrastructure
- \* SCADA Programming.

## "Function of SCADA"

- \* Centrally monitor and controls thousands of industrial equipment such as Motor, valves, pumps, relays, sensor etc.
- \* Display current state of the remote process (visualisation)
- \* Display alarms / Events log.



## Q.3 A) part

### Hardwired control system

\* The function are determined by the physical wiring

\* changing the function means changing the wiring

\* can be Contact-making type (relay, contactor) or electronic types (logic circuit)

### PLC System

• The function 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 sensor and actuators are connected.



## B) 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.

### Example.

A large-scale application of a SCADA system is a nuclear power plant which thousand of sensors monitor mission critical and safety critical systems. The computer system collect data from the sensors, processes update and make computer controlled adjustments to equipment as required to maintain operational and safety parameters. In addition to the automatic control employees staff a large control room where they monitor the entire system around the clock.



These Functions are performed by the Four kind of the SCADA components

→ **Sensor** :- either "digital or analog" with control relays that directly interface with the managed system.

→ **Remote teleterminal unit (RTUs)**

These are small computerized units deploy in the field at specific sites and locations.

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

→ **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 input.

→ **The Communication network**

that connect the SCADA master Unit to the RTUs in the field.