GOVT. POLYTECHNIC BALASORE

[LAB MANUAL]

PLC & AUTOMATION LAB

[PR. 4]

DIPLOMA

6TH SEMESTER, E & TC ENGINEERING

PREPARED BY:-ER. PRAKASH CHANDRA DAS

DEPT. OF ELECTRONICS &TELECOMMUNICATION ENGINEERING

LIST OF EXPERIMENTS

S.NO.	NAME OF EXPERIMENTS	PAGE NO.
1	Introduction to PLC trainer & its installation with PC	
2	Write and implement a simple ladder logic program using digital inputs and outputs for PLC.	
3	Write and implementation of simple ladder logic program using timer 1) On delay timer 2) Off delay timer 3) Retentive timer	
4	Write and implementation of simple ladder logic program using counter. 1) UP counter 2) Down counter	
5	Write program on MOVE, control statement, math function, data manipulation technique on PLC.	
6	To study about conveyor control system using PLC	
7	Write and implement ladder logic program to on-off the DC motor using PLC	
8	To study the traffic light controller system by using PLC	
9	Interface SCADA with PLC and associate tags with memory and I/O and operate the PLC inputs through the switch symbol from the computer screen and view the status of the outputs using lamp and motor graphics symbols in the screen.	

Programming And Logic Control (PLC)

AIM OF THE EXPERIMENT:

Introduction /Familiarization PLC trainer & its instruction with PC.

APPARATUS REQUIRED:

Sl. no.	Name of Equipment
1	Lab Programmable Logic Controller (PLC) kit
2	Personal Computer

THEORY:

***What is PLC*?**

A programmable logic controller (PLC) is an industrial computer control system that continuously monitors the state of input device and makes decisions based upon a custom program to control the state of output devices.

***What is inside a PLC*?**

- The central processing unit, the CPU, contains an internal program that tells the PLC how to perform the following functions.
- The CPU combines a microprocessor, an integrated power supply, input and output circuits, built in PROFINET, high speed motion control I/O, and on-board analog input in a compact housing to create a powerful controller.
- After you download your program, the CPU contains the logic required to monitor and control the devices in your application.
- **The CPU monitors the input and changes the outputs according to the logic of your user program**, which can include Boolean logic, counting, timing, complex math operations and communication with other intelligent devices.
- To communicate with a programming device, the CPU provides a built in PROFINET port.
- With the PROFINET network, the CPU can communicate with HMI panels or another CPU.
- To provide security for your application, every S7-1200 CPU provides password protection that allows you to configure access to the CPU functions.

- The CPU supports only a preformatted SIMATIC memory card. To insert a memory card, open the top CPU door and insert the memory card in the slot.
- Use the optional SIMATIC memory card either as a program card or as a transfer card.
- Digital inputs in the controller are 14 and voltage is 24. Digital outputs in the controller are 10 and voltage is 24.
- Back panel is available to connect extra I/O modules and communication modules.
- Analog input in the controller is two.
- Input power supply to the controller is 120/240 VAC.
- Three communication modules and eight I/O expansion modules can be used.
- Modbus communication board, output board and analog input board can be used.

***PLC Languages*:**

The function of all programming languages is to allow the user to communicate with the programmable controller via a programming device. They all convey to the system, by means of instructions, a basic control plan.

- The most common types of languages encountered in programmable controller system design is ;
    a) Ladder Diagram (LD)
    b) Function Block Diagram (FBD)

LADDER DIAGRAM (LD)

Traditional ladder logic is graphical programming language. Initially programmed with simple contacts that simulated the opening and closing relays, counters, timers, shift registers etc.

FUNCTION BLOCK DIAGRAM (FBD)

Useful for expressing the interconnection of control system algorithms and logic.

HARDWARE/SOFTWARE REQUIREMENT:

Processor type - Intel Pentium i3, 2.5 GHZ or similar

RAM - 4GB

Available hard disk space - 10 GB on system drive C:\

Operating systems- windows XP professional SP3, windows 2003 server R2 SP2, windows 7 (professional, enterprise, ultimate) SP1, windows 10 pro

Graphics card - 32MB RAM 24-bit color depth

Screen resolution - 1024 x 768

Network – 20 M bit/s Ethernet or faster

Optical drive- DVD-ROM

PROCEDURE: (PLC SETUP)

1. First select **TIA portal 14.0** and double click on it.
2. Double click on "**Create new project**" then select the "**Project name**" and select the location path to save project and then click "**Create**".
3. Double click on "**Configure a device**".
4. Click "**Add new device**". After device is added click "**Controller**" and then click on "**SIMATIC S71200**".
5. Click on "**CPU**" and "**CPU 1214 DC/DC/DC**", then select the required "**MLFB**" number and click "**Add**".
6. Now select the signal module **AQ1x12 BIT** and Add to the CPU and save the project by pressing **CTRL+S** key.
7. The select respective expansion module 3 no's of **DI 16/DQ 16x24VDC**, 1 no. of **DI 8/DQ8 x 24 VDC** and 1 no. of **AI 4 x 13 BIT/AQ 2 x 14 BIT** from the hardware catalogue.
8. Double click on the "**RJ 45**" symbol in the controller, now "**Properties**" of the controller will be open and Ethernet configuration also open, if it is not opened just click on the Ethernet address and change IP address and change IP address as required then save the project.
9. Then go to "**Downloading the program**" setting for click on the "**Compile**" icon and then click on the "**Download**" icon.
10. Then automatically the "**Extended to download device**" window open. Select the "**PN/IE**" into the type of the "**PG/PC**" interface and also select the "**Show all compatible devices**". Finally click the "**Start search**" option and then click the "**Load**" button.
11. In software synchronization before loading to a device window in opens and then clicks the "**Continue without synchronization**" option below.

12. "**Stop modules**", "**Stop all**" option and then "**Load**" option and then load option and also goes to "**Load results**" window tick the "Start all" and click the "**Finish**" option.

PROGRAMMING METHOD IN PLC:

1. Click "**PLC-1**" in the project tree then click "**Program block**" and click "**main OB1**". Now OB1 is created (object block1).
2. Now select the network and double click on "**normally open**" icon (⊣⊢).
3. Now normally open is added. Now add the "**output coil**" (– ( ) –) in the network. Then double click on the both NO contact and output coil to enter their addresses simultaneously.
4. After it click on the "**Compile**" icon then "**Download to device**" icon.
5. For make an online process goes to click the "**Monitoring on/off**" icon. Then the window shows the online mode of the PLC.

RESULT:

We studied introduction of PLC, its installation with PC, hardware components, building various blocks and determine no. of digital inputs/outputs & analog inputs/outputs.

Write and implement a simple ladder logic program to study and verify and gate using digital inputs and outputs for PLC.

AND-GATE OPERATION

AIM OF THE EXPERIMENT:

Test the truth table of AND gate using PLC software.

APPARATUS REQUIRED:

Sl. no.	Apparatus Name
1.	PLC trainer kit
2.	Personal computer installed with PLC software
3.	Ethernet cable
4.	Patch chords

THEORY:

1) In AND_GATE operation is used to make the multiple operations of 2 inputs. Now using A&B are 2 inputs and C is the output.
2) Now generating the following formula to create the AND gate operation is given below.

A.B = C

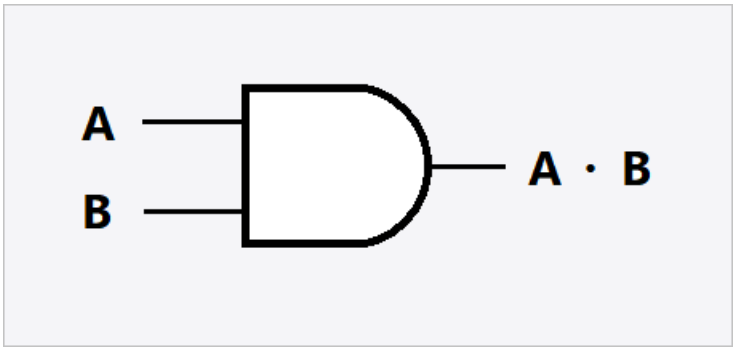
Programming:-

Truth table & Symbol of AND gate:

A	B	C
0	0	0
0	1	0

1	0	0
1	1	1

0-LOW ; 1-HIGH



PROCEDURE:

1. Click "**PLC-1**" in the project tree then click "**Program block**" and click "**Main OB1**". Now **OB1** is created (object block1).
2. Now write an **AND_GATE** operation for make a 2 inputs like A and B. It is created by using two normally open contacts. And their addresses are **A(I0.0)** and **B(I0.1).**
3. And the only one output can be used in this program that is C and their address is **(Q0.0).**
4. After saved the program go to online mode to click **GO Online** icon directly.

5. After click the online mode goes to select the **Monitoring ON/OFF** icon.

6. Finally the two inputs [(10.0),(10.1)]are goes to HIGH the output[Q0.0]will goes to HIGH.

CONCLUSION:

Thus the AND**_GATE** operation was studied successfully through **PLC Software.**

OR-GATE OPERATION

AIM OF THE EXPERIMENT:

Test the truth table of OR gate using PLC software.

APPARATUS REQUIRED:

Sl. no.	Apparatus Name
1.	PLC trainer kit
2.	Personal computer installed with PLC software
3.	Ethernet cable
4.	Patch chords

THEORY:

- In OR_GATE operation is used to make the addition operation of 2 inputs. Now using A&B are 2 inputs and C is the output.
- Now generating the following formula to create the AND_GATE operation is given below.

A + B = C

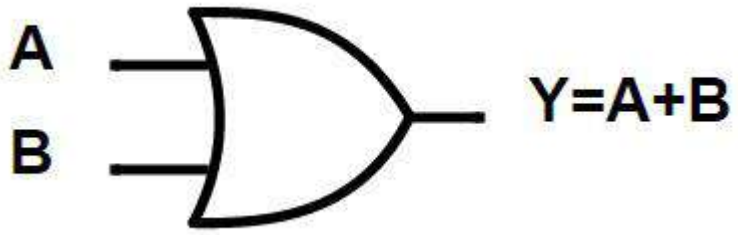
Programming:-

TRUTH TABLE & SYMBOL OF OR_GATE:

A	B	C

0	0	0
0	1	1
1	0	1
1	1	1

0-LOW ; 1-HIGH



PROCEDURE:

1. Click PLC-1 in the project tree then click **program block** and then click **main OB1.**
2. Now the (object block 1) **OB1** is created.
3. Now write an **OR_GATE** operation for make a 2 inputs like A and B.
4. It is created by using two normally open contacts parallel connection. And their addresses are A (**I0.0**) and B (**I0.1**).
5. And the only one output can be used in this program that is C and their address is (**Q0.0**).
6. Then save the program to press (CTRL+S) function it will be saved.
7. After saved the program go to online mode to click **GO Online** icon directly.
8. After click the online mode goes to select the **Monitoring ON/OFF** icon.
9. Finally the inputs [(I0.0), (I0.1)] are goes to **HIGH** the output [Q0.0] will goes to **HIGH**. It can be represented in **Green** color indication.

CONCLUSION:

Thus the **OR_GATE** operation was studied successfully through **PLC Software.**

EX_OR-GATE

AIM OF THE EXPERIMENT:

Test the truth table of EX- OR gate using PLC software.

APPARATUS REQUIRED:

Sl. no.	Apparatus Name
1.	PLC trainer kit
2.	Personal computer installed with PLC software
3.	Ethernet cable
4.	Patch chords

THEORY:

- In **EX-OR_GATE** operation is used to make the operation of inequality functions of inputs. Now using A,B and C is the output.
- Now generating the following formula to create the **EX-OR_GATE** operation is given below.

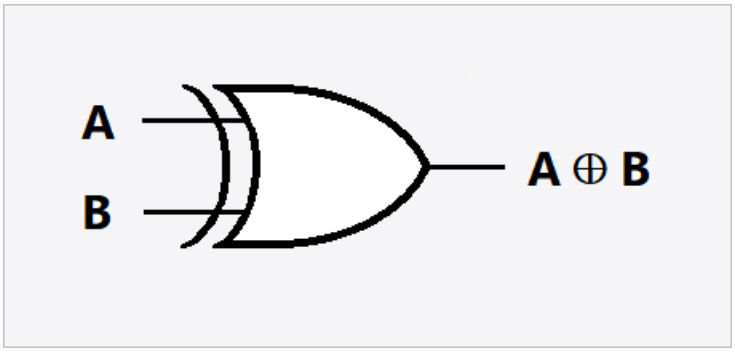
$$\overline{A}.B + A.\overline{B} = C$$

PROGRAMMING:-

TRUTH TABLE & SYMBOL OF EX-OR_GATE:

A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

0-LOW ; 1-HIGH



PROCEDURE:

1. Click **PLC-1** in the project tree then click **program block** and then click **main OB1.**
2. Now the (object block 1) **OB1** is created.
3. Now write an **EX-OR_GATE** operation for make a 2 inputs like A and B.
4. Then save the program and go to **download** into PLC.
5. After saved the program go to online mode to click **GO Online** icon directly.
6. Finally **monitoring** all the values of the inputs and outputs.
7. All the inputs are **LOW** at that time the output is **LOW**. The inequality functions of Inputs are **HIGH** the Output is **HIGH**.
8. Thus the all input values are **HIGH** at that time the Output is **HIGH**.

CONCLUSION:

Thus the **EX-0R_GATE** operation was studied successfully through **PLC Software.**

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EX NOR-GATE

AIM OF EXPERIMENT:

Test the truth table of EX- OR gate using PLC software.

APPARATUS REQUIRED:

Sl. no.	Apparatus Name
1.	PLC trainer kit
2.	Personal computer installed with PLC software
3.	Ethernet cable
4.	Patch chords

THEORY:

- In **EXNOR_GATE** operation is used to make the inverse operation of the **EXNOR_GATE** values. Now using A,B and C is the output.
- Now generating the following formula to create the **EXNOR_GATE** operation is given below.

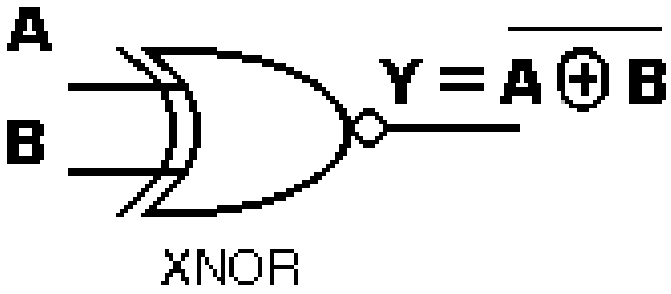
$$\bar{\mathbf{A}}.\bar{\boldsymbol{B}} + \boldsymbol{A}.\boldsymbol{B} = \boldsymbol{C}$$

Programming:-

TRUTH TABLE & SYMBOL OF EXNOR_GATE:

A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

0-LOW 1-HIGH



PROCEDURE:

1. Click **PLC-1** in the project tree then click **program block** and then click **main OB1.**
2. Now the (object block 1) **OB1** is created.
3. Now write an **EXNOR_GATE** operation for make a 2 inputs like A and B.
4. Then save the program and go to **download** into PLC.

5. After saved the program go to online mode to click **GO Online** icon directly.
6. Finally **monitoring** all the values of the inputs and outputs.
7. All the inputs are **LOW** at that time the output is **HIGH**. The inequality functions of Inputs are **HIGH** the Output is **HIGH**.
8. Thus the all input values are **HIGH** at that time the Output is **HIGH**.

CONCLUSION:

Thus the **EX-N0R_GATE** operation was studied successfully through **PLC Software.**

Write and implementation of simple ladder logic program using timer

ON DELAY TIMER

AIM OF THE EXPERIMENT:

To study the ON Delay Timer operation using PLC Software.

APPARATUS REQUIRED:

- PLC Trainer kit
- Personal Computer Installed with PLC Software
- Ethernet cable
- Patch chords

THEORY:

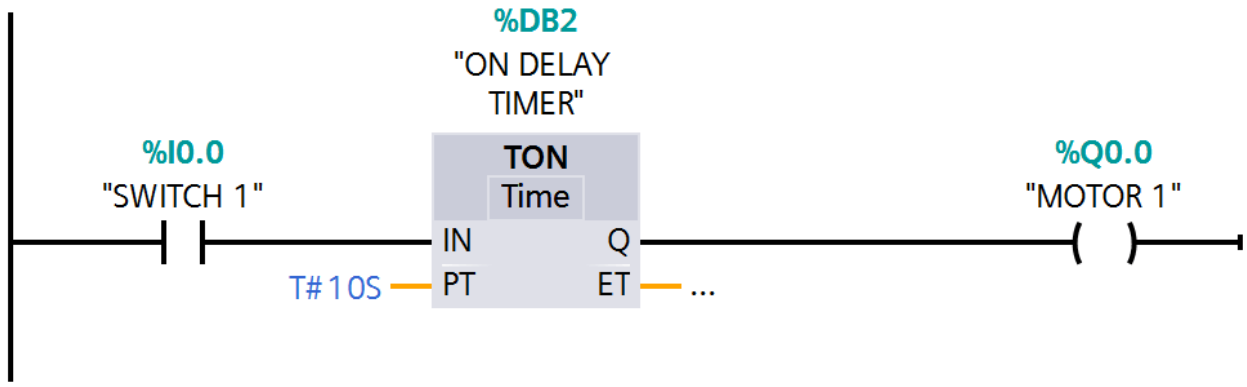
- ON Delay Timer is used to make the Delay operation in processes.
- It can control the inputs and outputs of the field instruments.

PROCEDURE:

1. Click PLC-1 in the project tree ''1'' then click program block ''2'' and click main OB1 ''3'' as shown in the below image.
2. Now the (Object Block1) OB1 is created.
3. Now select the On Delay Timer goes to instructions tab and click the Basic Instructions and select the Timer operations tab and then double click the TON block.
4. Now the call options block is displayed. Then change the data block name. And click the automatic option finally select the ok button.
5. Now the Timer block is created in network is shown below the diagram. And also that one input and one output coil is created in same network for testing the timer block.
6. The input can be connected with IN of the Timer block. Then output coil connected with Q of the Timer block.
7. Then given the addresses for input and outputs. And finally given the preset time for the Timer goes to double click the PT in timer block and write the values in sec.
8. Then save the program and download after that goes to online mode. And monitoring the program can be displayed in following images.
9. Then given the addresses for input and outputs. And finally given the preset time for the Timer goes to double click the PT in timer block and write the values in sec.
10. Then save the program and download after that goes to online mode and monitor the program.

11. When the status of the SWITCH 1(I0.0) changes from 0 to 1 the timer instruction will be executed and it will activate the MOTOR 1(Q0.0) after 10s delay.

LADDER LOGIC PROGRAM:-



CONCLUSION:

Thus the ladder logic program of ON Timer was written and implemented successfully using PLC Software.

OFF DELAY TIMER

AIM OF THE EXPERIMENT:

To study the OFF Delay Timer operation using PLC Software.

APPARATUS REQUIRED:

- PLC Trainer kit
- Personal Computer Installed with PLC Software
- Ethernet cable
- Patch chords

THEORY:

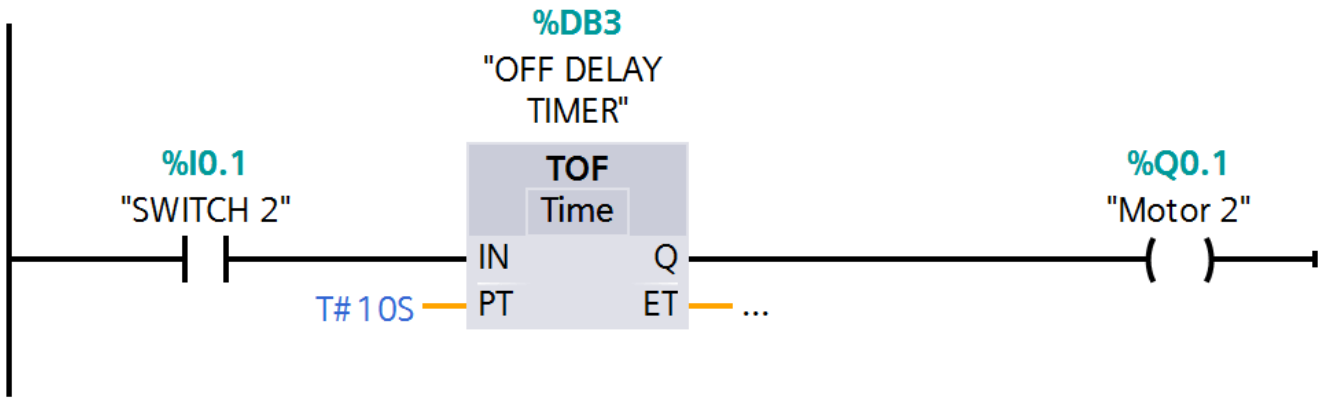
- ❖ OFF Delay Timer is used to make the Delay operation in processes.
- ❖ It can be control the inputs and outputs of the field instruments.

PROCEDURE:

1. Click PLC-1 in the project tree ''1'' then click program block ''2'' and click main OB1 ''3'' as shown in the below image
2. Now the below image shows (Object Block1) OB1 is created.
3. Now select the OFF Delay Timer goes to instructions tab and click the Basic Instructions and select the Timer operations tab and then double click the TOF block.
4. Now the call options block is displayed. Then change the data block name. And click the automatic option finally select the ok button.
5. Now the Timer block is created in network. And also that one input and one output coil is created in same network for testing the timer block.
6. The input can be connected with IN of the Timer block. Then output coil is connected with Q of the Timer block.
7. Then given the addresses for input and outputs. And finally given the preset time for the Timer goes to double click the PT in timer block and write the values in seconds.
8. Then save the program and download after that goes to online mode and monitor the program.
9. When the status of the SWITCH 2(I0.1) changes from 0 to 1 the timer instruction will be executed and it will activate the MOTOR 2(Q0.1) immediately.

10. When the SWITCH 2(I0.1) status changes back to 0 then programmed time (PT) will start and after time MOTOR 2(Q0.1) will be OFF.

LADDER LOGIC PROGRAM:



CONCLUSION:

Thus the ladder logic program of OFF Timer was written and implemented successfully using PLC Software.

RETENTIVE TIMER

AIM OF THE EXPERIMENT:

Write and implement a simple ladder logic program using Retentive timer.

APPARATUS REQUIRED:

- PLC Trainer kit
- Personal Computer Installed with PLC Software
- Ethernet cable
- Patch chords

THEORY:

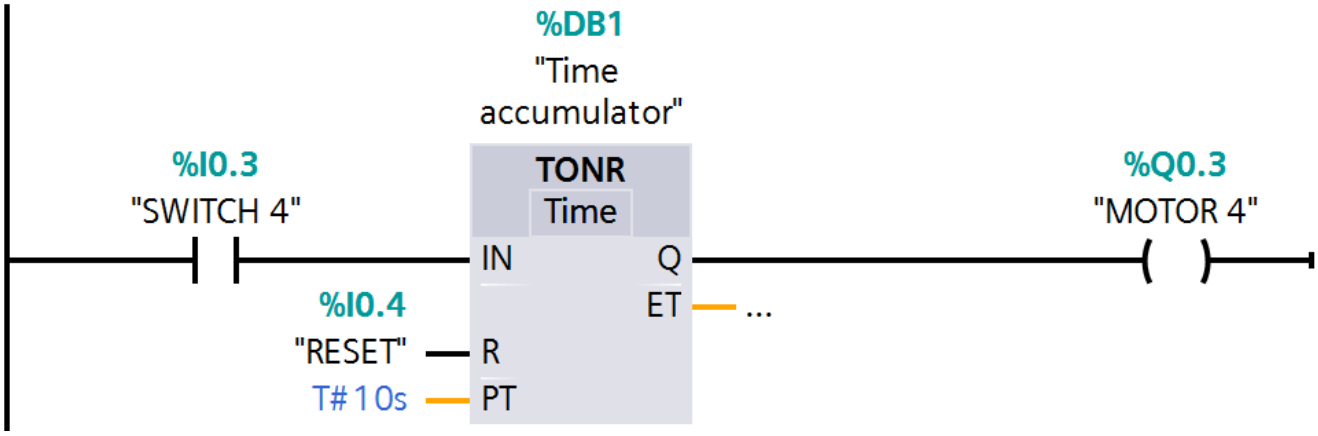
- Counts time base intervals when the instruction is true and retains the accumulated value when the instruction goes false or when power cycle occurs.
- The Retentive Timer instruction is a retentive instruction that begins to count time base intervals when rung conditions become true.
- The Retentive Timer instruction retains its accumulated value when any of the following occurs:
- Rung conditions become false.
- The processor loses power while battery backup is still maintained. And a fault occurs.

PROCEDURE:

1. Click PLC-1 in the project tree ''1'' then click program block ''2'' and click main OB1 ''3'' as shown in the below image
2. Now the below image shows (Object Block1) OB1 is created.
3. Now select the Accumulator timer goes to instructions tab and click the Basic Instructions and select the Timer operations tab and then double click the TONR block.
4. Now the call options block is displayed. Then change the data block name. And click the automatic option finally select the ok button.
5. Now the Timer block is created in network. And also that one input and one output coil is created in same network for testing the timer block.
6. The input can be connected with IN of the Timer block. Then output coil is connected with Q of the Timer block.
7. Then given the addresses for input and outputs. And finally given the preset time for the Timer goes to double click the PT in timer block and write the values in seconds.
8. Then save the program and download after that goes to online mode and monitor the program.

9. When the status of the SWITCH 4(I0.3) changes from 0 to 1 the timer instruction will be executed and MOTOR 4(Q0.3) will start after 10s.
10. The MOTOR 4(Q0.2) will remain ON, even when the input status changes back to 0.The Reset (I0.4) is necessary to reset the timer or accumulated time.

LADDER LOGIC PROGRAM-



CONCLUSION:

Thus the ladder logic program of Accumulator Timer was written and implemented successfully using PLC software.

Write and implementation of simple ladder logic program using counter

UP COUNTER

AIM OF THE EXPERIMENT:

To study about the UP Counter operation using PLC Software.

APPARATUS REQUIRED:

- PLC Trainer kit
- Personal Computer Installed with PLC Software
- Ethernet cable
- Patch chords

THEORY:

The counters are mainly used for counting the values from the field equipment. The UP counters can be used to counting the values in upward manner. It can be performing the incremental purpose.

PROCEDURE:

1. Click **PLC-1** in the project tree ''1'' then click **program block** ''2'' and click **main OB1** ''3''.
2. Now the below image shows (Object Block1) OB1 is created.
3. To select the UP Counter block in plc goes to **Instructions** Tab and click the **Basic Instructions** then select the **CTU** block for UP Counter operation.
4. Now the UP Counter call options block can be opened. Then change the **data block** name in that Name block. And then click the **ok** button.
5. The following details can be entered into the UP Counter block is given below.

CU - Make the counter Input

Q- Counter Output

R - Reset input

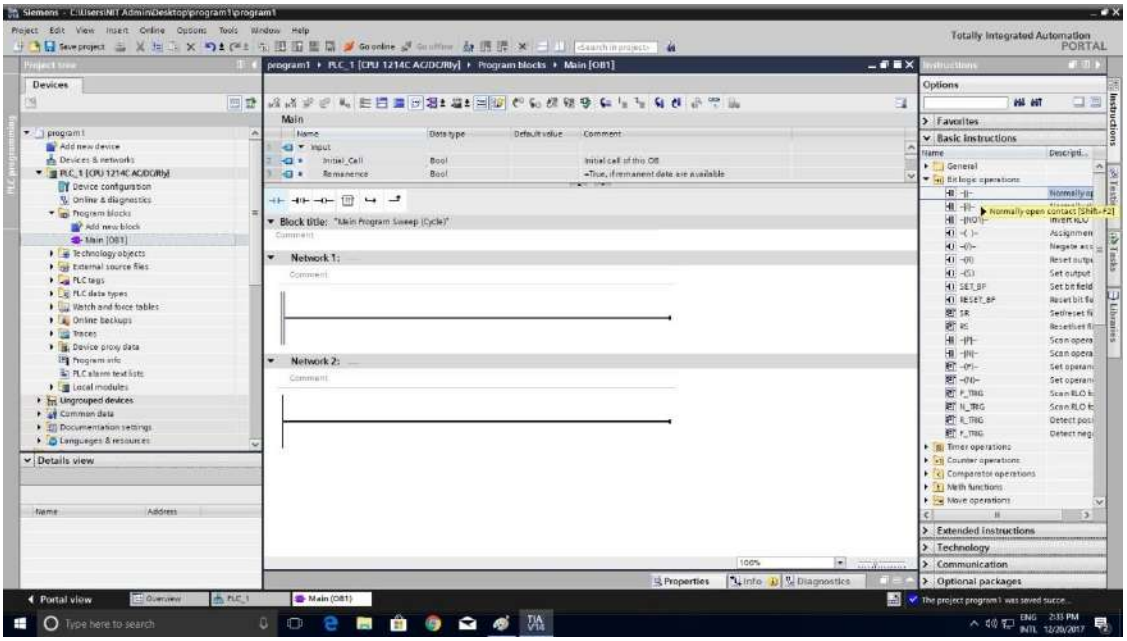
CV - Count Value

PV - Preset value (Set Value)

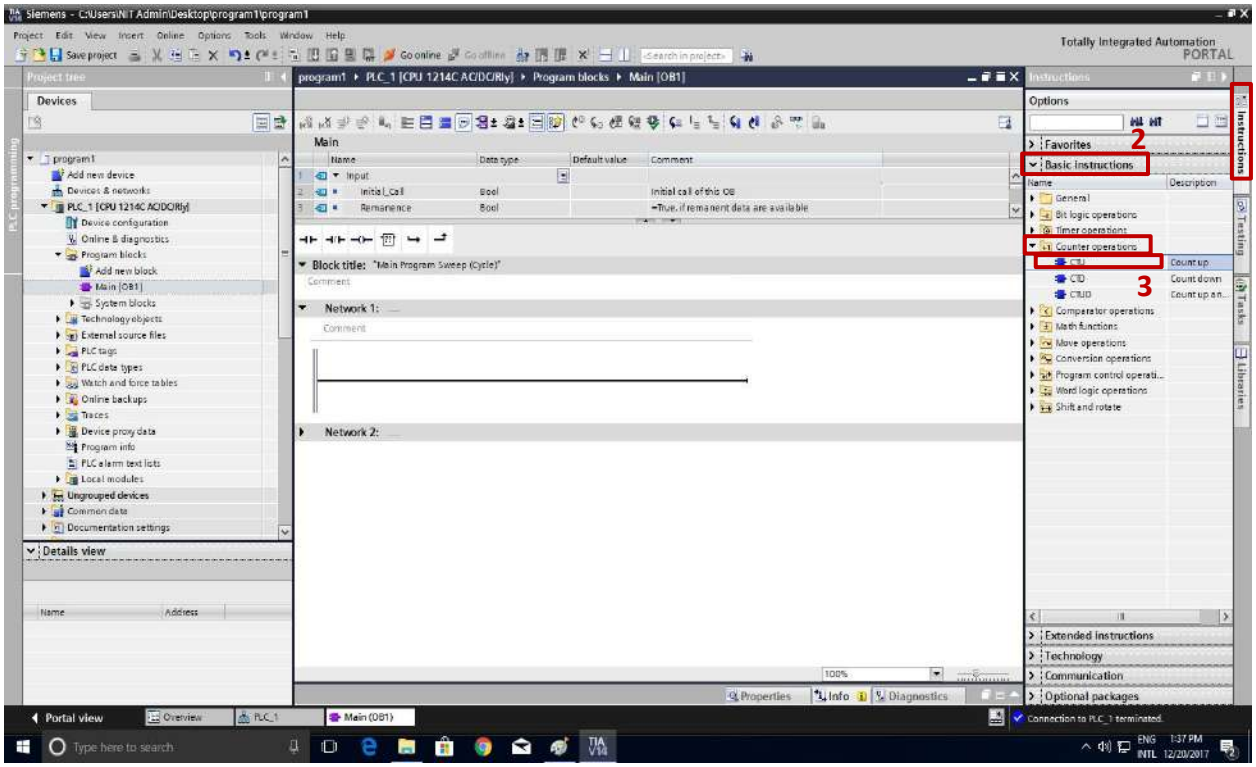
6. Then save the program and goes to online mode and monitoring the counter values before and after enabling the counter block.

LADDER LOGIC PROGRAM:-

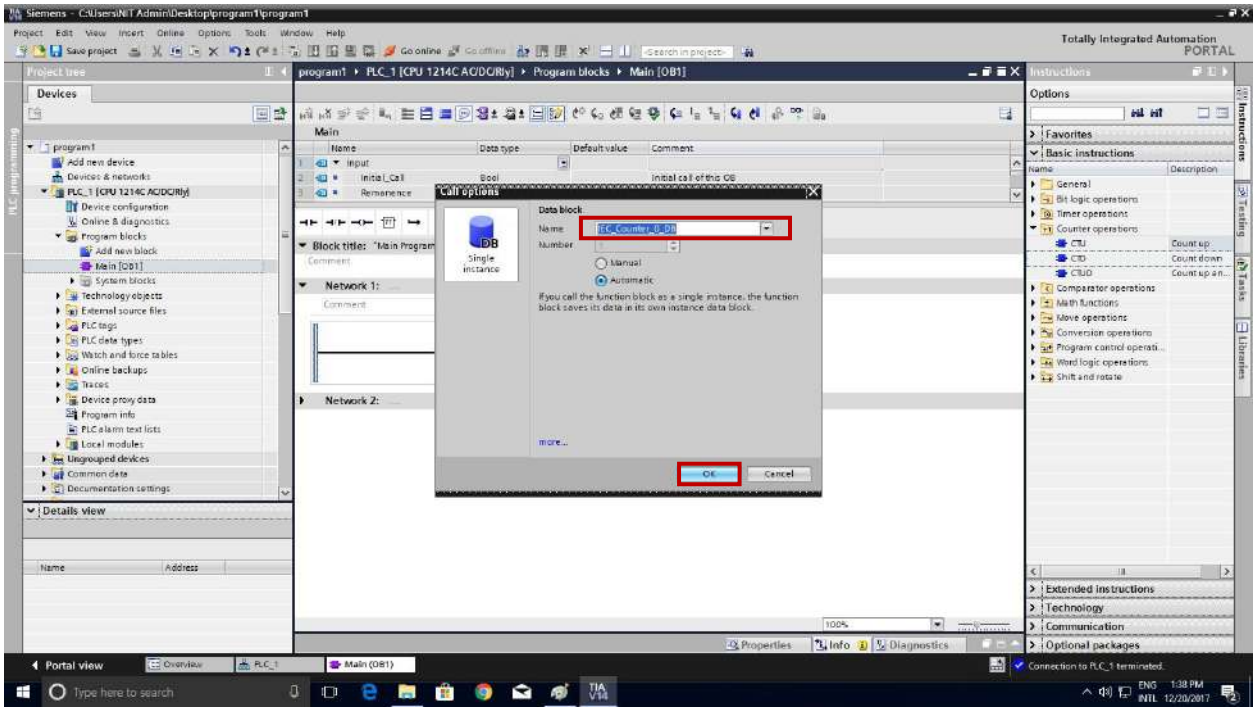
1.



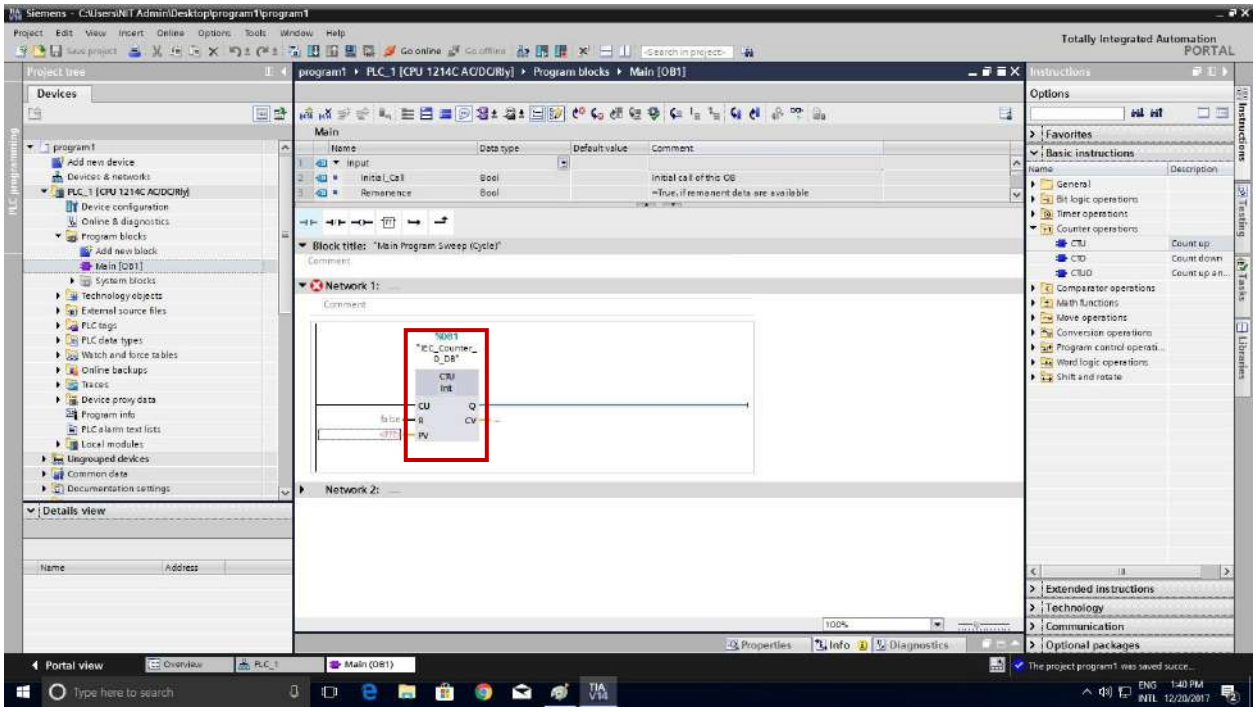
2.



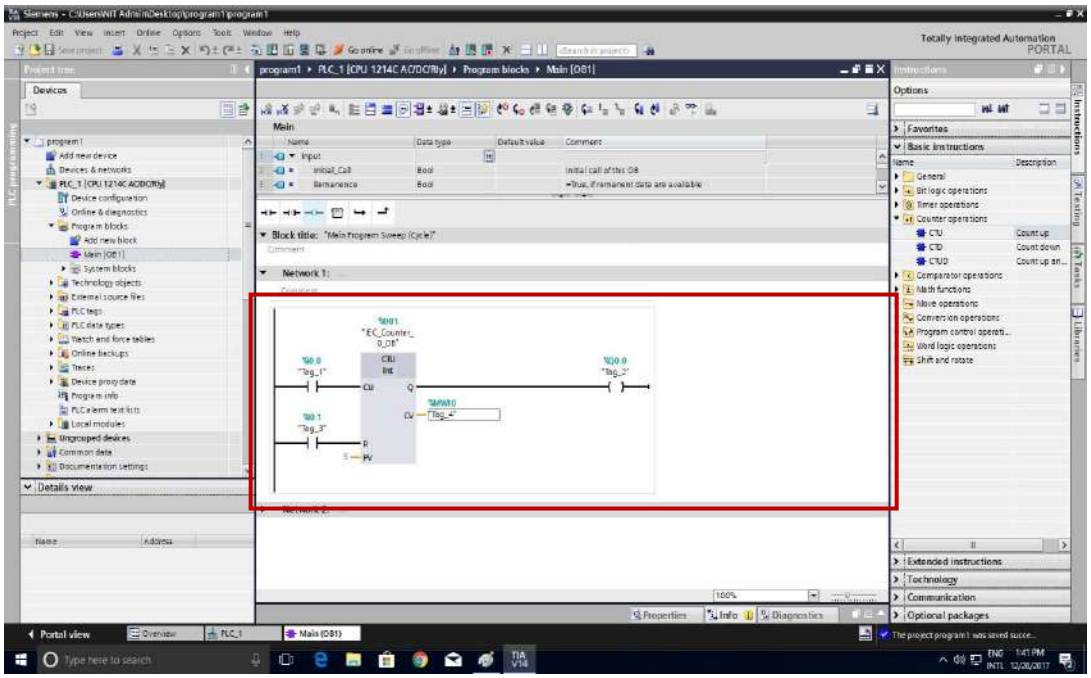
3.



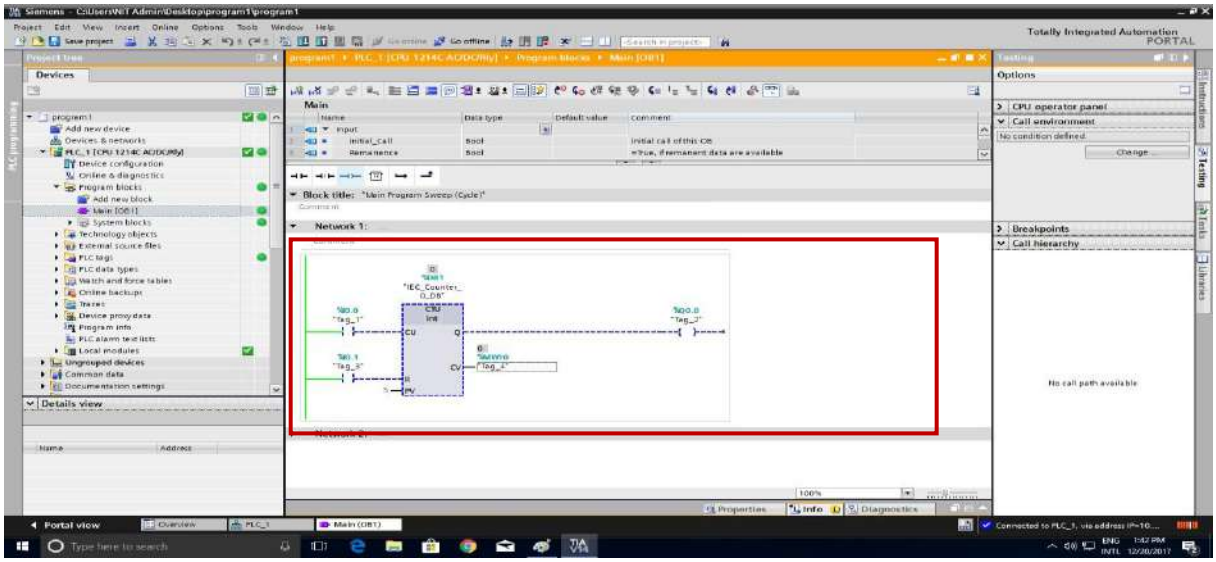
4. Now the UP Counter block is created in network is shown below the image.



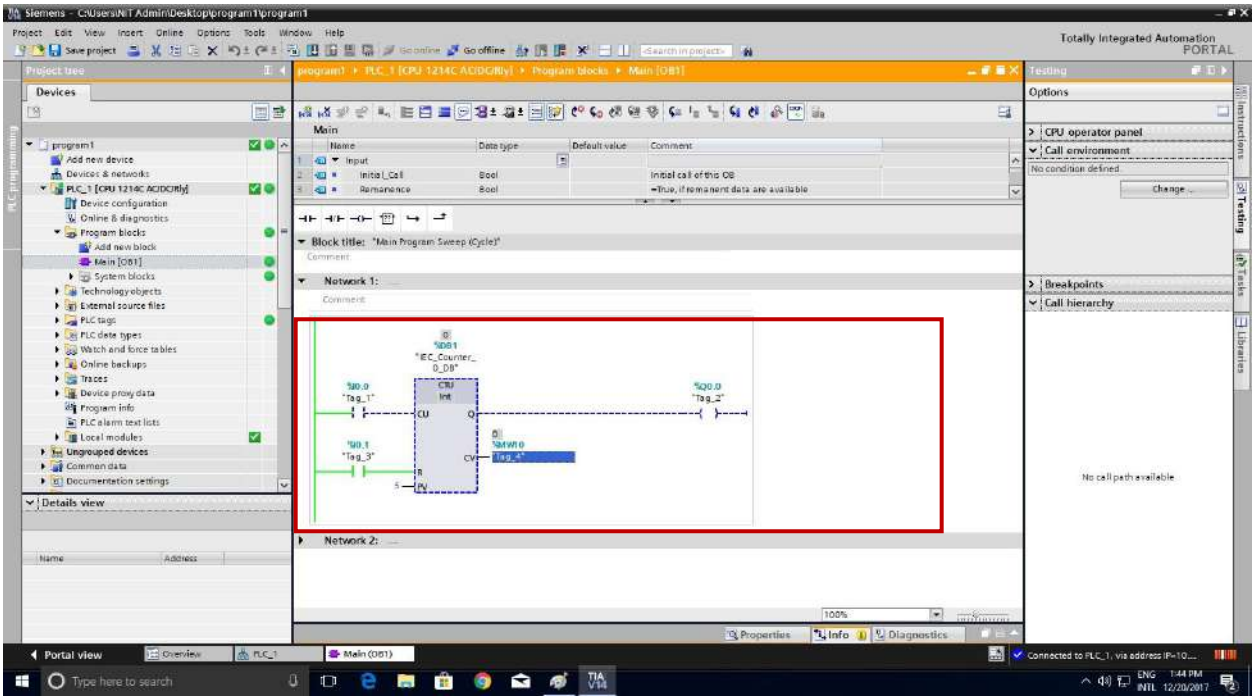
5. Before Enabling the Counter Block



6.After Enabling the Counter Block



7. After Resetting the Counter Block



CONCLUSION:

Thus the UP Counter operation was successfully performed using PLC software.

DOWN COUNTER

AIM OF THE EXPERIMENT:

To study about the Down Counter operation using PLC Software.

APPARATUS REQUIRED:

- PLC Trainer kit
- Personal Computer Installed with PLC Software
- Ethernet cable
- Patch chords

THEORY:

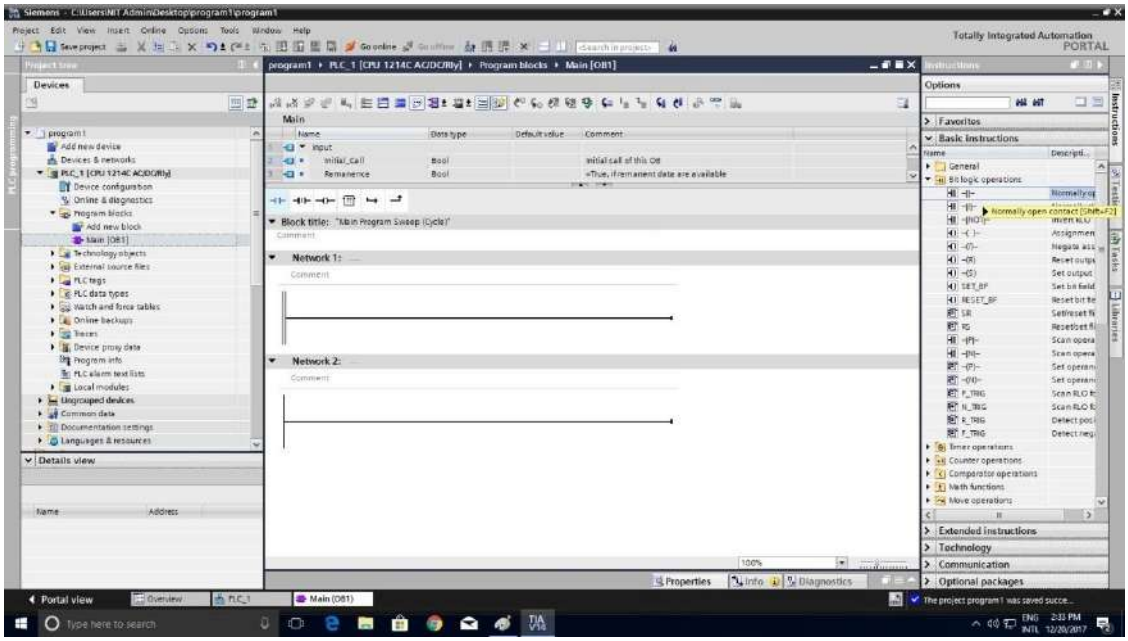
The counters are mainly used for counting the values from the field equipment. The DOWN Counters can be used to counting the values in down ward manner. It can be performing the decremental purpose.

PROCEDURE:

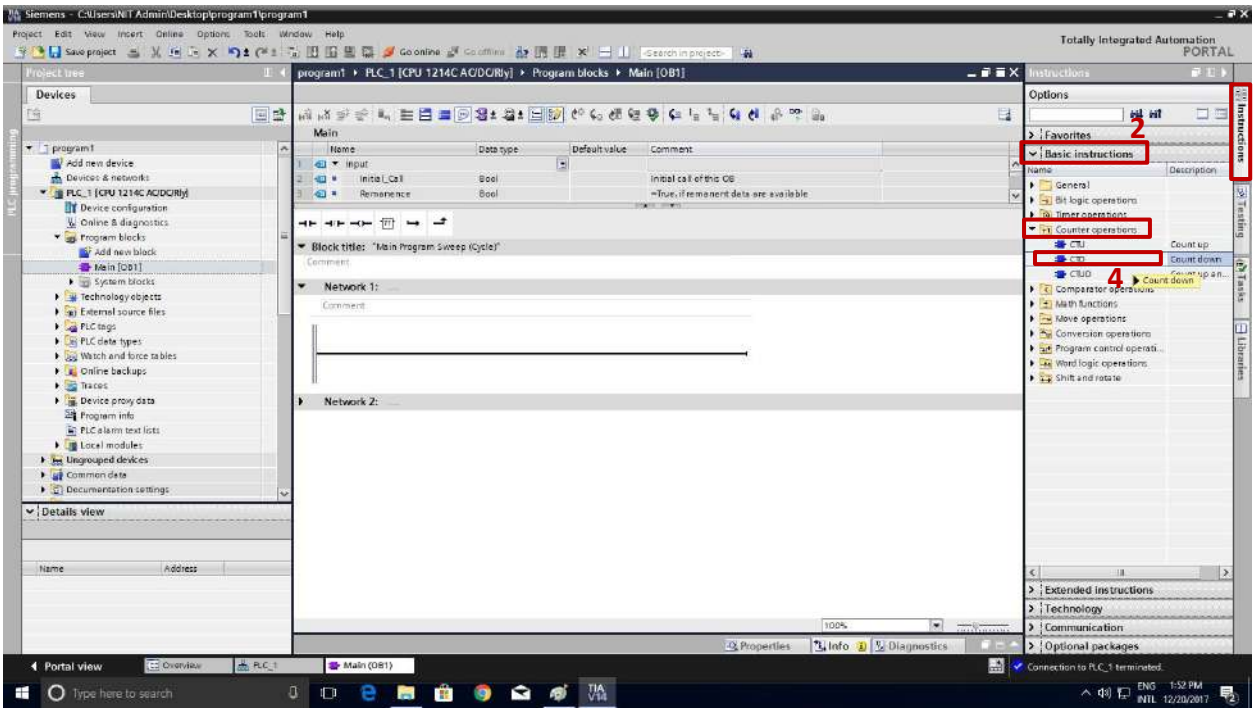
1. Click **PLC-1** in the project tree ''1'' then click **program block** ''2'' and click **main OB1** ''3''.
2. Now the below image shows (Object Block1) OB1 is created.
3. To select the DOWN Counter block in plc goes to **Instructions** Tab and click the **Basic Instructions** then select the **CTD** block for DOWN Counter operation.
4. Now the DOWN Counter call options block can be opened. Then change the **data block** name in that Name block. And then click the **ok** button.
5. Now the **DOWN** Counter block is created in network.
6. The following details can be entered into the UP Counter block is given below.
   CD - Make the counter Input
   Q- Counter Output
   LD - load Preset value (After reach the value of 0)
   CV - Count Value
   PV - Preset value (Set Value)
7. Then save the program and goes to online mode and monitoring the counter values before and after enabling the counter block.

LADDER LOGIC PROGRAM:-

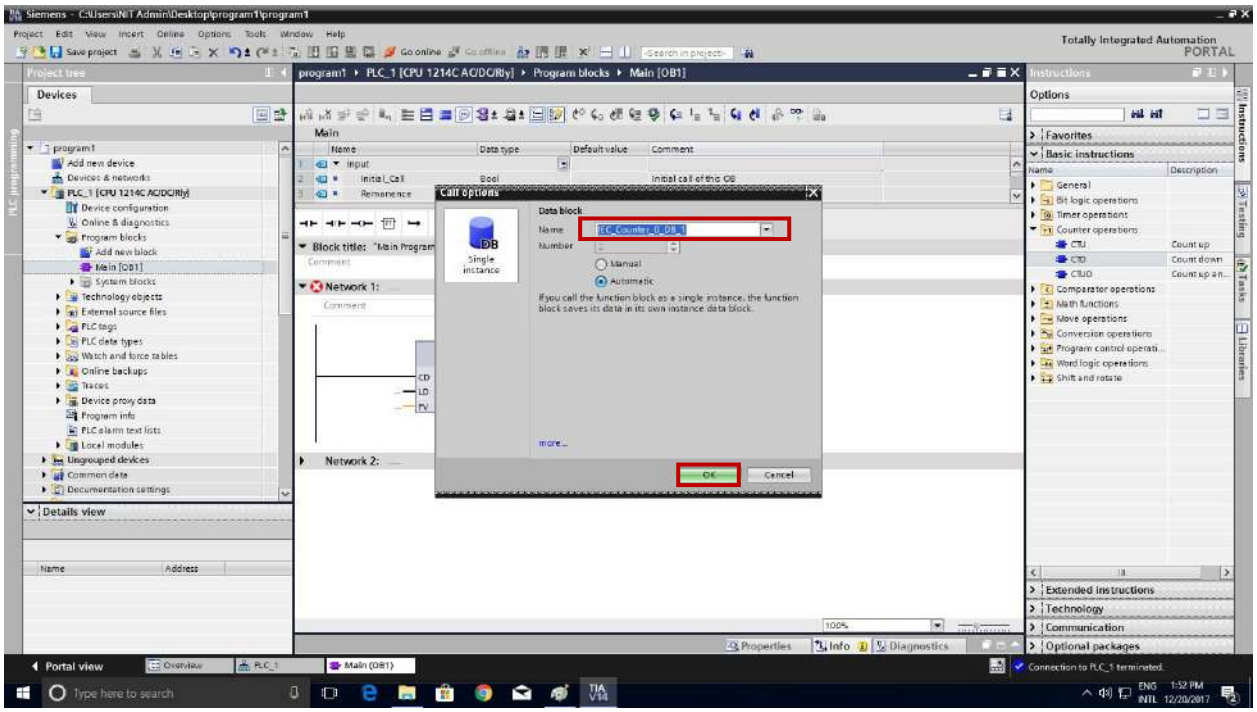
1.



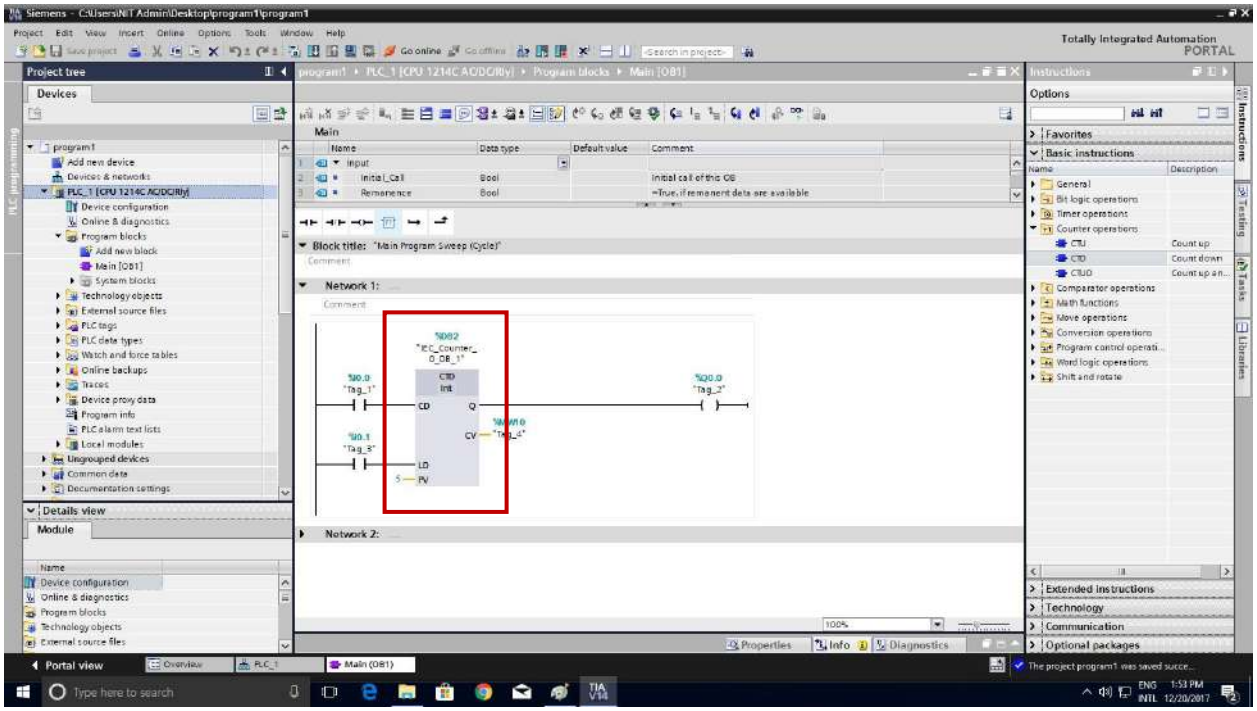
2.



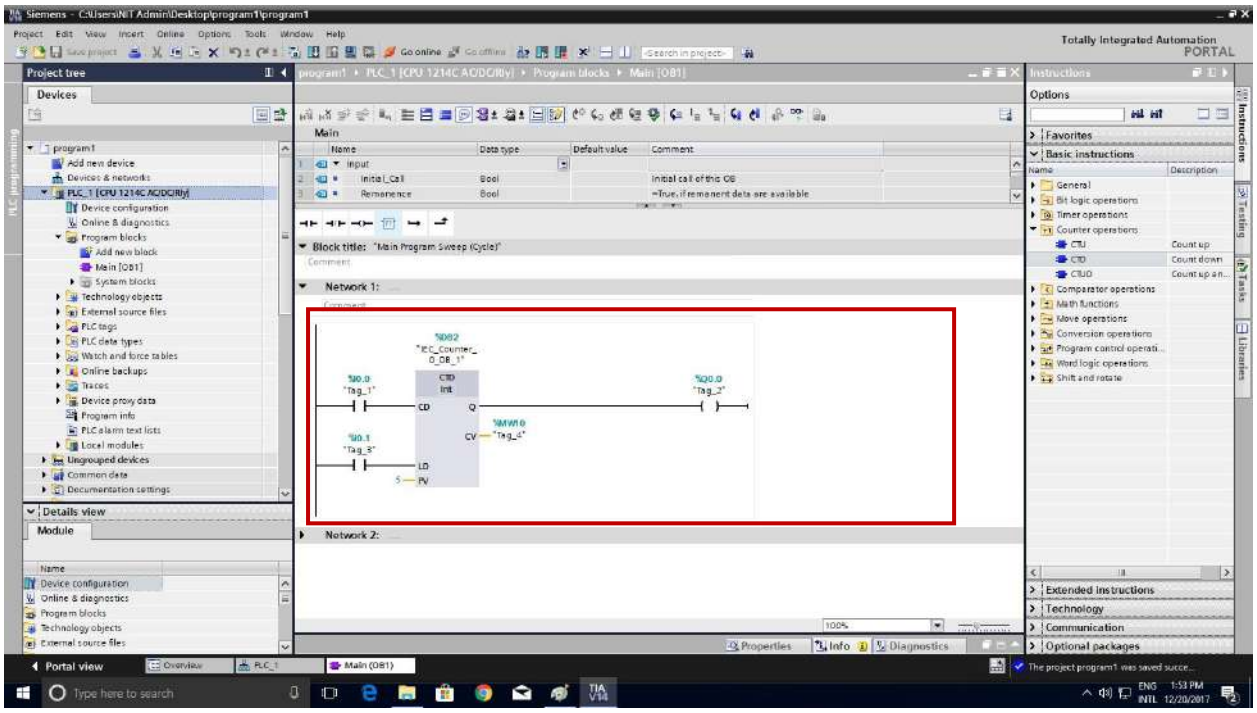
3.


Siemens - C:\Users\NIT Admin\Desktop\program1\program1
Totally Integrated Automation
PORTAL
Project tree
Devices
program1 ▸ PLC_1 [CPU 1214C AC/DC/Rly] ▸ Program blocks ▸ Main [OB1]
Instructions
Options
Main
Call options
Data block
Single instance
Manual
Automatic
OK
Cancel
Network 1:
Network 2:
Portal view
Overview
PLC_1
Main (OB1)
Properties
Info
Diagnostics
Connection to PLC_1 terminated.

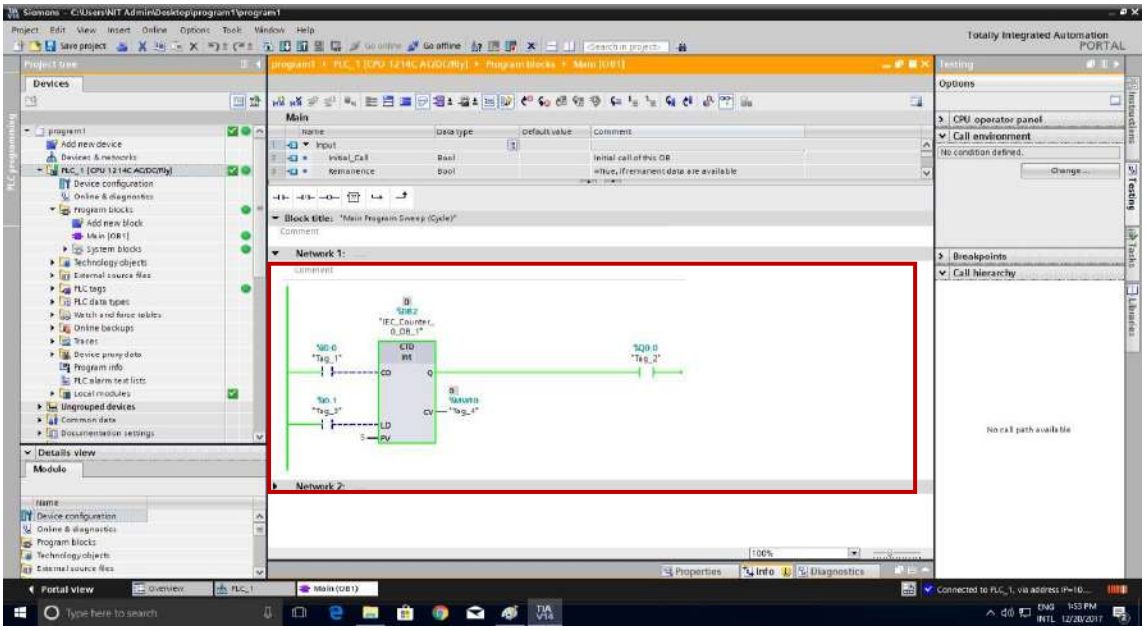
4.


Siemens - C:\Users\NIT Admin\Desktop\program1\program1
Totally Integrated Automation
PORTAL
Project tree
Devices
program1 ▸ PLC_1 [CPU 1214C AC/DC/Rly] ▸ Program blocks ▸ Main [OB1]
Instructions
Options
Main
Block title: "Main Program Sweep (Cycle)"
Network 1:
Network 2:
%DB2
"IEC_Counter_0_DB_1"
CTD
Int
%I0.0
"Tag_1"
%I0.1
"Tag_3"
%Q0.0
"Tag_2"
%MW0
"Tag_4"
Details view
Module
Portal view
Overview
PLC_1
Main (OB1)
Properties
Info
Diagnostics
The project program1 was saved succe...

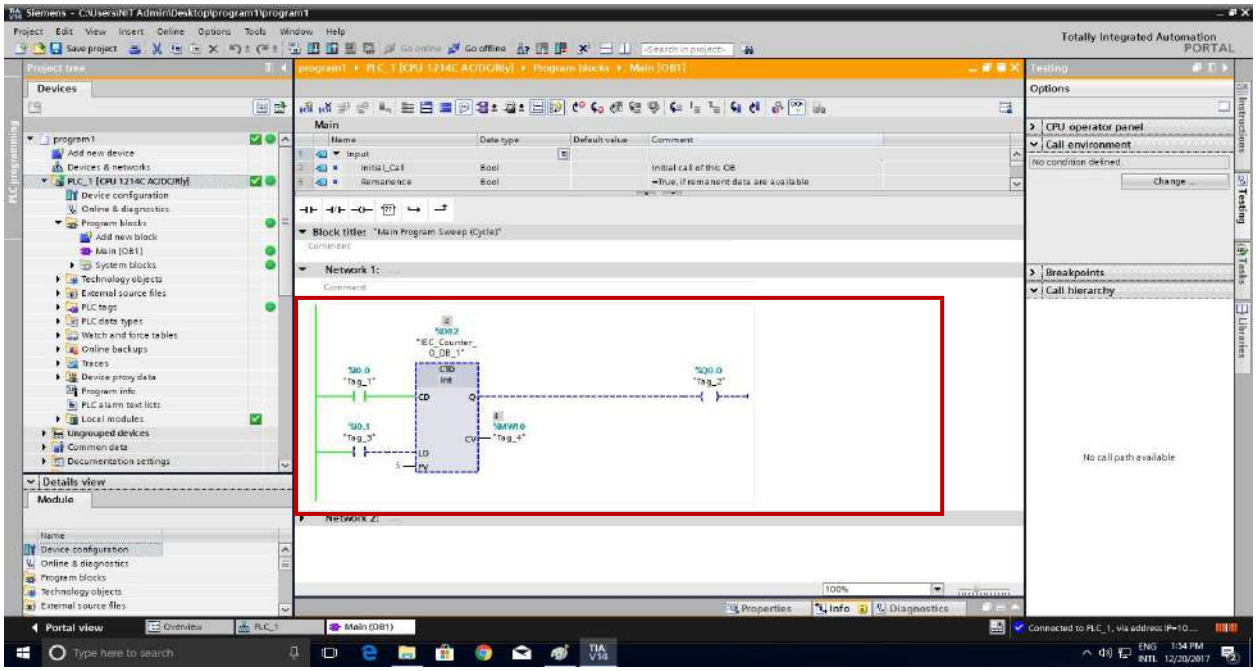
5. Before Enabling the Counter Block.



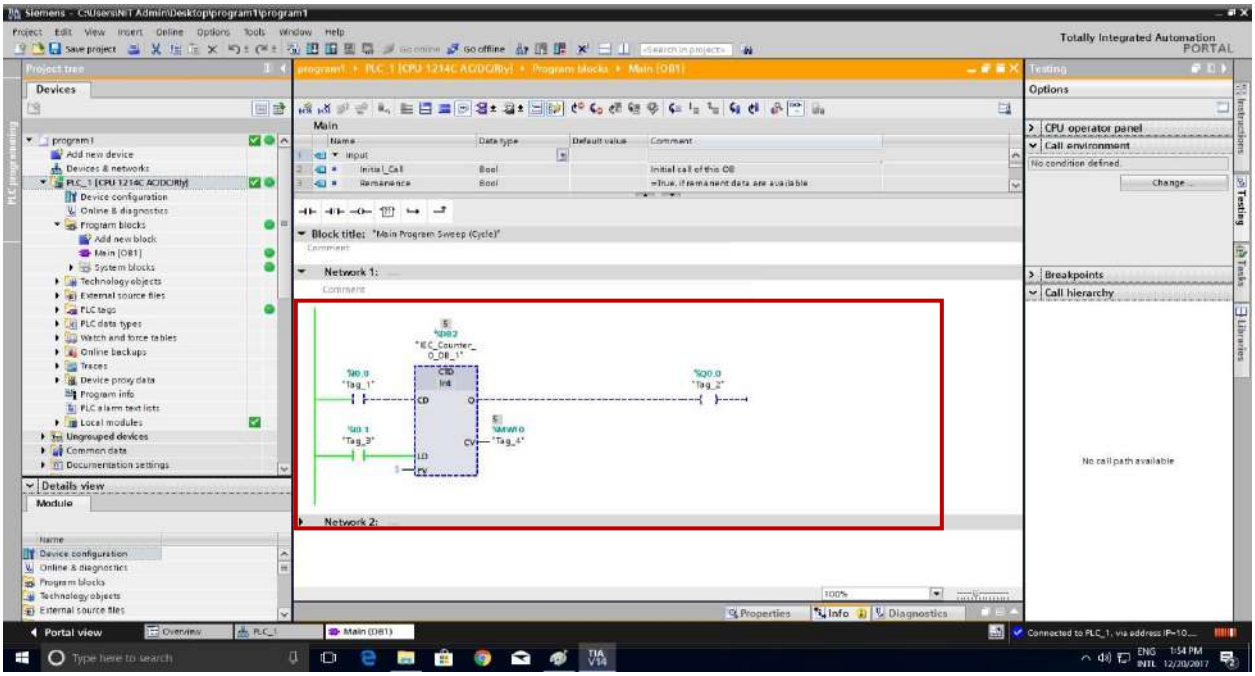
6. After Enabling the Counter Block



7. After Load Presetting the Counter Block



8.



CONCLUSION:

Thus the DOWN Counter operation was performed successfully using PLC software.

Write program on MOVE, Control statement, math function, data manipulation technique on PLC

MOVE

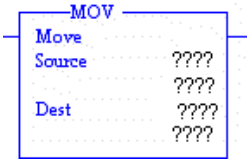
AIM OF THE EXPERIMENT:

Write a simple ladder logic program using MOVE instruction.

EQUIPMENTSREQUIRED:

- PLC software
- Desktop Computer

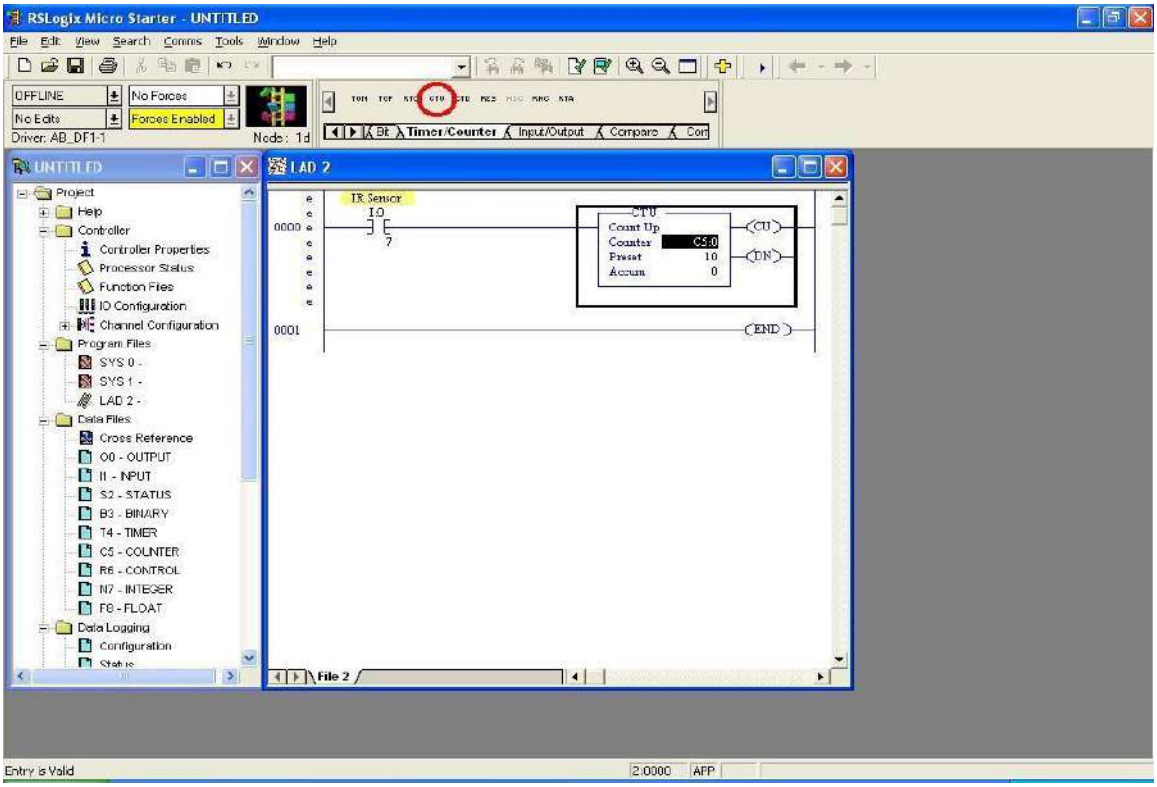
THEORY:



When rung conditions preceding this instruction are true, the MOV instruction movesa copy of the source to the destination each scan. The original value remains intactandunchanged in its sourcelocation.

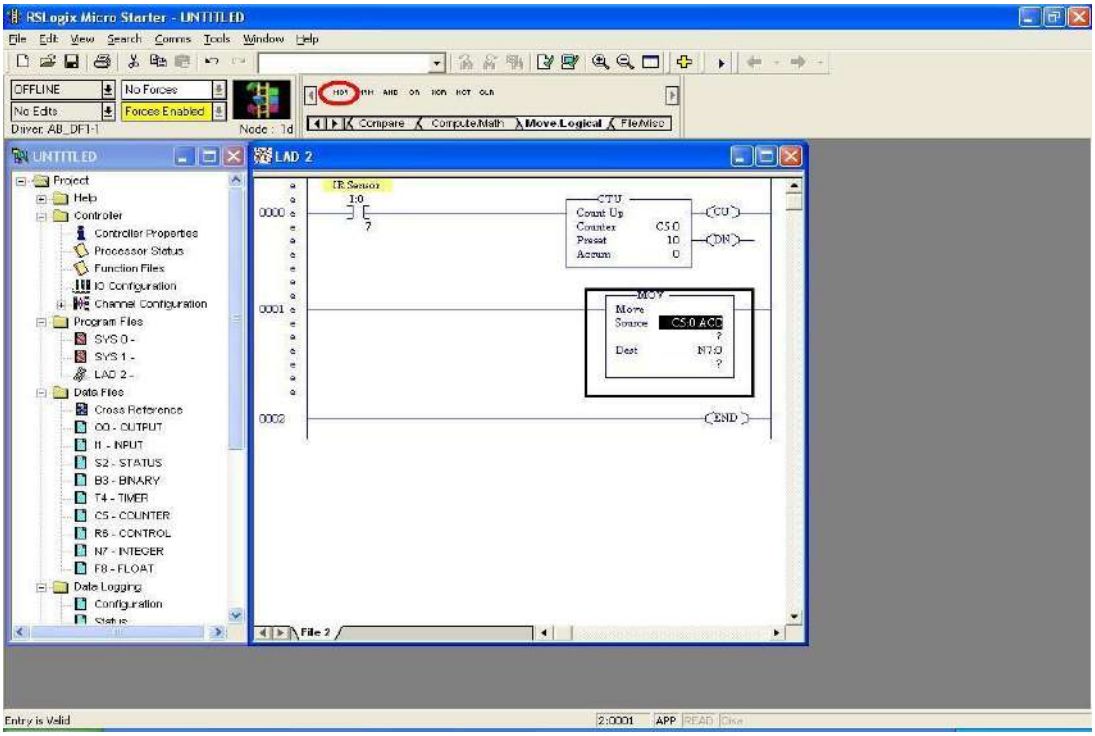
PROCEDURE AND LADDER LOGIC PROGRAM:

- TakeoneNObitandassignaddressI:0/7andcommenttoIRSensorandtakeCount

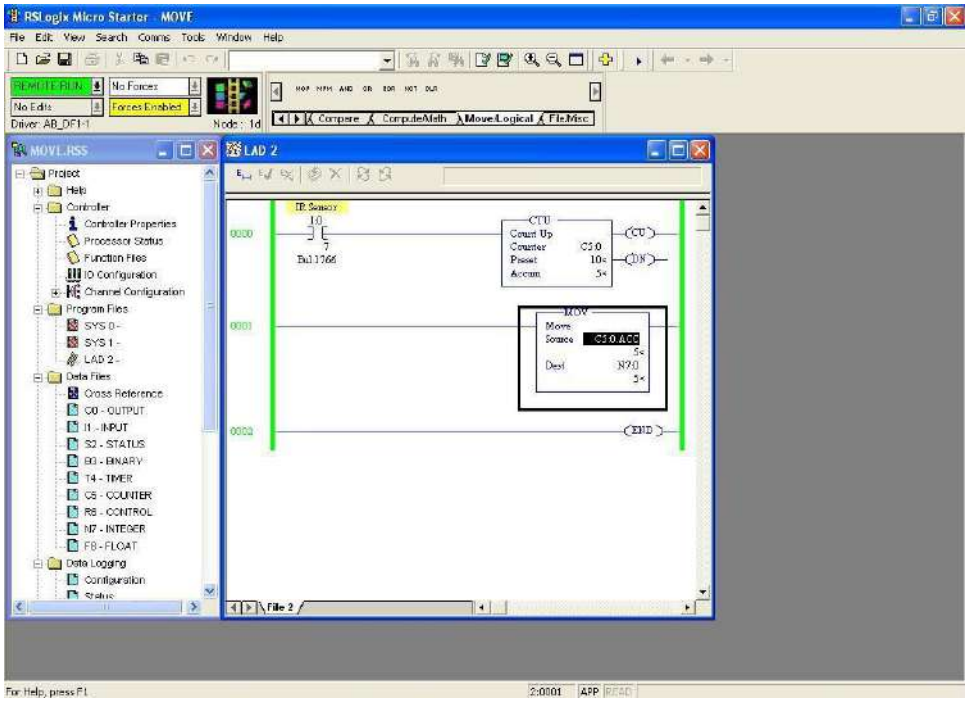


erand assign Counterto C5:0and Preset to 10is shown below.

- Take Move instruction form Move/Logical Instruction and assign Source toC5:0.ACCand assign Dest. to N7:0 is shownbelow.



- Verifyanddownloadandrunntheprogram.
- Whenany obstacleinfrontofI:0/7(IRSensor)thencounterC5:0willstartcounting . When counter Accumulator value is increase and move instructionMovetheCounteraccumulatorvalue in DestinationN7:0 is shown below.



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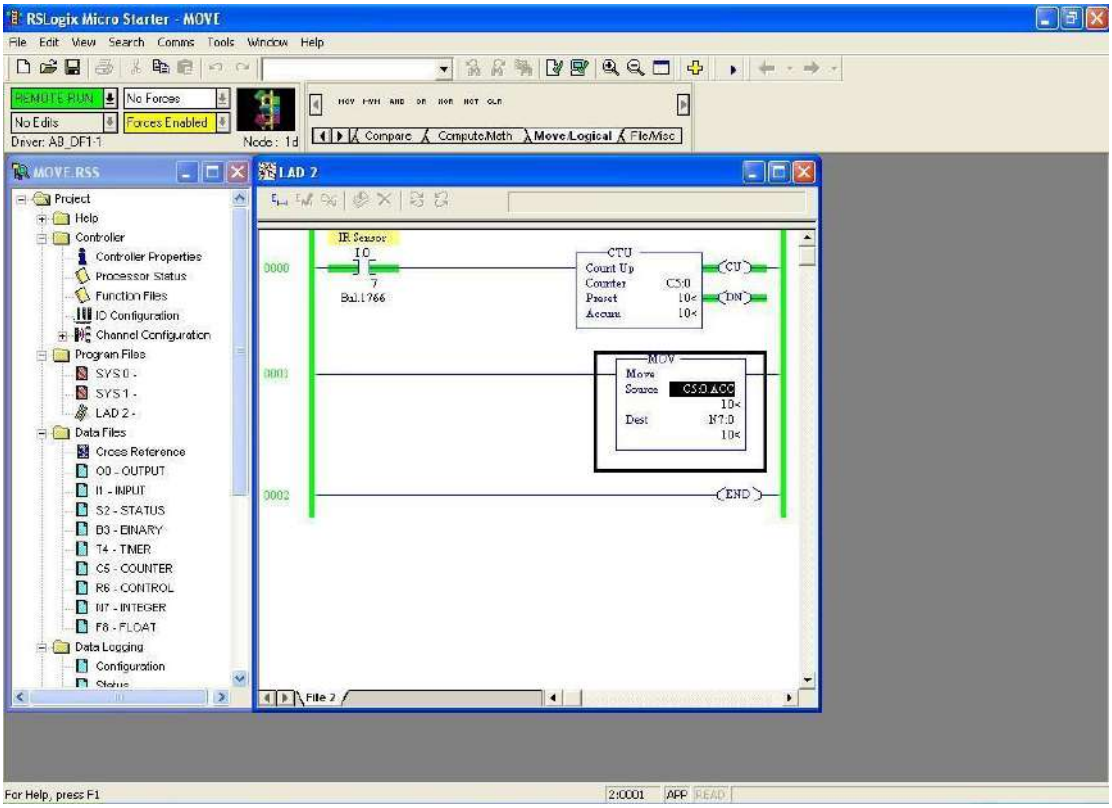


CONCLUSION:

Thus the MOVE operation was studied and performed successfully using PLC software.

CONTROL STATEMENT

AIM OF THE EXPERIMENT:

Write a simple ladder logic program using Control statement (Jump & Label instruction).

EQUIPMENTSREQUIRED:

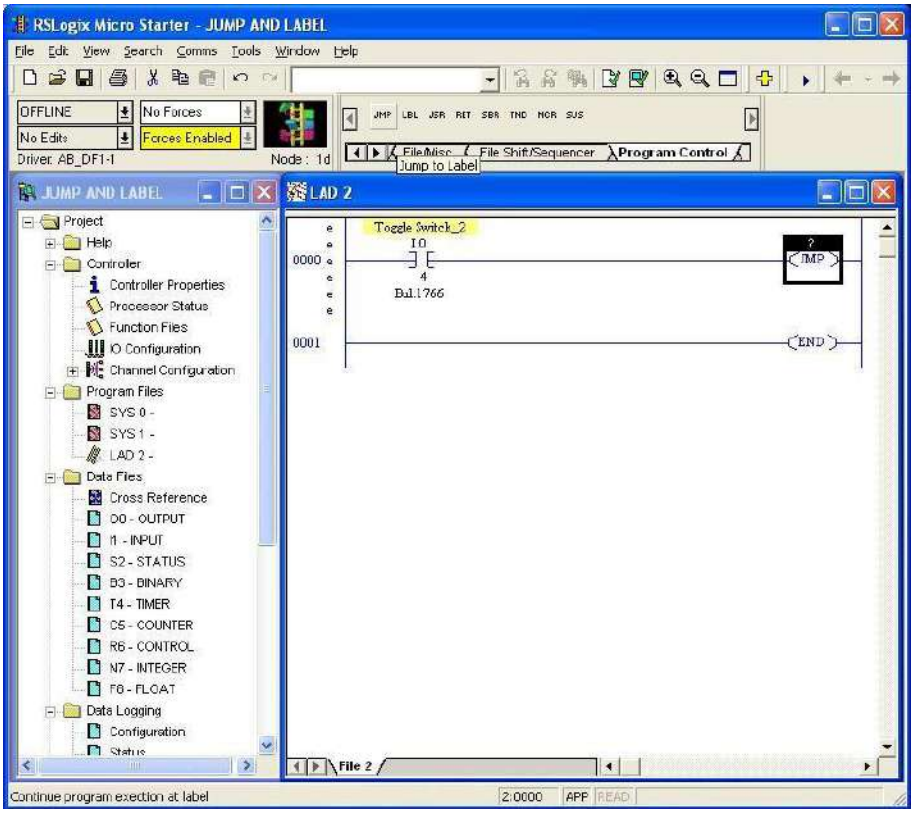
- PLC software
- Desktop Computer

THEORY:

Whentherung conditionforthisoutputinstructionistrue,theprocessorjumps forwardorbackwardtothecorrespondinglabelinstruction(LBL)andresumesprogram execution at the label. More than one JMP instruction can jump to the samelabel. Jumping forward to a label saves program scan time by omitting a programsegmentuntilneeded.Jumpingbackwardletsthecontrollerexecuteprogramsegmen tsrepeatedly.

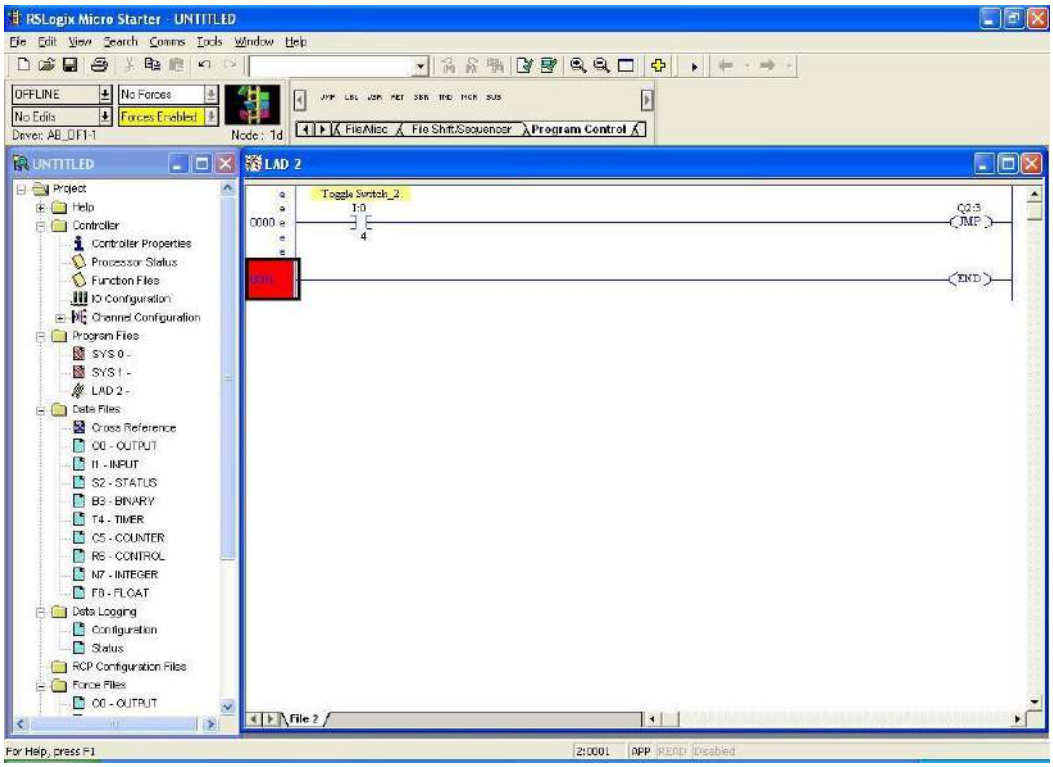
PROCEDURE AND LADDER LOGIC PROGRAM:

- TakeNOBitandassignaddressI0:0/4andcommenttoToggleSwitch_2andtakeJ

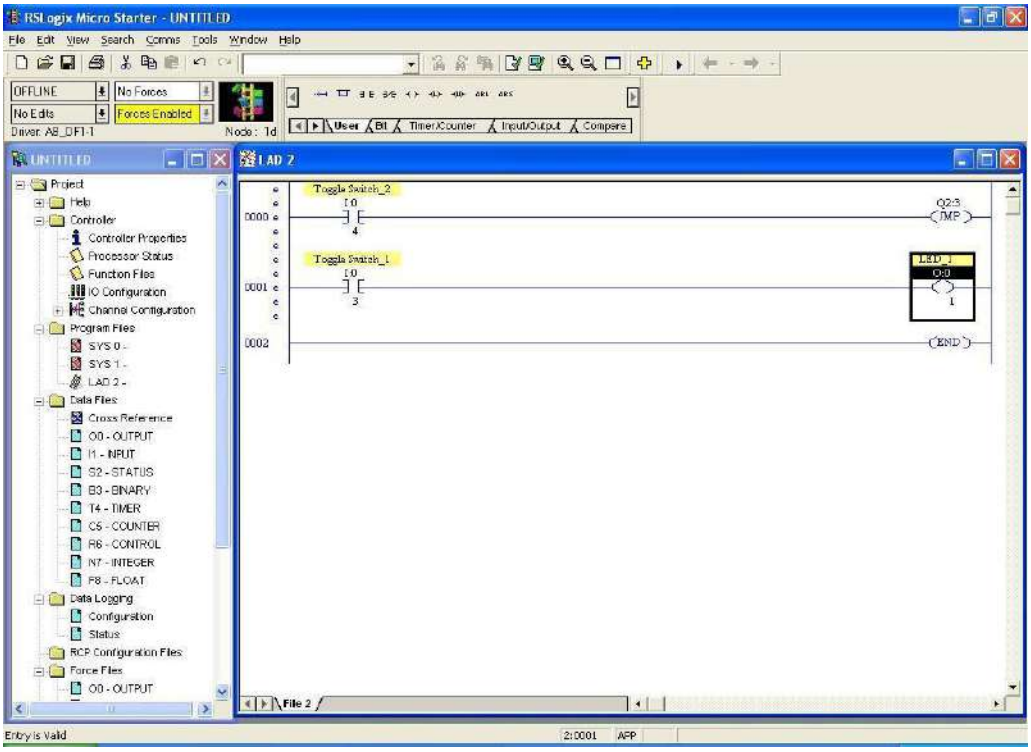


MPinstruction fromProgramcontrolinstructionis shownbelow.

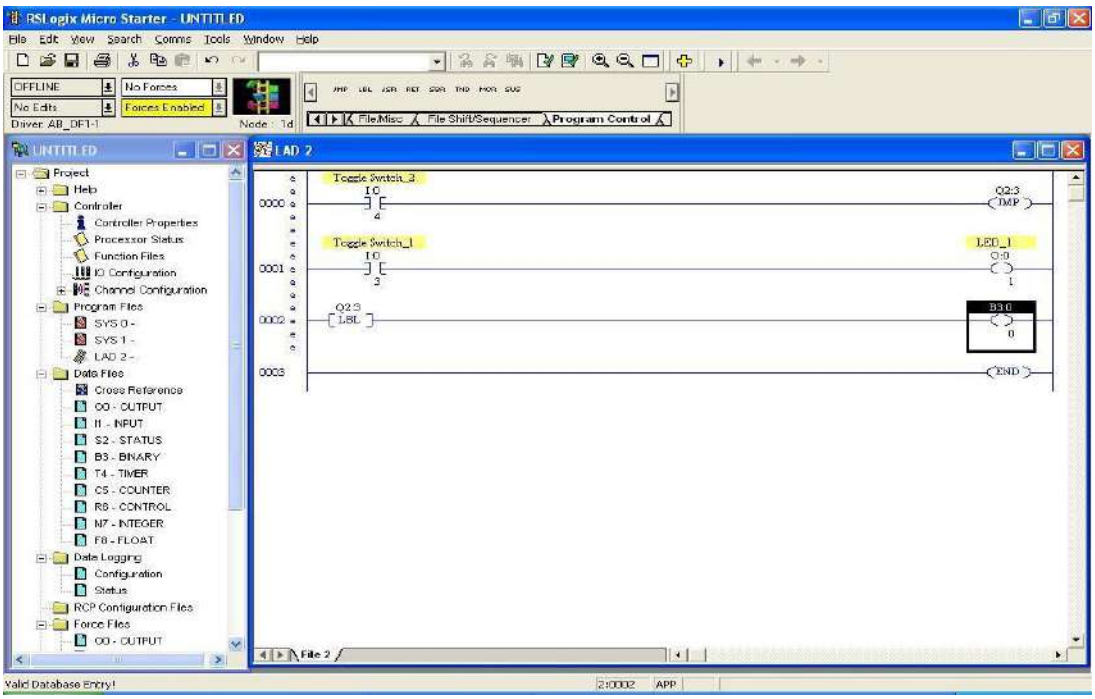
- Assignaddressto JMPinstructionto 3is shownbelow.



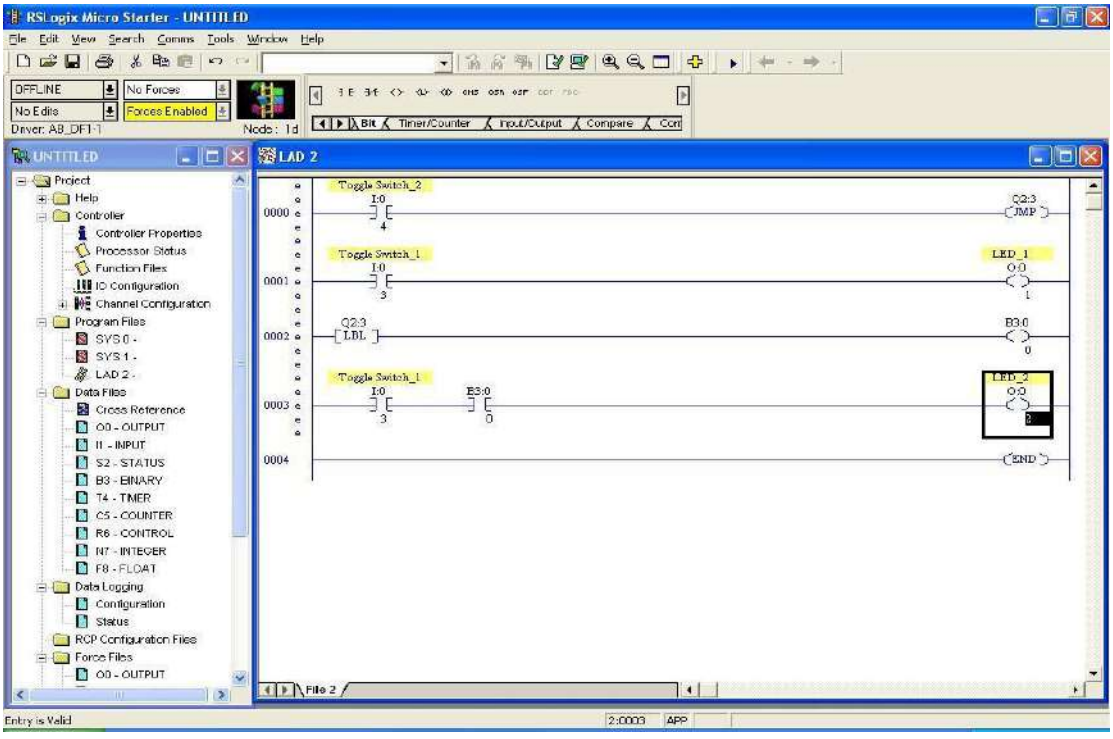
- TakeNObitandassignaddressI:0/3(ToggleSwitch_1)andtakecoilandassignaddress O0:0/1 (LED_1) is shown below.



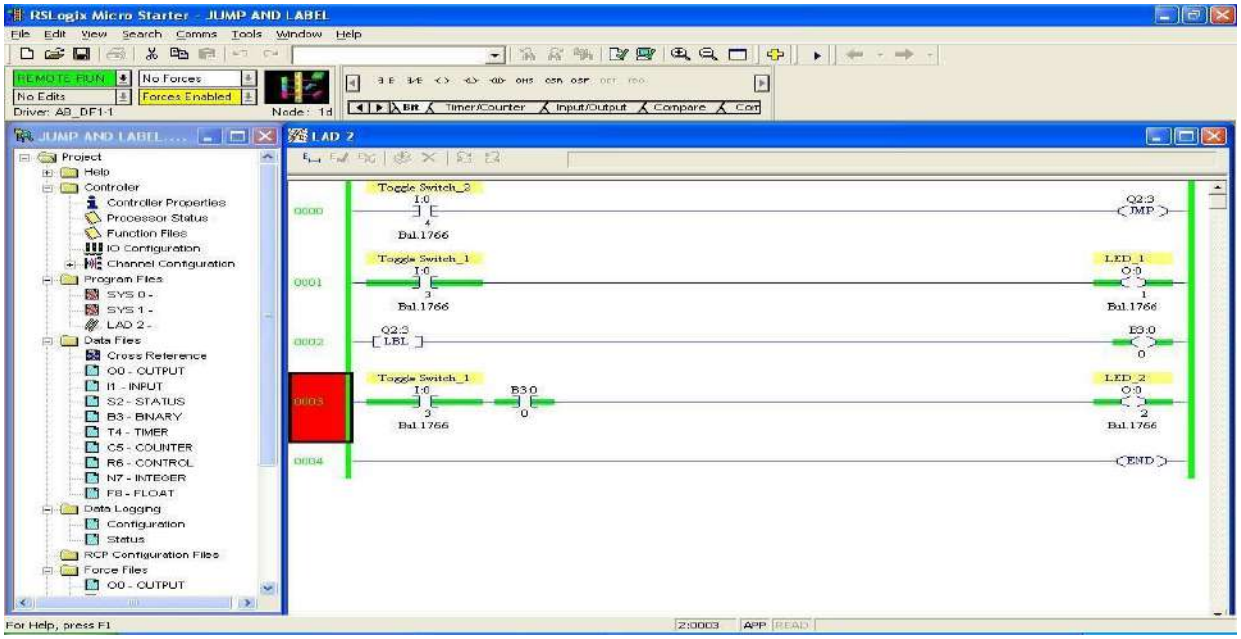
- Take LBL instruction from Program Control instruction and assign address Q2:3andtakeCoil and assignaddressB3:0/0 is shown below.



- TakeNObitandassignaddressI:0/3(ToggleSwitch_1)andtakeanotherNObitandassignB3:0/0andtakecoilandassign O:0/2(LED_2)isshown below.

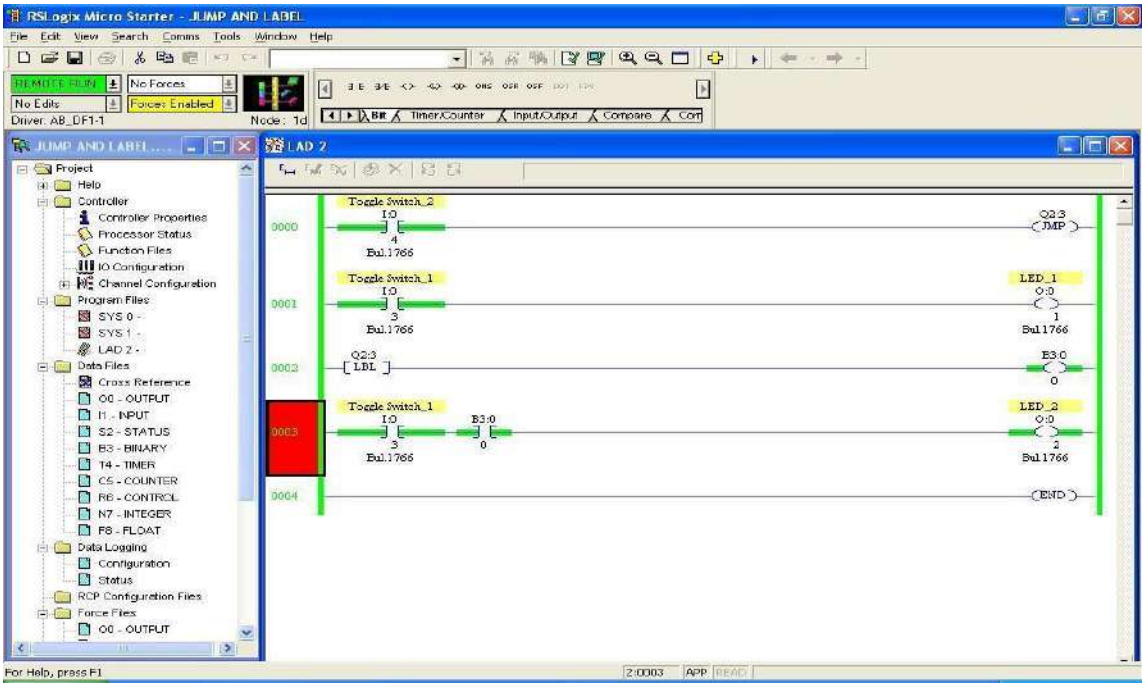


- Verify,download andruntheprogramofJumpand Labelinstruction.
- WhenyouenabletheI:0/3(ToggleSwitch_1)thenoutputO:0/1(LED_1)andO:0/



2(LED_2)will beON is shown below.

- When youenableI:0/4(ToggleSwitch_2)thenJUMPinstructionisON.
- When you enable the I:0/3 (Toggle Switch_1) then output O:0/1 is off becauseexecutionofinstructionisJumponnetwork3(0003)meansoutputO:0/2(LED_2) will beONis shown below.



CONCLUSION:

Thus the Control operation was performed and verified successfully using PLC software.

MATH FUNCTION

AIM OF THE EXPERIMENT:

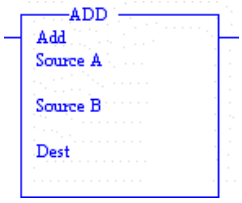
Write a simple ladder logic program using Math instruction (Addition).

EQUIPMENTSREQUIRED:

- PLC software
- Desktop Computer

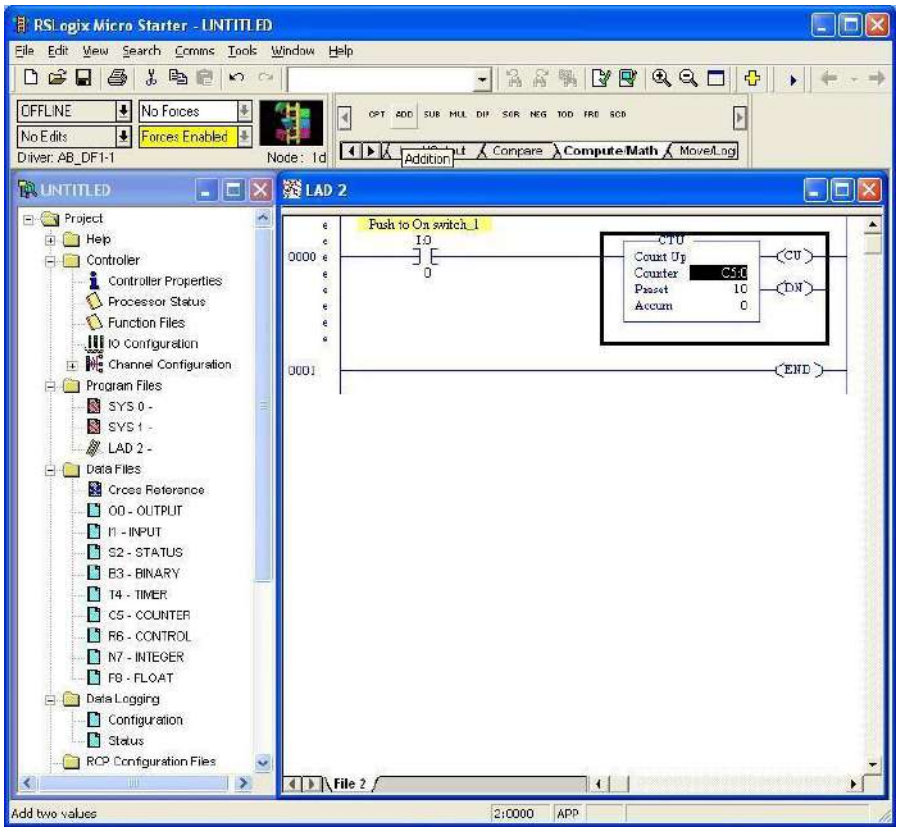
THEORY:

Use the ADD instruction to add one value to another value (Source A to Source B)andplacetheSUM in destination.

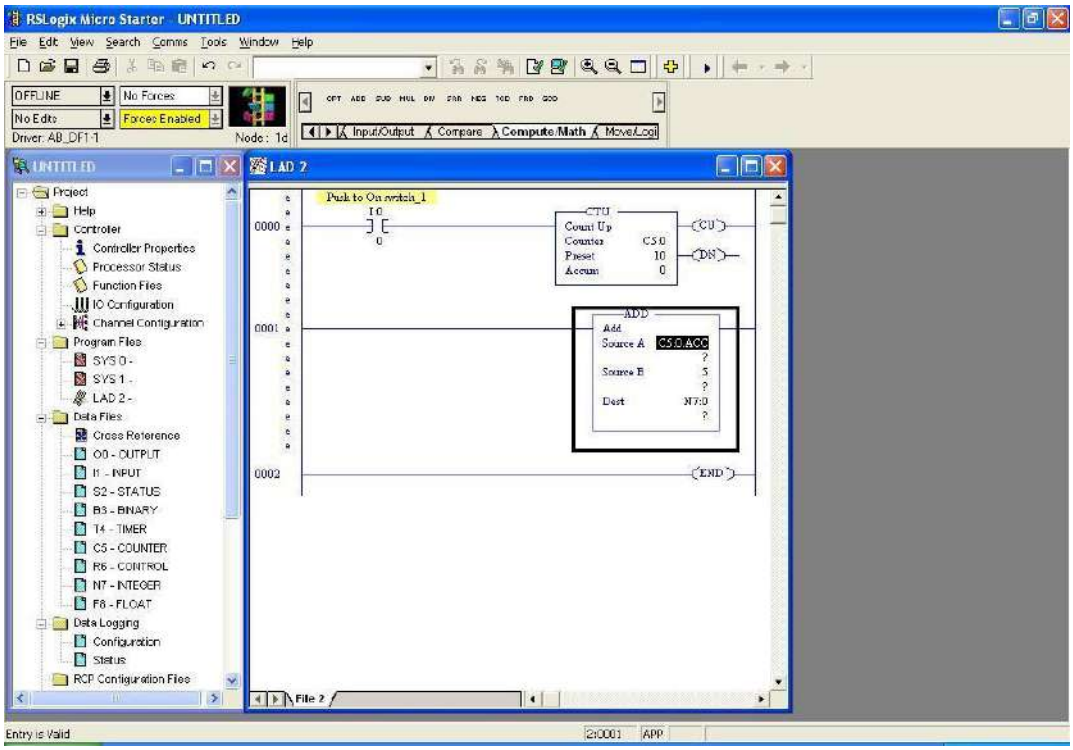


PROCEDURE AND LADDER LOGIC PROGRAM:

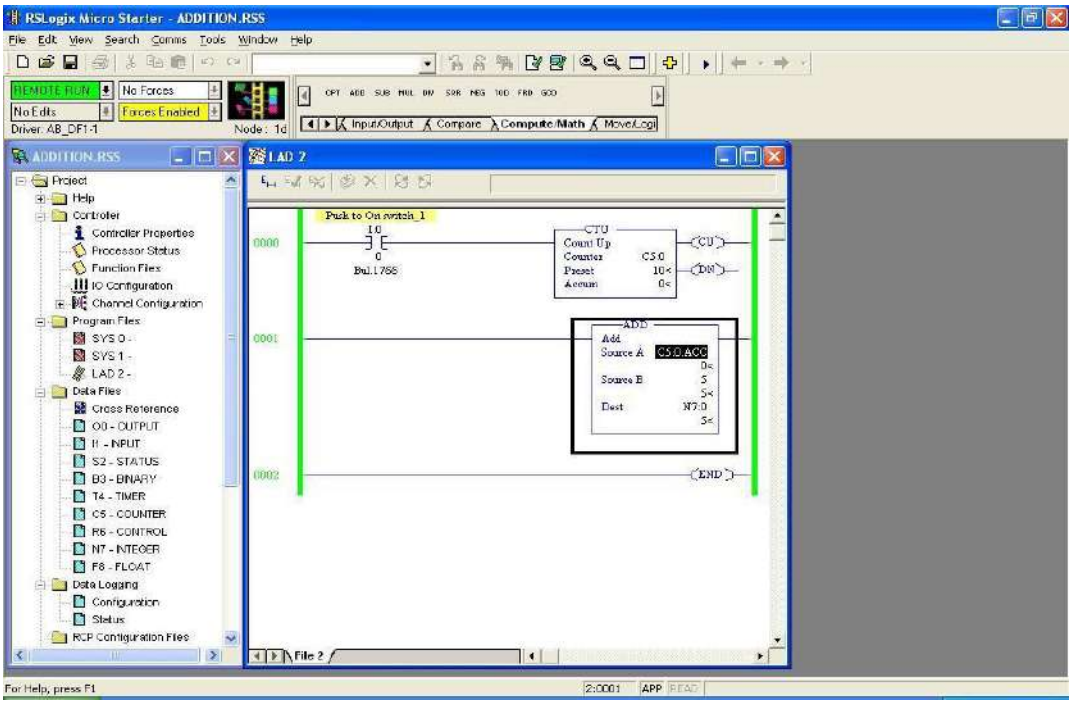
- Take one Examine if closed bit and assign it I: 0/0 (Pushbutton Switch_1) andTake one up counter and assign it Counter to C5:0 and Preset to 10 and Accumto0 is shown below.



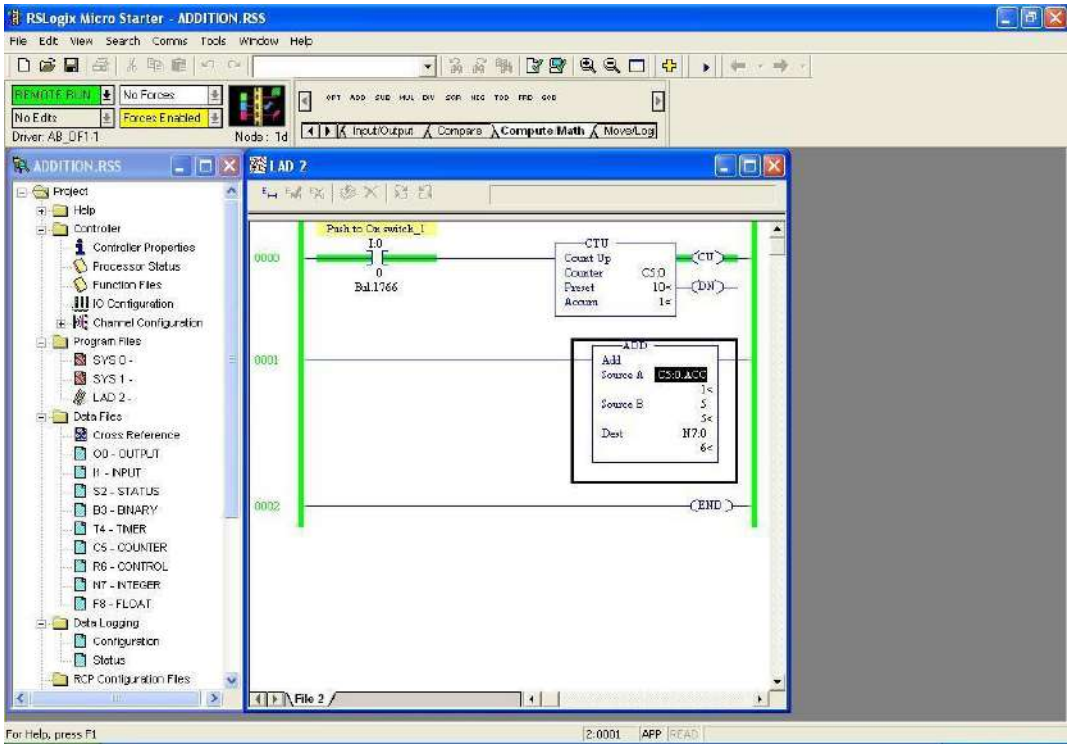
- Take Addition instruction from Compute Math (in instruction Bar) and assign itSource A to C5:0.ACC and Source B to 5 and Destination to N7:0 is shownbelow.



- CompileandDownloadandRuntheProgram.



- WhenyoupressI:0/0(PushbuttonSwitch_1)counterC5:0startcountingandadd itionis shown in N7:0.



UseofAdditionInstruction

CONCLUSION:

Thus the ADDITION operation was performed and verified successfully using PLC software.

DATA MANIPULATION

AIM OF THE EXPERIMENT:

Write a simple ladder logic program using data manipulation technique (Bit shift left).

EQUIPMENTSREQUIRED:

- PLC software
- Desktop Computer

THEORY:

Bitshiftinstructionisusedtoshiftthebitinanydirectionasuserwantsuchas BitshiftLeft (BSL),Bit Shift Right(BSR).

Bitshift left (BSL): Whenthe rug goesfromfalsetotrue,the controller settheenable bits (Enable Bit 15) and the data block is shifted to the left one bit position. The specified bit at the bit address is shifted into the first bit position. The last bit isshifted out ofarrayand stored in unloaded bit. Theshift iscompleted immediately

Thefollowinggeneralinformationappliestobitshiftinstruction

Enteringparameter:

Enterthefollowingparameter whenprogrammingtheseinstruction

- Fileistheaddressofthebitarrayyouwanttomanipulate.Youmustusethefileindicator(#)in thebit arrayaddress.
- Controlistheaddressofcontrolelementthatstorethestatusbyteofinstruction,the sizeofarray(in number ofbits) .

Thecontrol element isshown in below

	15	13	11	10	00
Word 0	EN	DN	ER	UL	Notused
Word 1	Sizeof bit array(number of bits)				
Word2	Reserved				

Status bitsof controlelementmaybe addressed

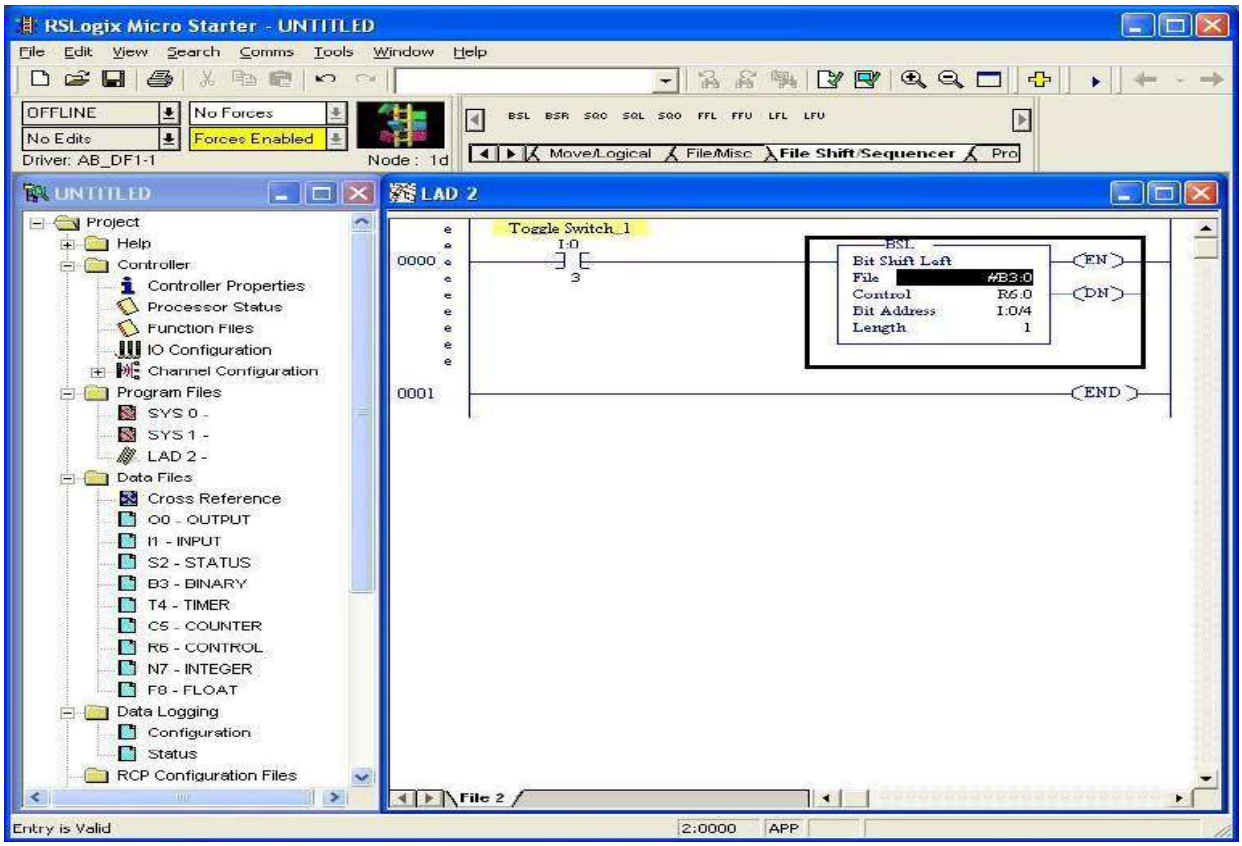
bymnemonics.Theyincluded • Unloadedbit UL(Bit 10)is

theinstructionsoutput.

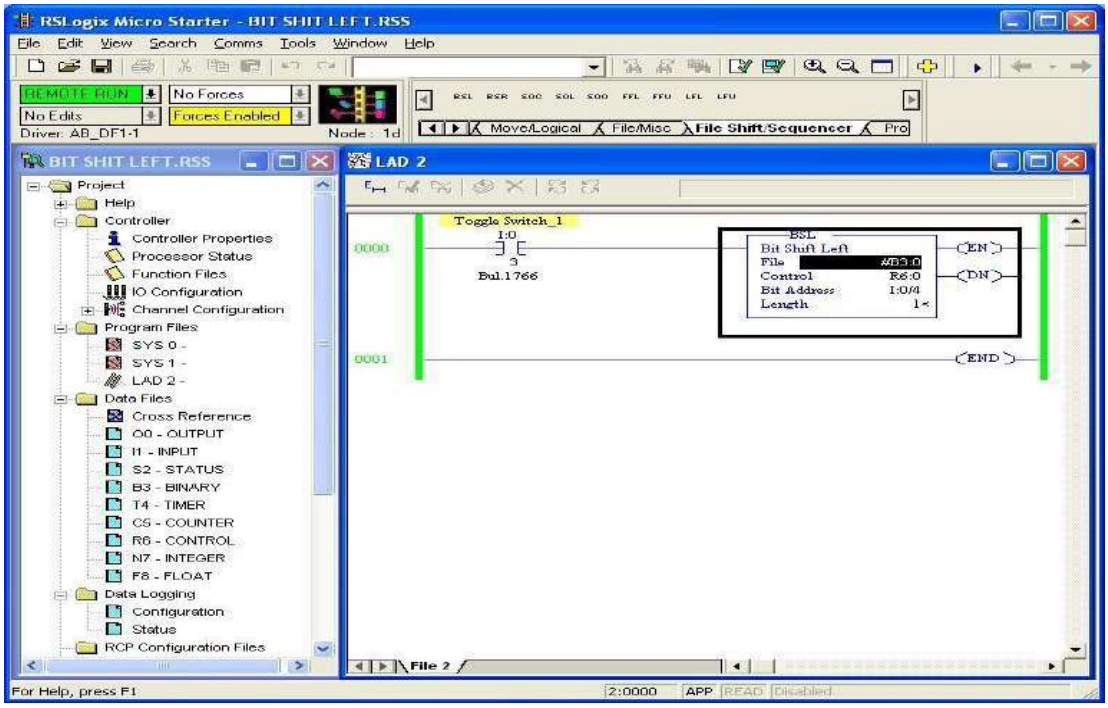
- ErrorbitER(Bit11)whenset,indicatestheinstructiondetectedanerrorsuch enteringanegativenumber forlength or position.
- DoneBit DN (Bit 13)when setindicate thebitarrayshiftedoneposition.
- Enable bit EN (Bit 15) is set on a false to true transition of the rung and indicatetheinstruction is enabled.
- Bit address is the address of the source bit. The status of this bit is inserted ineitherthefirst (lowest)bitposition(BSL) orlast (highest)bit position(BSR).
- Length (size of bit array) is the number of bits in bit array up to 1680 bits.

PROCEDURE AND LADDER LOGIC PROGRAM:

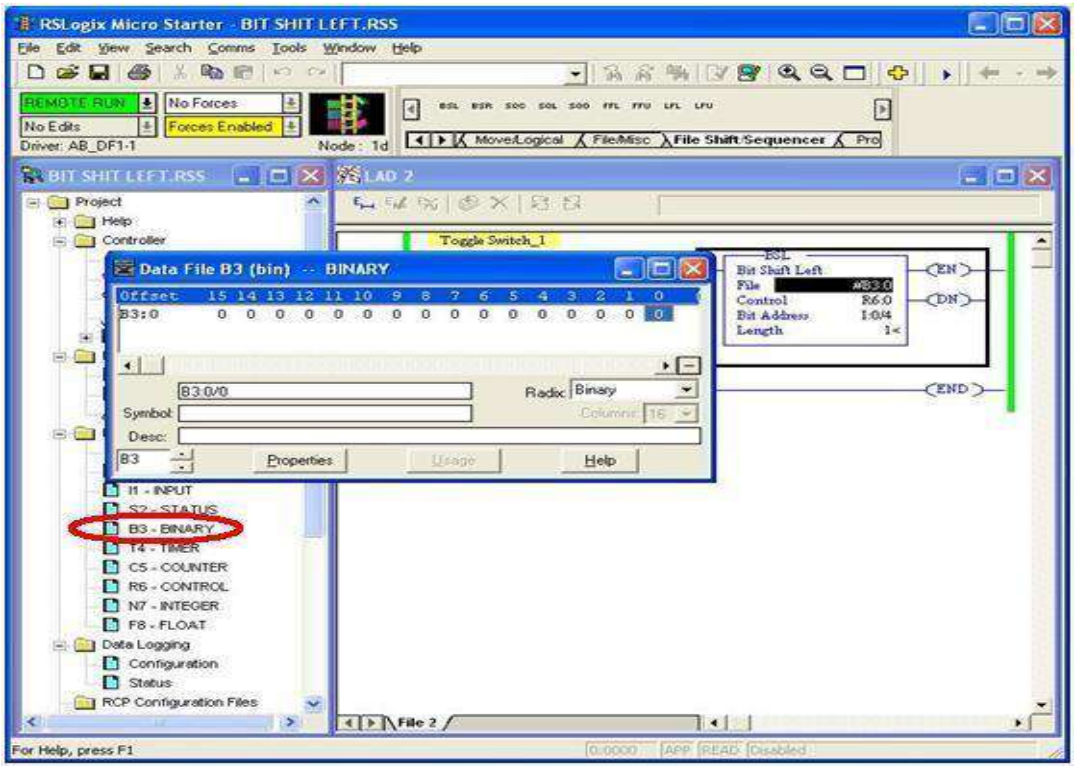
- Take No bit assign I:0/3 (Toggle Switch_1) and select a File shift / sequencerinstruction in Tool bar then take a BSL (Bit Shift Instruction) and assign it Fileto #B3:0 and Control to R6:0 and File Address I:0/4 and Length 1is shownbelow.



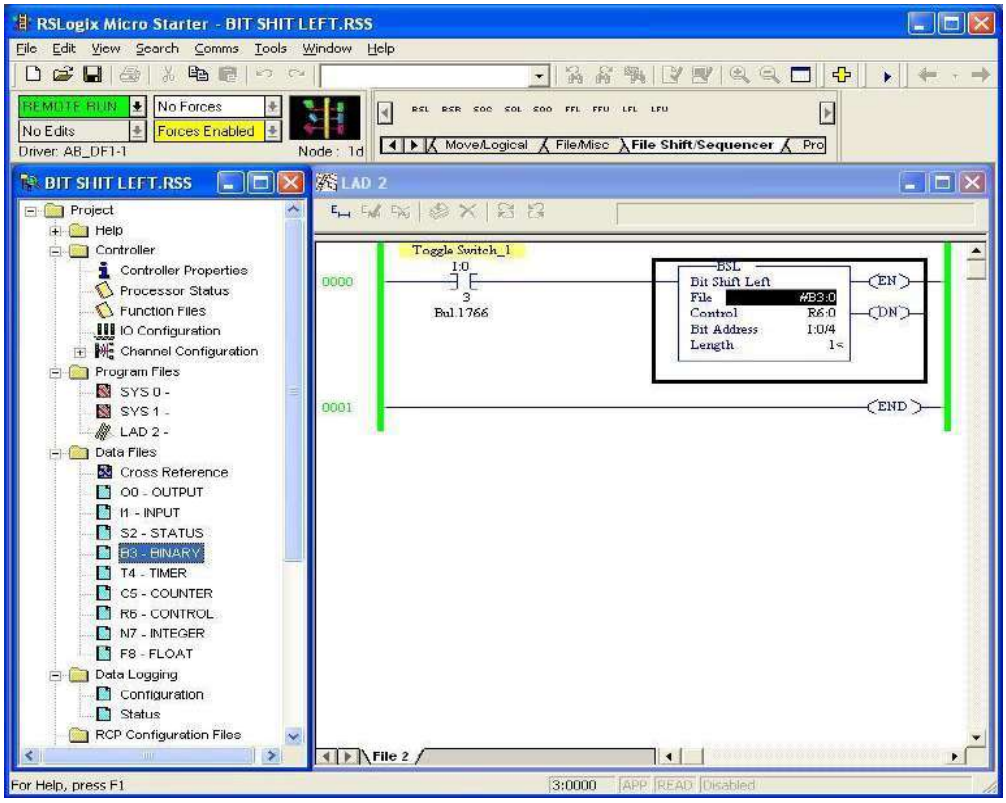
- Compileanddownloadandrunthe program.



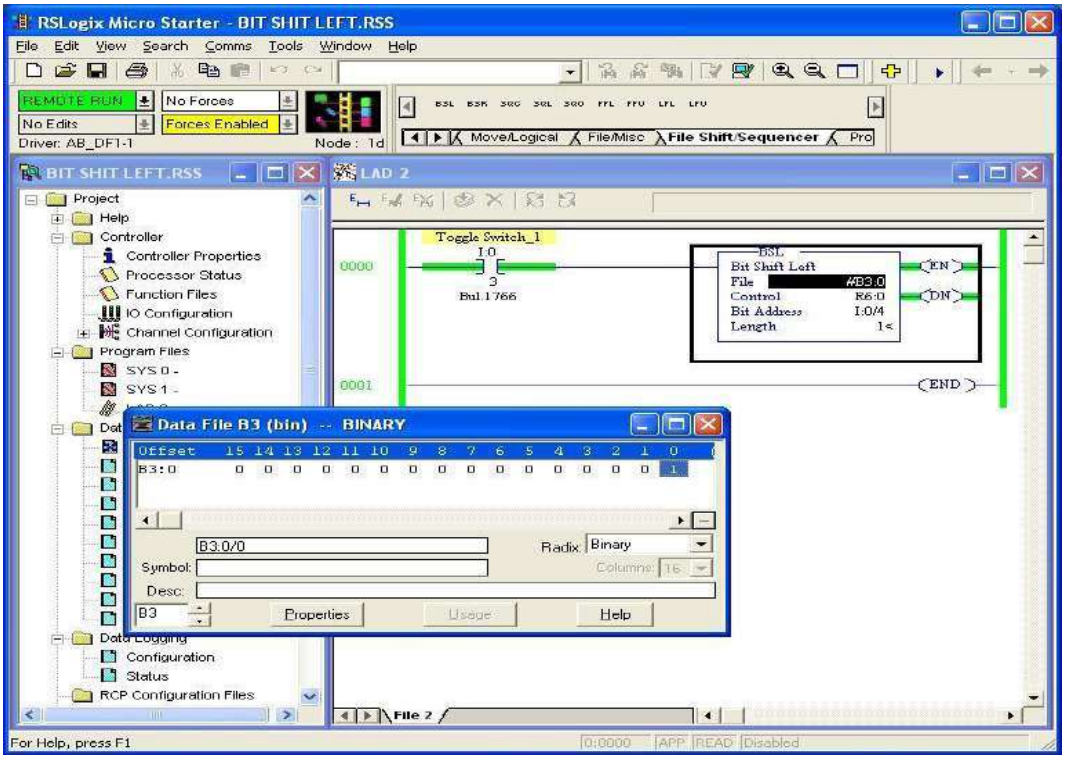
- ClickonB3:0BinaryOptionisshownbelow.AfterclickonB3:0Binarythiswindowwill open.



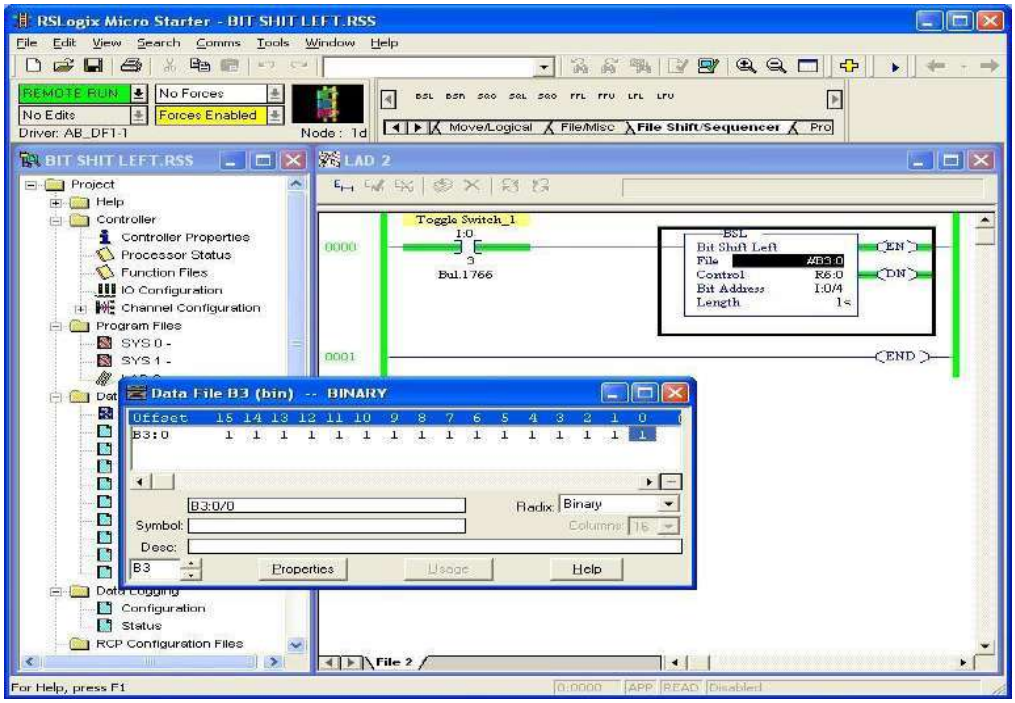
- YouenablethеI:0/4(ToggleSwitch_2)isshown below.



- WhenyouenabletheToggleswitch,B3:0bit positionisshownbelow.



- WhenyouEnabletheI:0/5manytimes,B3:0BitpositionShiftLeftisshownbelow.
- WhenYouEnableand Disablethe I:0/3 (Toggle Switch_1)bitwill beshiftleft



CONCLUSION:

Thus the data manipulation operation was performed and verified successfully using PLC software.

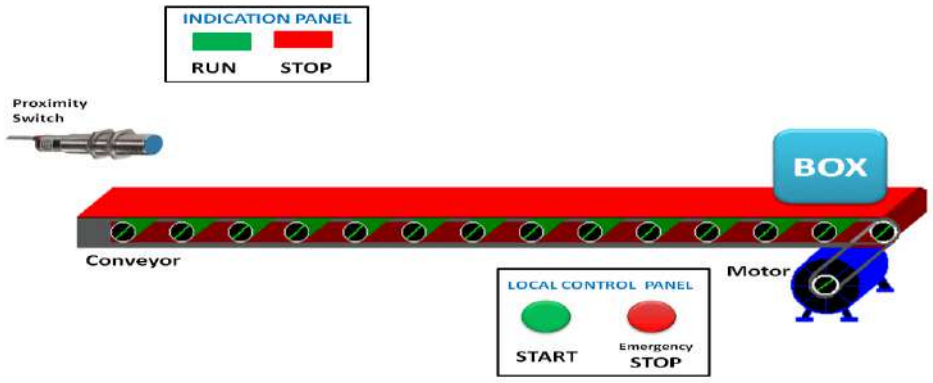
AIM OF THE EXPERIMENT:

To study about conveyor control system using PLC

APPARATUS REQUIRED:

Sl. no.	Apparatus Name
1.	VPAT-24 kit
2.	VPLCT-03 kit
3.	PLC software installed PC
4.	STEPPER MOTOR
5.	Patch chords
6.	Power chord

THEORY:



Conveyor System:

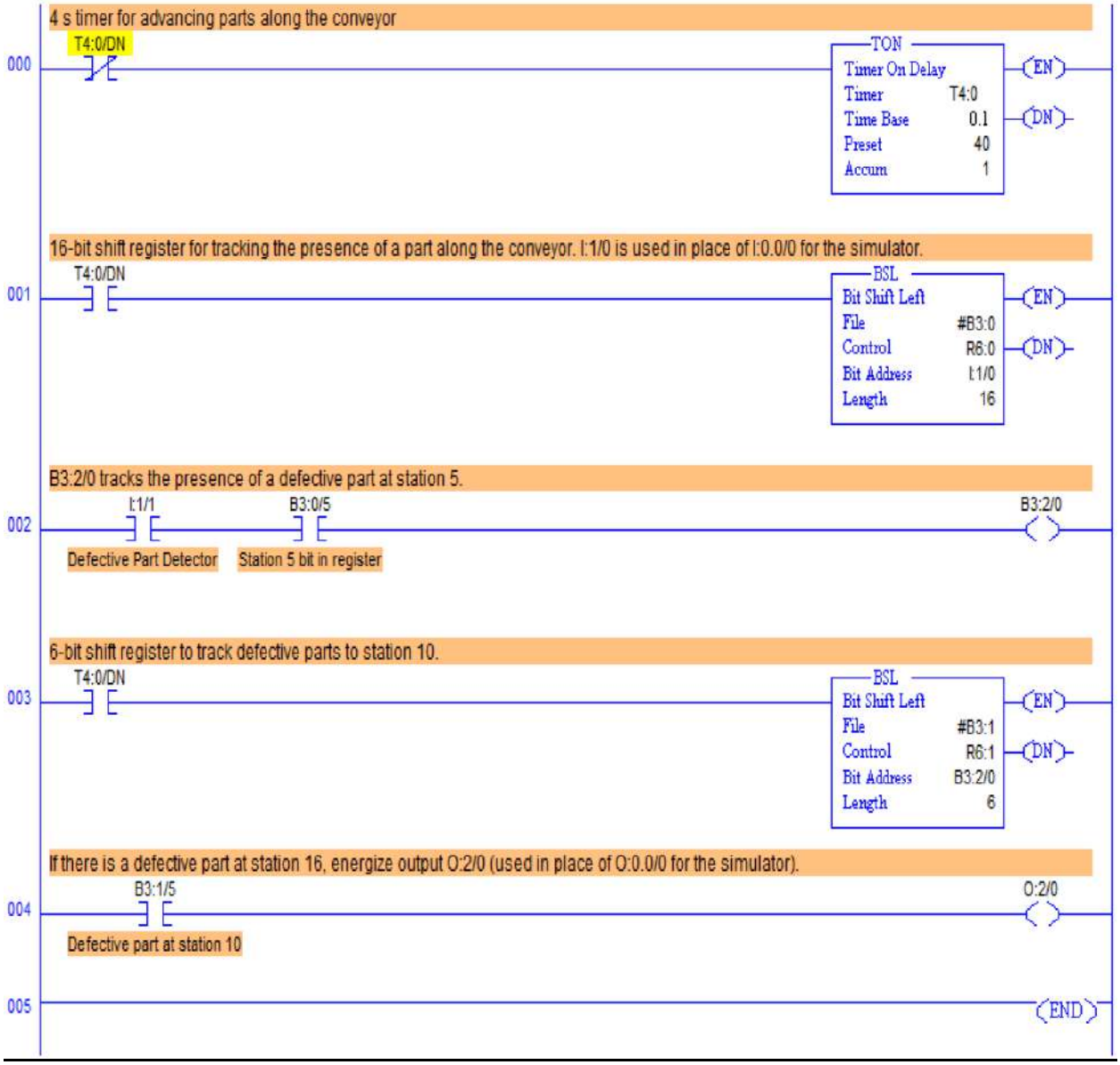
- ✓ A conveyor system is a common piece of mechanical handling equipment that moves materials from one location to another.
- ✓ Conveyors are especially useful in applications involving the transportation of heavy or bulky materials.
- ✓ Conveyor system allows quick and efficient transportation for a wide variety of materials, which makes then very popular in the material handling and packaging industries.

Stages in the System:

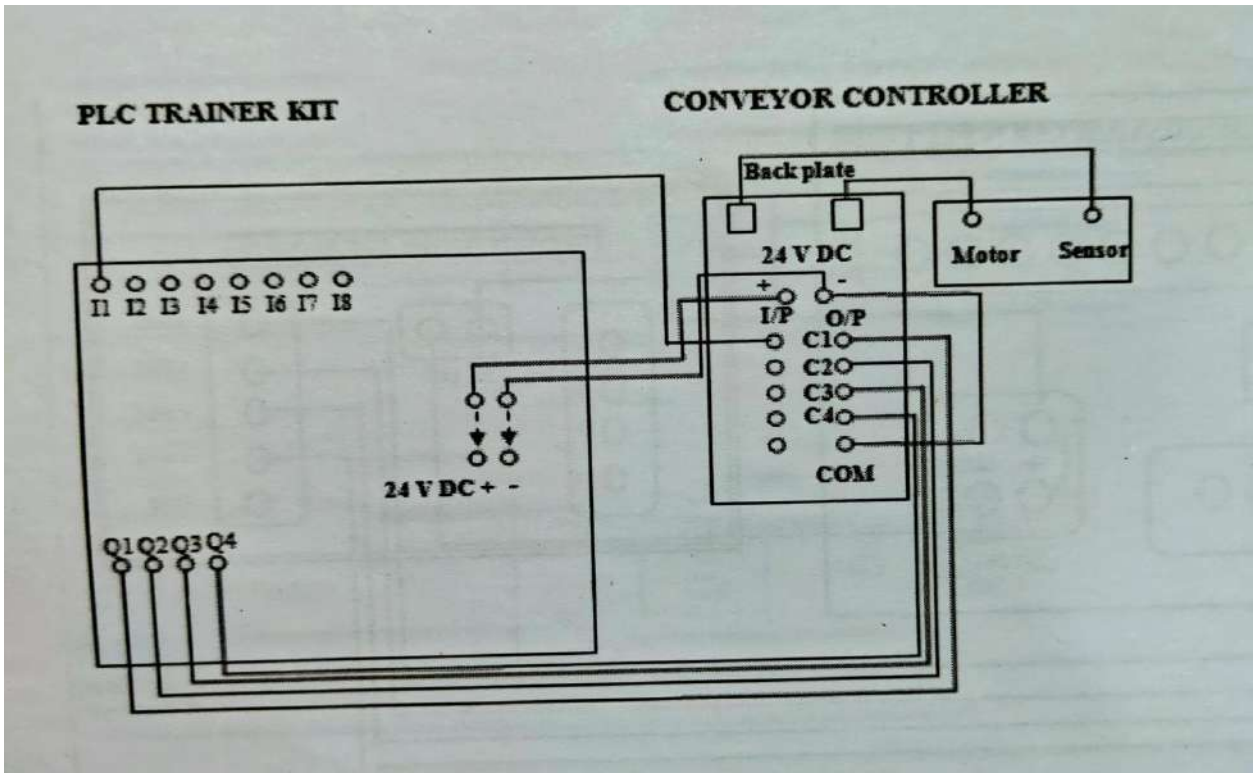
1. **Comparator**: - Two inputs (Threshold & Feedback); compares the output of detecting network and a preset.
2. **Converter/Switching circuit**: - Controller; takes decision based on the comparator output.

3. **Steeper Motor**: - A stepper motor is a brushless, synchronous electric motor that converts digital pulses into mechanical movement.
4. **Conveyor belt**: - Object translational mechanism.
5. **Object presence detector**: - To give feedback based on presence of object at the end position.

LADDER LOGIC:-



WIRING DIAGRAM:



PROCEDURE:

1. Open the PLC Software anddesign the ladder diagram.
2. Interface the PLC with the system using Ethernet cable.
3. Make electrical connections as per wiring diagram.
4. Download the program and run it.
5. Place the object on the conveyor. If the sensor the object, conveyor stops for 2 seconds and again starts automatically.

CONCLUSION:

Thus the study of conveyor control system had been studied.

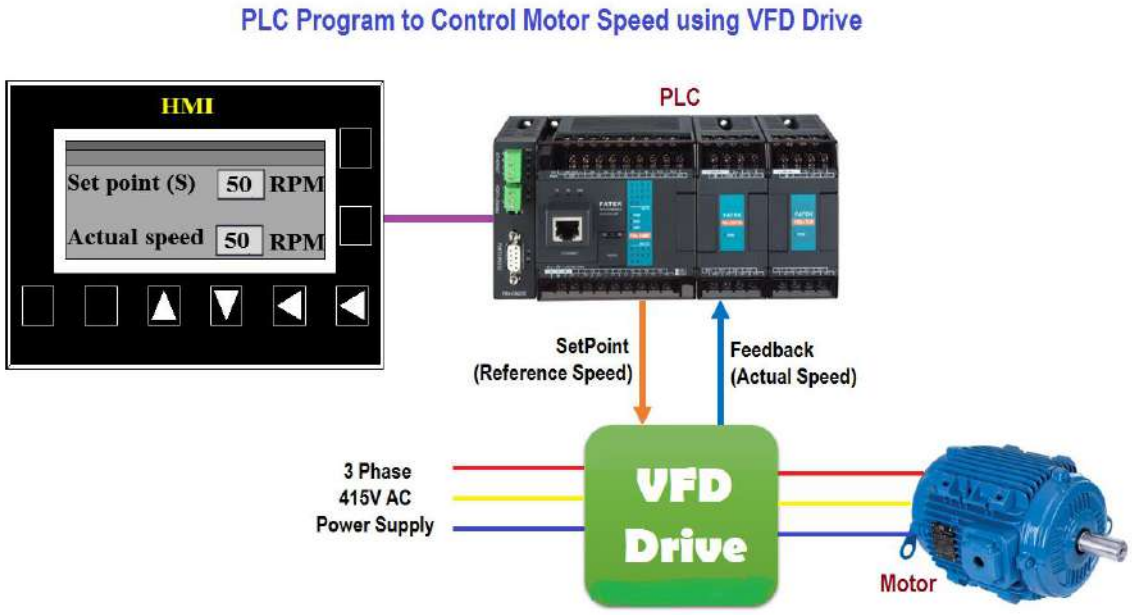
AIM OF THE EXPERIMENT:

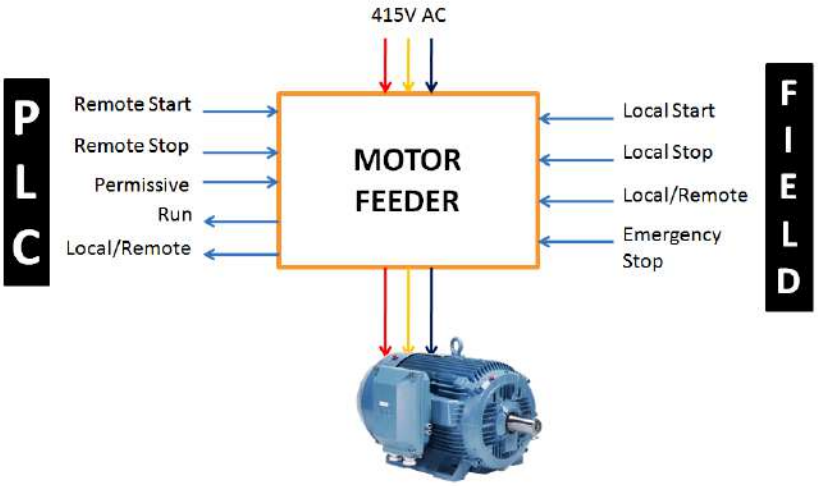
Write and implement ladder logic program to on-off the DC motor using PLC.

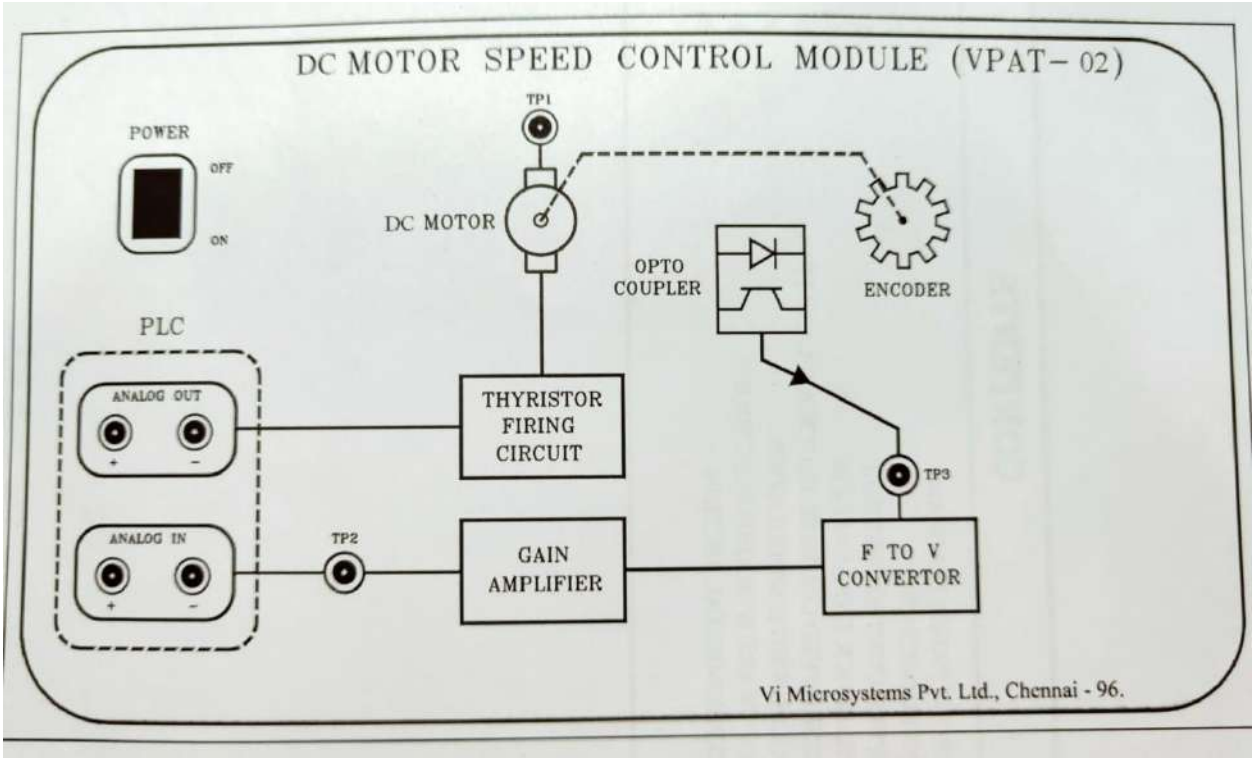
APPARATUS REQUIRED:

Sl. no.	Apparatus Name
1.	Speed control module trainer (VPAT-02)
2.	PLC trainer kit
3.	Personal computer installed with TIA portal software
4.	DC Motor
5.	Patch chords

THEORY:



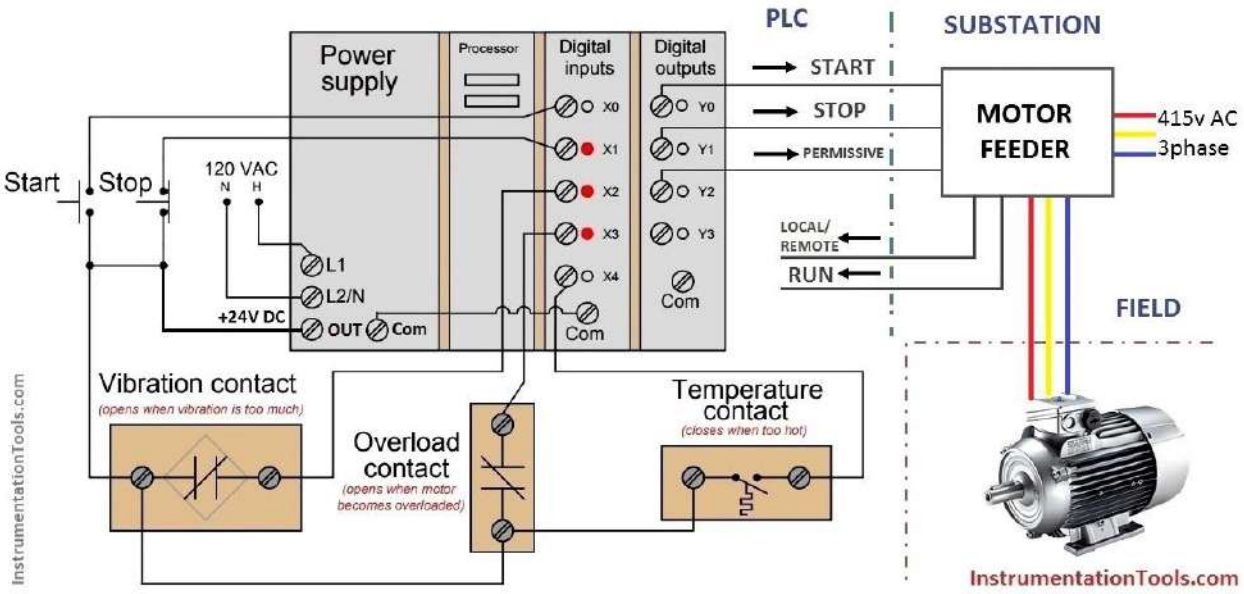




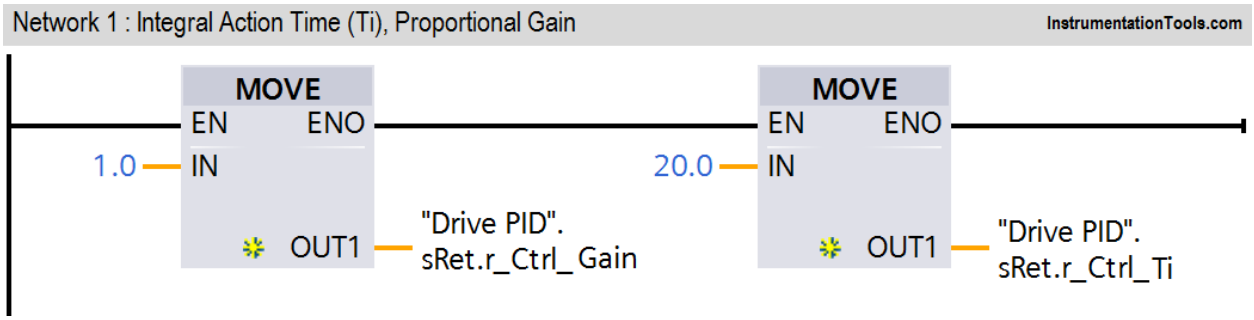
Speed Control Module:

- This module maintains the speed of DC motor to the set point using PLC.
- After giving the set point (SP) the PLC produces the analog output, this will be given to motor.
- So initially the motor starts rotating at some speed.
- The speed of the motor is measured using Opto coupler sensor.

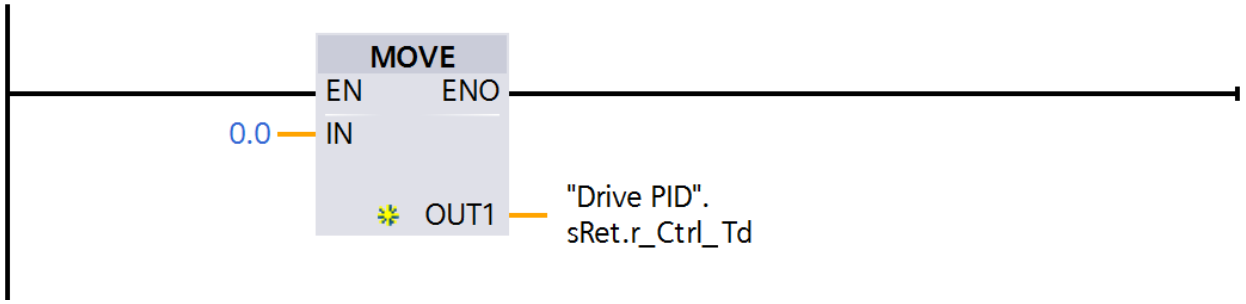
- The output of Opto coupler will be a series of pulses are converted into voltage using frequency to voltage converter.
- This voltage is process variable (PV) and is applied to the analog input of PLC.
- In PLC program PID block reads this PV and compares the both set point (SP) and process variable (PV), it creates error value and produces the control variable (CV) to the motor unit through analog output.
- This controlled output will maintain the speed of AC motor at its set point (SP).
- Likewise it forms the closed loop control using PLC.



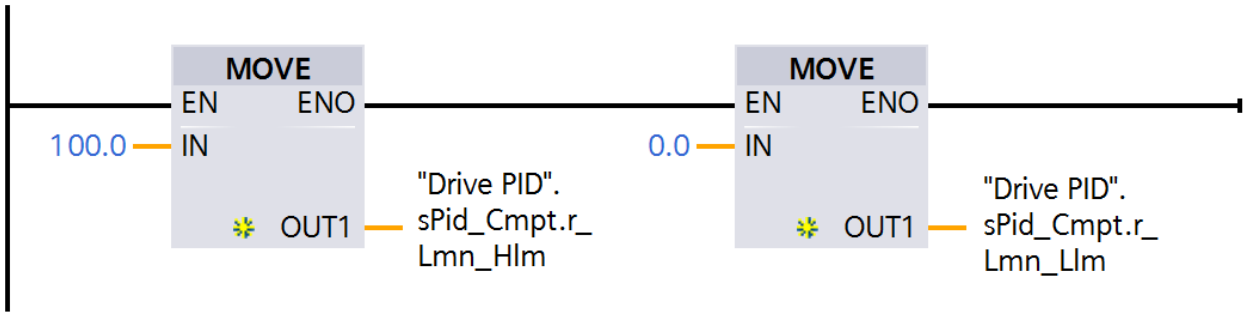
PLC Ladder diagram to control Motor Speed



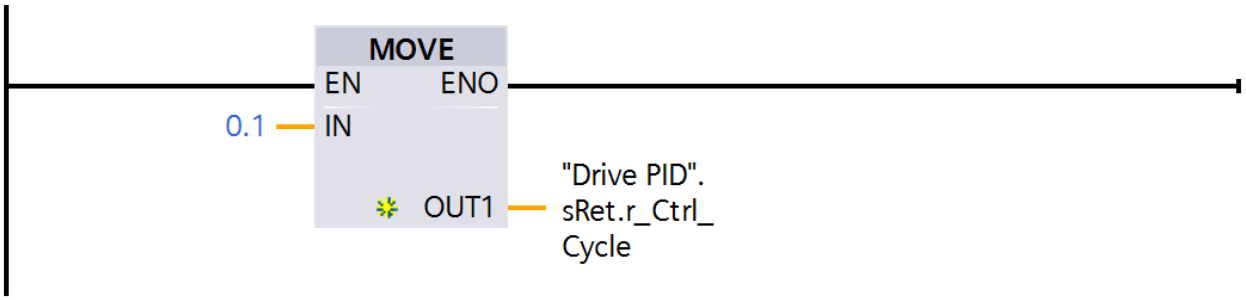
Network 2 : Derivative Action Time (Td) InstrumentationTools.com



Network 3 : Max and Min Output Limit InstrumentationTools.com

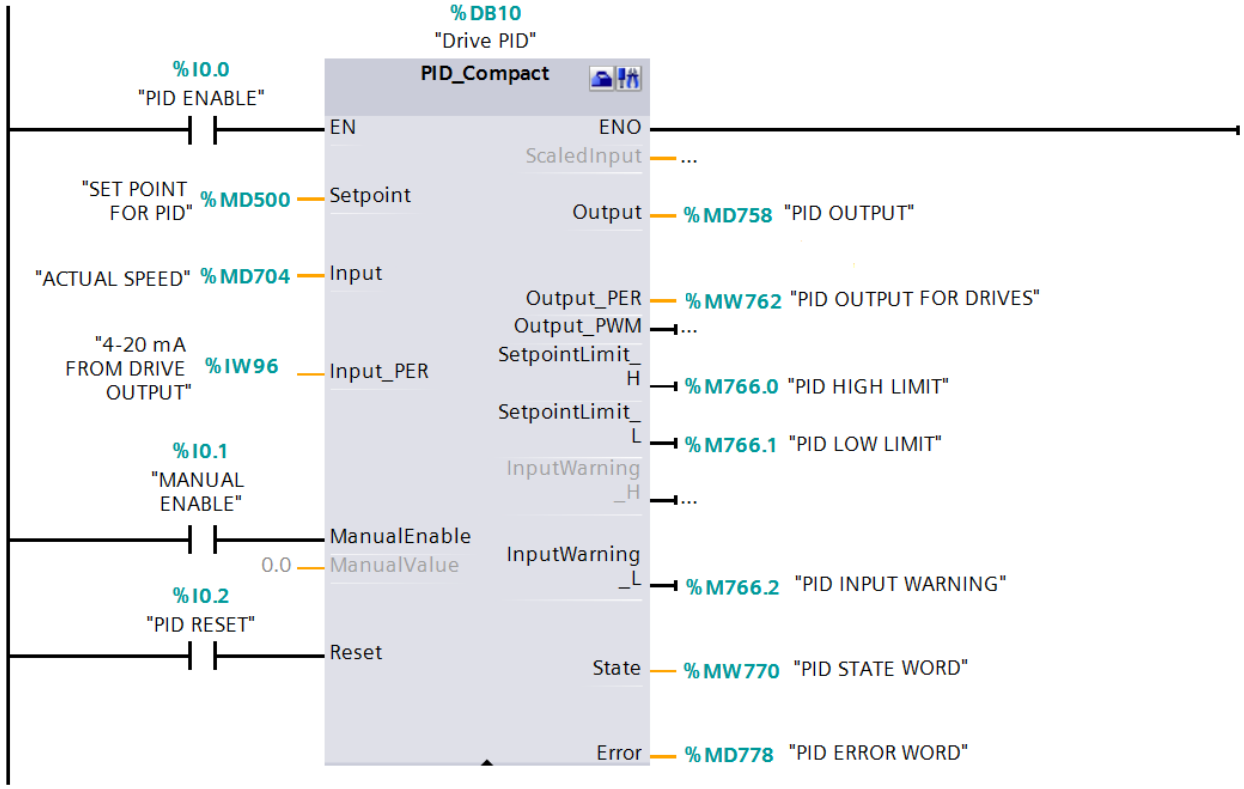


Network 4 : PID Sampling Time InstrumentationTools.com



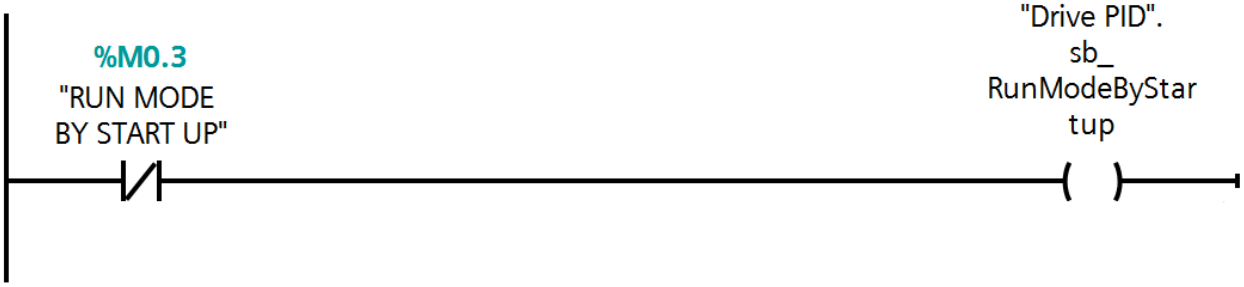
Network 5 : PID Block (Linear PID for Drives Output

InstrumentationTools.com



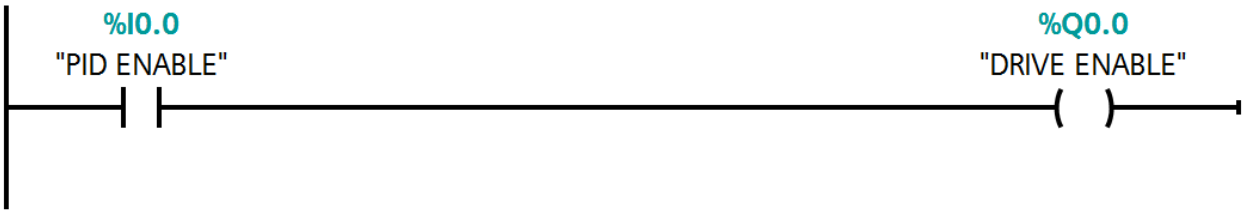
Network 6 : Enable Running Last State Re-Start or Start-up

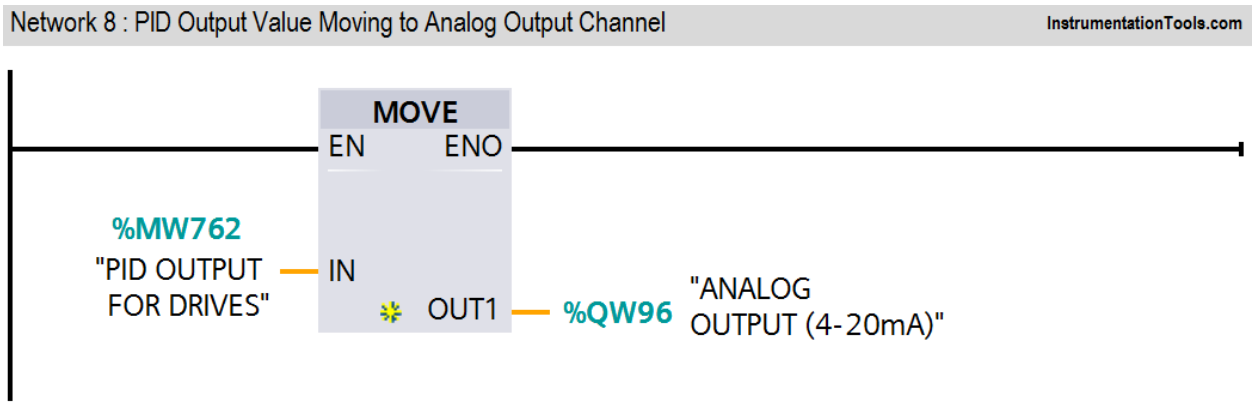
InstrumentationTools.com



Network 7 : PID Output for VFD Drive

InstrumentationTools.com

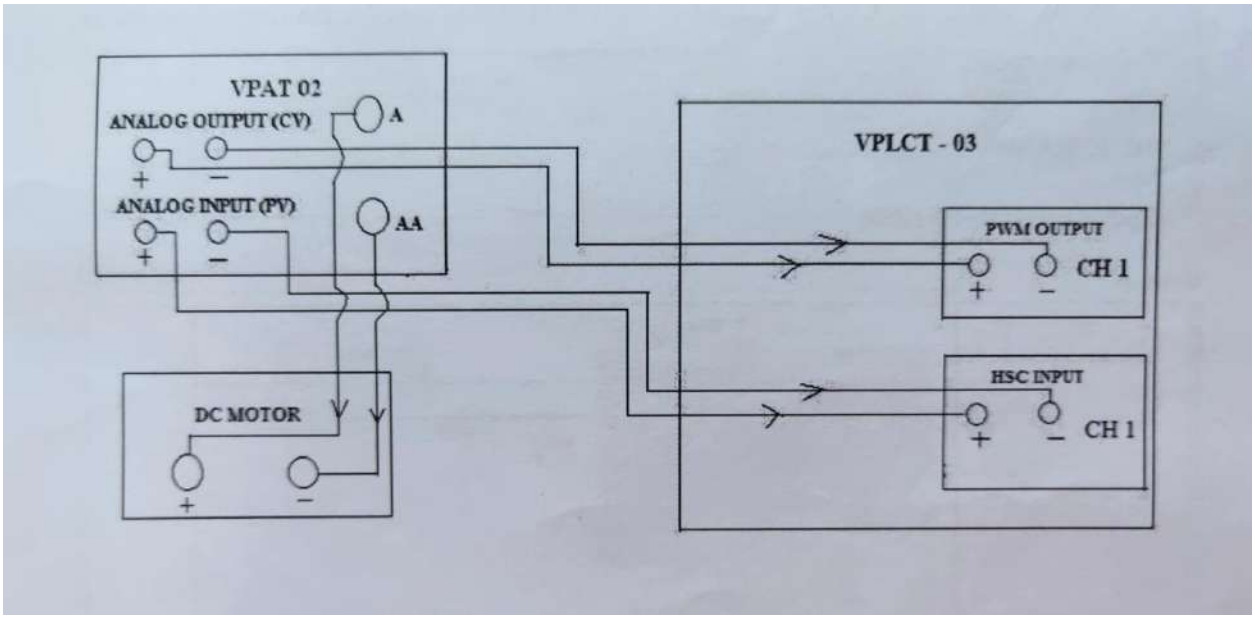




Runtime Test Cases:-

Inputs	Outputs	Physical Elements
I0.0=1	Q0.0=1	Drive ON
MD500=50RPM	MW762=13838 (approx.)	Drive speed =50RPM

WIRING DIAGRAM:



PROCEDURE:

1. Made the connections based on wiring diagram.
2. Switch ON the PLC kit.
3. Interface the PC to PLC through Ethernet Communication Cable.
4. For configuration of software, programming follows the procedure.
5. Switch ON the DC MOTOR SPEED CONTROL kit.
6. Download and run the program to PLC.
7. Set the set point of motor speed (0-1500 rpm) i.e. 0.0 to 100.0 in PID set point block.
8. Based on set point the PID controller enables the PWM output pulses.
9. By this pulse the DC Motor starts rotating at some speed.
10. Opto coupler sensor senses the feedback of high speed ON pulses.
11. That feedback we can read from High speed counter input channel.
12. Now the PID controller compares the set point (SP) and Process (PV) (SPEED).
13. By varying the Control Output (CV) (PWM pulse) it makes the motor running at set speed.

RESULT:

Thus the ON-OFF operation of DC motor using PLC was studied successfully.

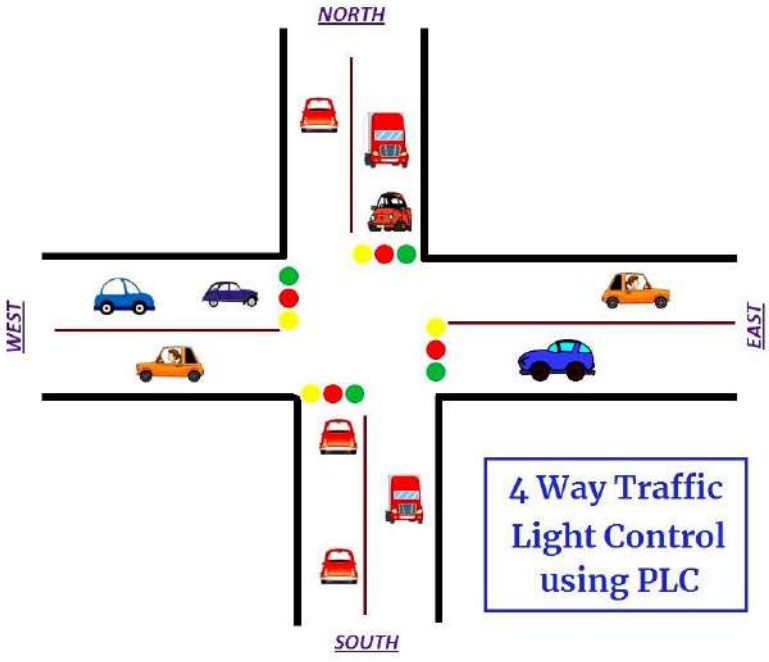
TRAFFIC LIGHT CONTROLLER

AIM OF THE EXPERIMENT:

To study the Traffic light controller system by using PLC.

APPARATUS REQUIRED:

Sl. no.	Apparatus Name
1.	VPAT-03 kit
2.	PLC
3.	PLC software installed PC
4.	ETHERNET cable
5.	Patch chords
6.	Power chord



THEORY:

Density Based Traffic Light Controller System:

- Traffic control system is used to control automatically the vehicle and human beings by using simple program logic.
- Microcontroller system is very complex to programming and wiring. Hence PLC is used to control the traffic.

- For the complex road maps the PLC provides simpler solution by means of ladder programs.
- It is four directions based traffic light controller system, which is depends upon the density of vehicle.
- If an one direction's density of vehicle is HIGH, but another one direction's density of vehicle is very LOW, then we will give more time duration to high density direction half of time duration to middle density direction, the one third (1/3) of time duration to very low density direction as respective as our decision.
- If one direction is in glow green LED [Run-mode], other directions are in red- LED [Stop-mode] .

List of Inputs and Outputs

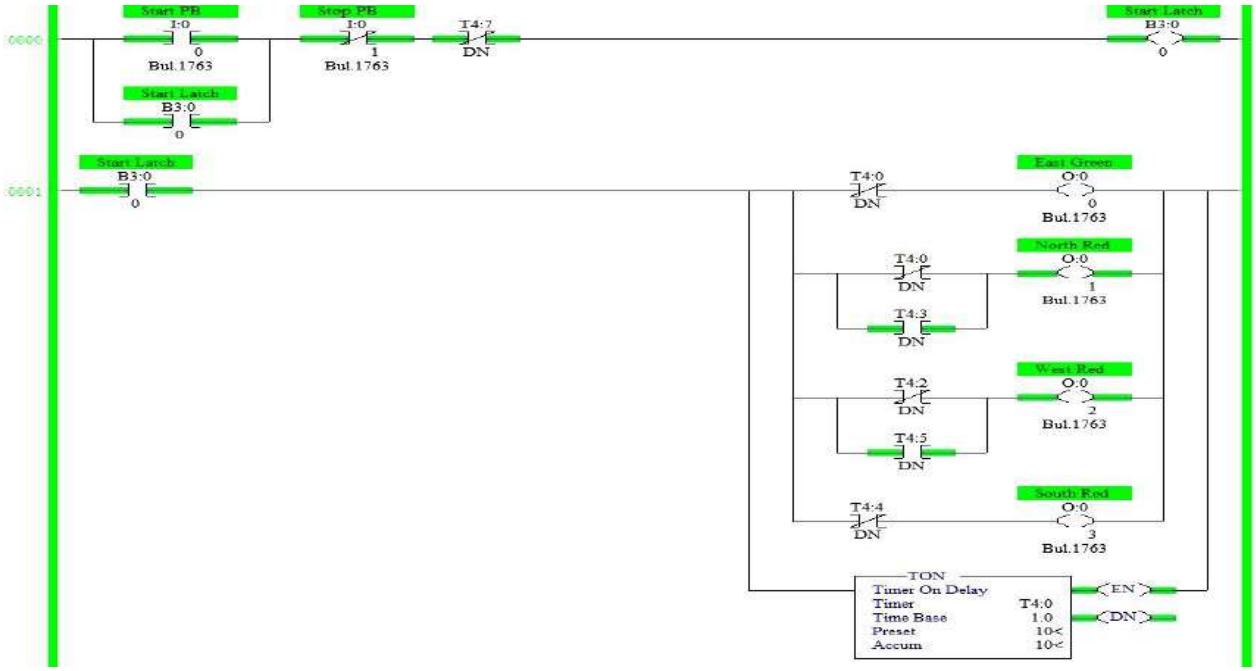
Sl. no	Address	Name	Input/ Output
1	I:0/0	Start	Input
2	I:0/1	Stop	Input
3	B3.0	Memory	Memory
4	O:0/0	East Green	Output
5	O:0/1	North Red	Output
6	O:0/2	West Red	Output
7	O:0/3	South Yellow	Output
8	O:0/4	East Yellow	Output
9	O:0/5	North Yellow	Output
10	O:0/6	North Green	Output
11	O:0/7	East Red	Output
12	O:0/8	West Yellow	Output
13	O:0/9	West Green	Output
14	O:0/10	South Yellow	Output
15	O:0/11	South Green	Output

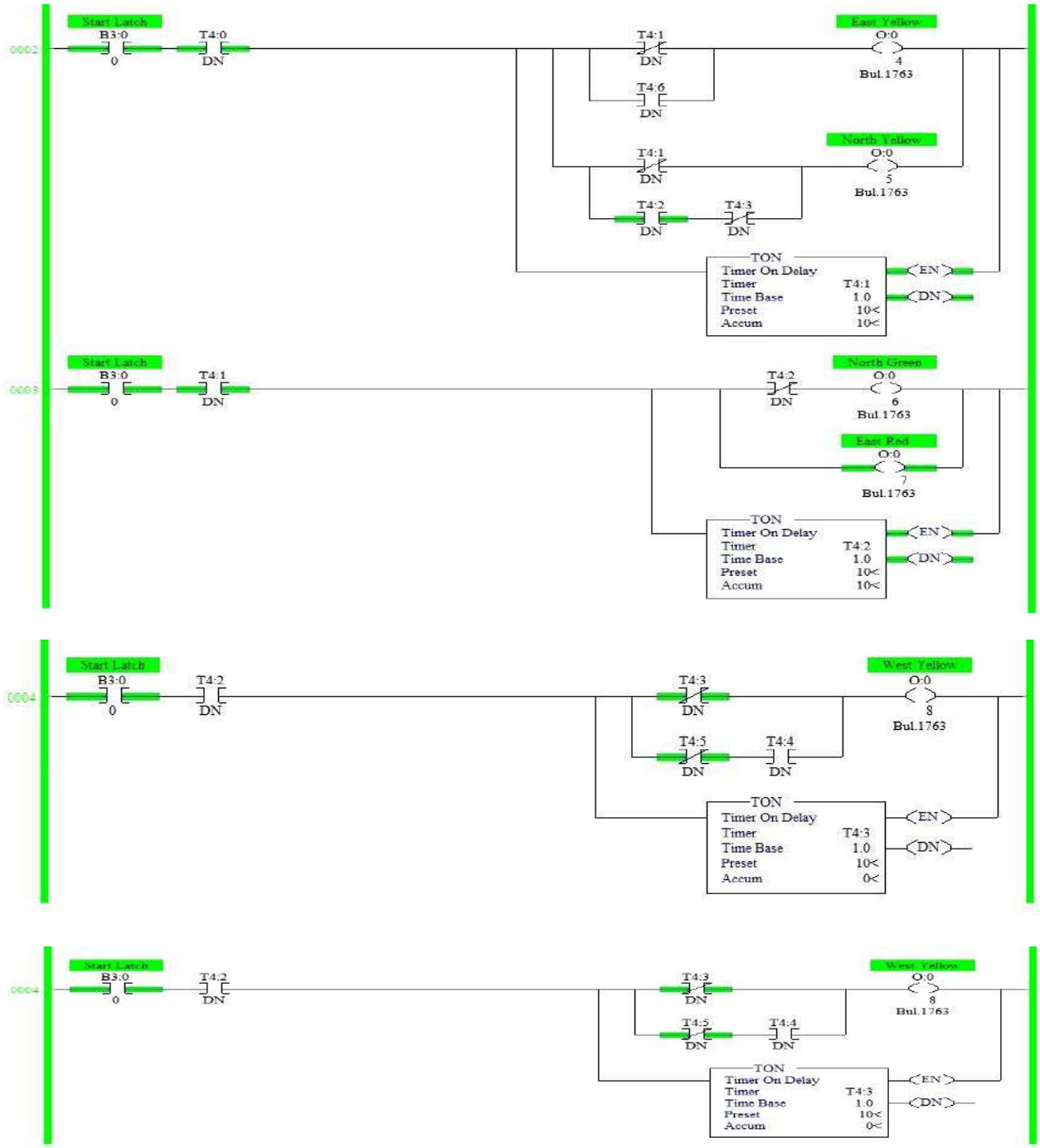
Sequence of Operation

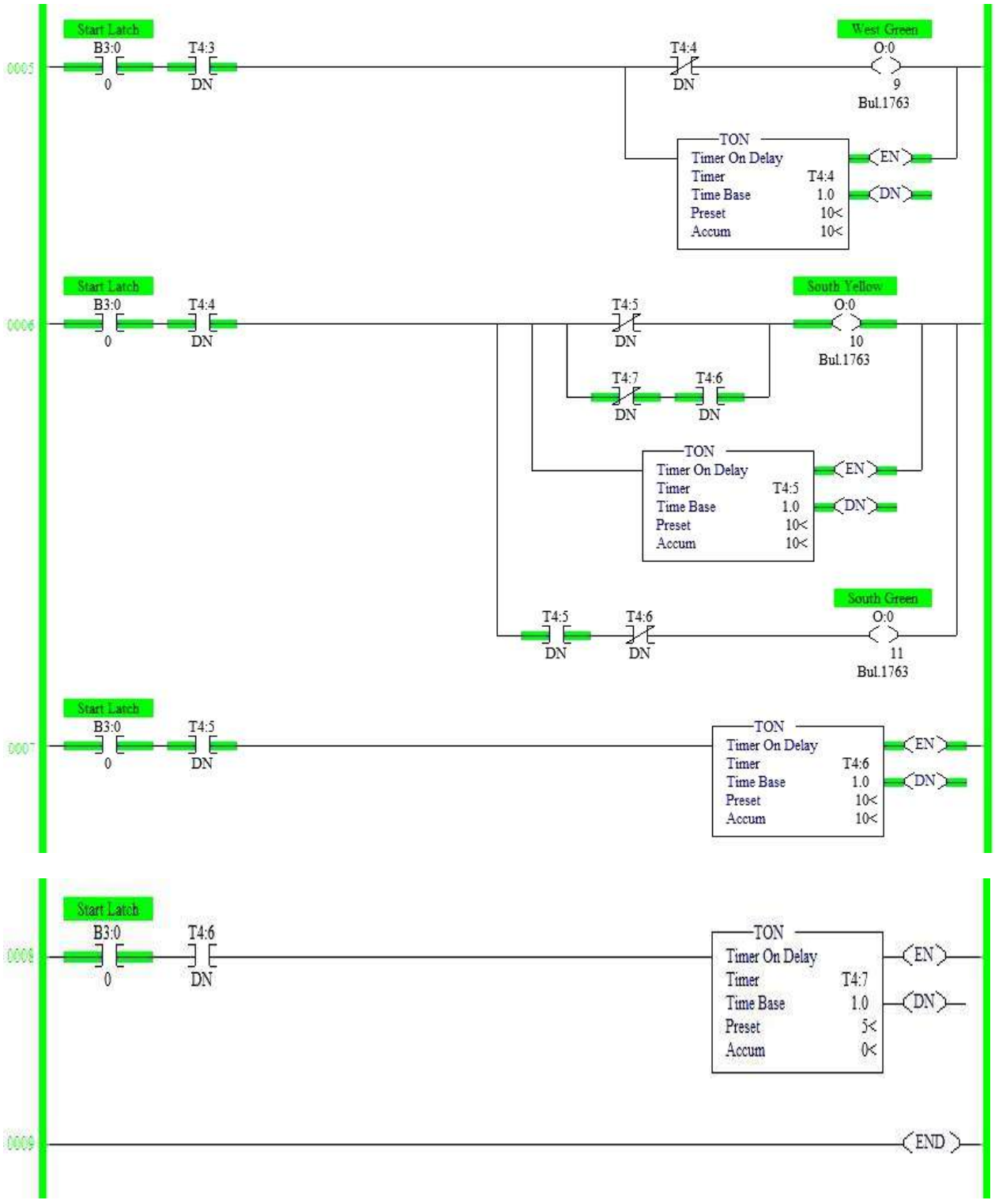
Below tabular column gives the Steps or sequence of outputs to turn ON the traffic system lamps (RED, GREEN, YELLOW)

S.NO	EAST	WEST	NORTH	SOUTH
1	G	R	R	R
2	Y	R	Y	R
3	R	R	G	R
4	R	Y	Y	R
5	R	G	R	R
6	R	Y	R	Y
7	R	R	R	G
8	Y	R	R	Y

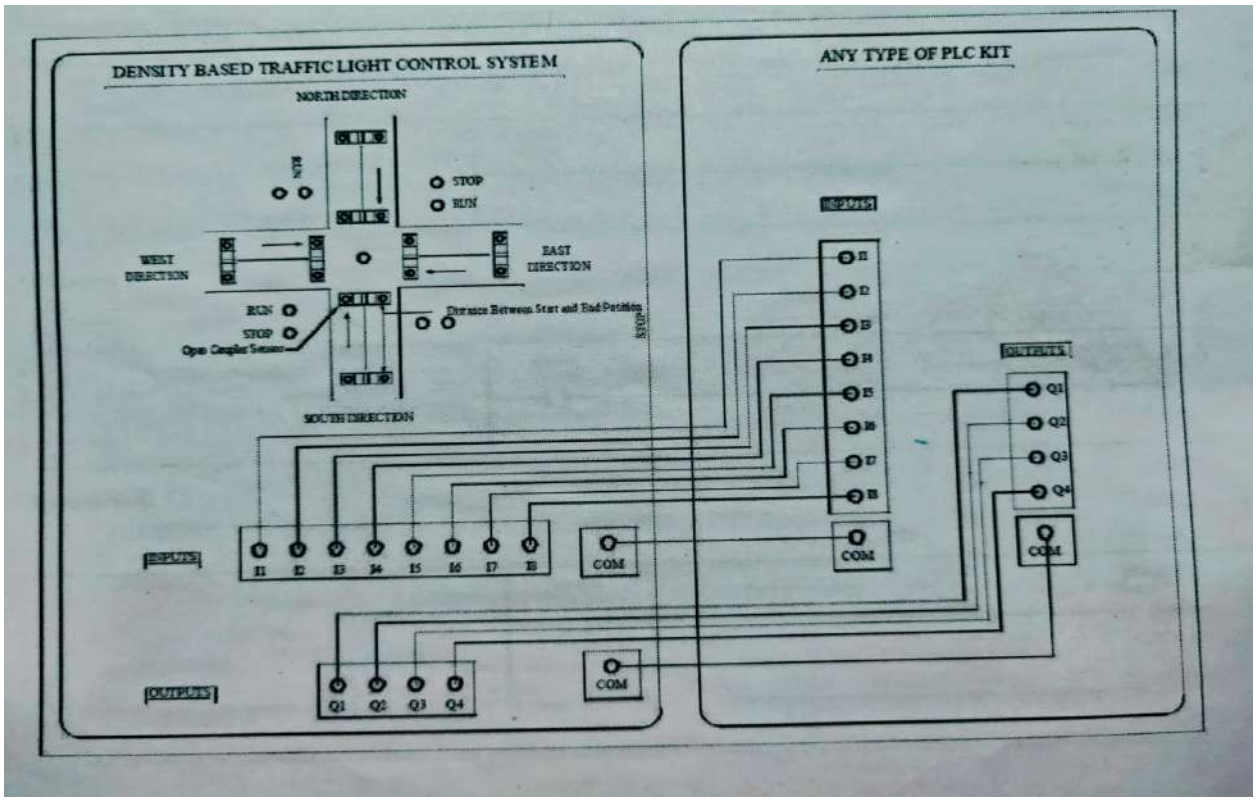
LADDER LOGIC PROGRAM:-




Start Latch
B3:0
0
T4:0
DN
T4:1
DN
T4:6
DN
East Yellow
O:0
4
Bul.1763
North Yellow
O:0
5
Bul.1763
T4:1
DN
T4:2
DN
T4:3
DN
TON
Timer On Delay
Timer T4:1
Time Base 1.0
Preset 10
Accum 10
EN
DN
0003
Start Latch
B3:0
0
T4:1
DN
T4:2
DN
North Green
O:0
6
Bul.1763
East Red
O:0
7
Bul.1763
TON
Timer On Delay
Timer T4:2
Time Base 1.0
Preset 10
Accum 10
EN
DN
0004
Start Latch
B3:0
0
T4:2
DN
T4:3
DN
T4:5
DN
T4:4
DN
West Yellow
O:0
8
Bul.1763
TON
Timer On Delay
Timer T4:3
Time Base 1.0
Preset 10
Accum 0
EN
DN
0004
Start Latch
B3:0
0
T4:2
DN
T4:3
DN
T4:5
DN
T4:4
DN
West Yellow
O:0
8
Bul.1763
TON
Timer On Delay
Timer T4:3
Time Base 1.0
Preset 10
Accum 0
EN
DN


Start Latch
B3:0
0
T4:3
DN
T4:4
DN
West Green
O:0
9
Bul.1763
TON
Timer On Delay
Timer T4:4
Time Base 1.0
Preset 10<
Accum 10<
EN
DN
Start Latch
B3:0
0
T4:4
DN
T4:5
DN
South Yellow
O:0
10
Bul.1763
T4:7
DN
T4:6
DN
TON
Timer On Delay
Timer T4:5
Time Base 1.0
Preset 10<
Accum 10<
EN
DN
T4:5
DN
T4:6
DN
South Green
O:0
11
Bul.1763
Start Latch
B3:0
0
T4:5
DN
TON
Timer On Delay
Timer T4:6
Time Base 1.0
Preset 10<
Accum 10<
EN
DN
Start Latch
B3:0
0
T4:6
DN
TON
Timer On Delay
Timer T4:7
Time Base 1.0
Preset 5<
Accum 0<
EN
DN
END

WIRING DIAGRAM:



PROCEDURE:

1. By applying start one triggering pulse to input I1.0(I9), which causes for open coilM0.0 energized in Network 1, Due to energization of open coil M0.0 initiates the operation.
2. It causes the open coil Q0.0 [Q1 coil] energized in Network 5 on delay timer is also energized. After completing the time delay [5sec], which is depending upon preset Time coil M0.0 will be energized. Due to energization of M0.1 it cuts the Q0.0 coil output and enables the Q0.1 west Direction output.
3. Due to Q0.1 (Q2 coil) will energized in Network 7, then Q1 coil Q0.0 de-energized and timer is reset in Network 8. This same process was repeated again in west direction, North Direction, and East direction.
4. In west direction, that means Network 8 ON delay timer will be energized depends upon Q2coil [Q0.1] then M0.2 [open coil] is energized, after completed programmed time delay, which is depends upon preset time, then rest the timer. At that time, Q2 coil [Q0.1] de-energized, timer was reset, Q3 coil [Q0.2] was energized.
5. In network I0, latch connection Q3 coil [Q0.2] is used to energized for continuously. Hence on delay timer are starts ON due to Q3 contact [Q0.2] energization in run- 8, then M0.3 [Q0.2] will energize. After completion of time delay, which is depends upon preset time, then reset the timer. Then Q4 coil [Q0.3] energized and Q3 coil [Q0.2] are de-energized at that same time.

6. In Network I3 ON delay timer is starts ON, due to contact [Q0.3] energization, then M0.4 coil will be energized, after completion of time delay, rest the timer this time delay depends upon the [M0.4] preset time.

CONCLUSION:

Thusthe study of traffic control system was done by using PLC.

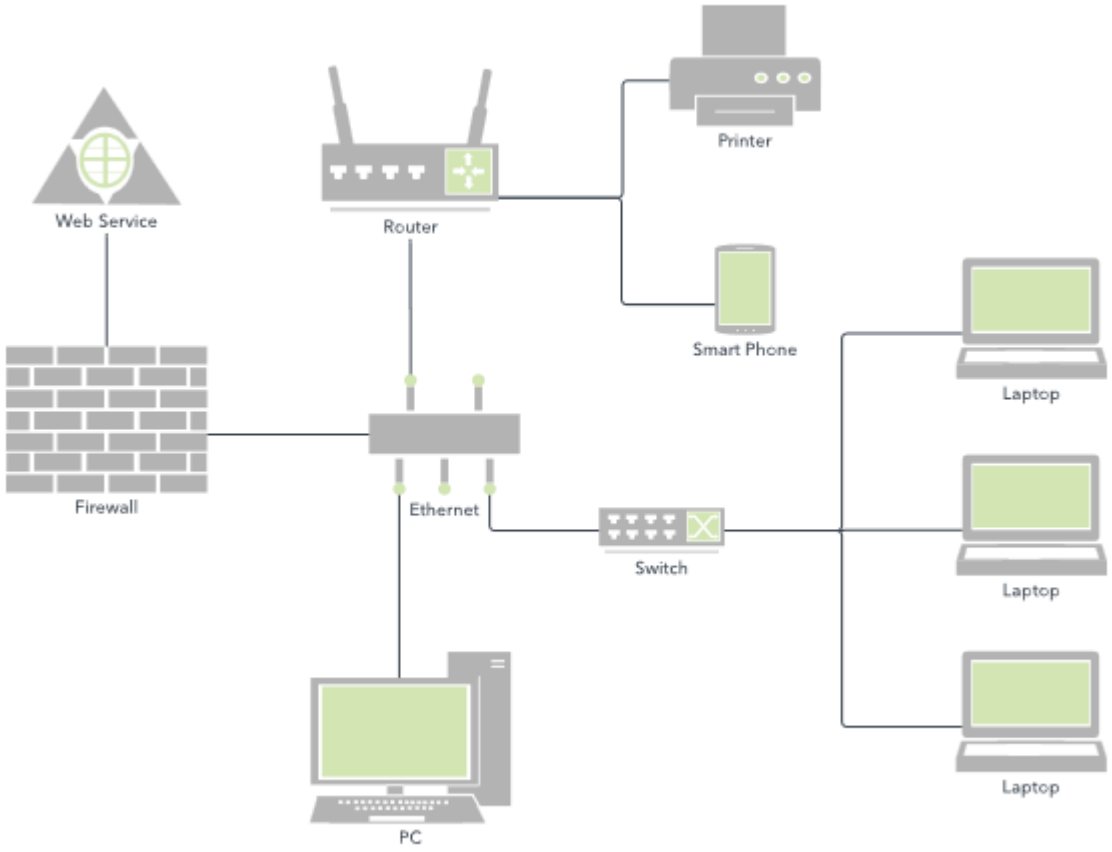
2. NETWORKING PROGRAMMING:

EXPERIMENT:

AIM:- FAMILIARIZE WITH COMPUTER NETWORKING LINE DIAGRAMS.

Network Diagram

A network diagram is a visual representation of a computer or telecommunications network. It Ashows the components that make up a network and how they interact, including routers, devices, hubs, firewalls, etc. This network diagram shows a local area network (LAN):

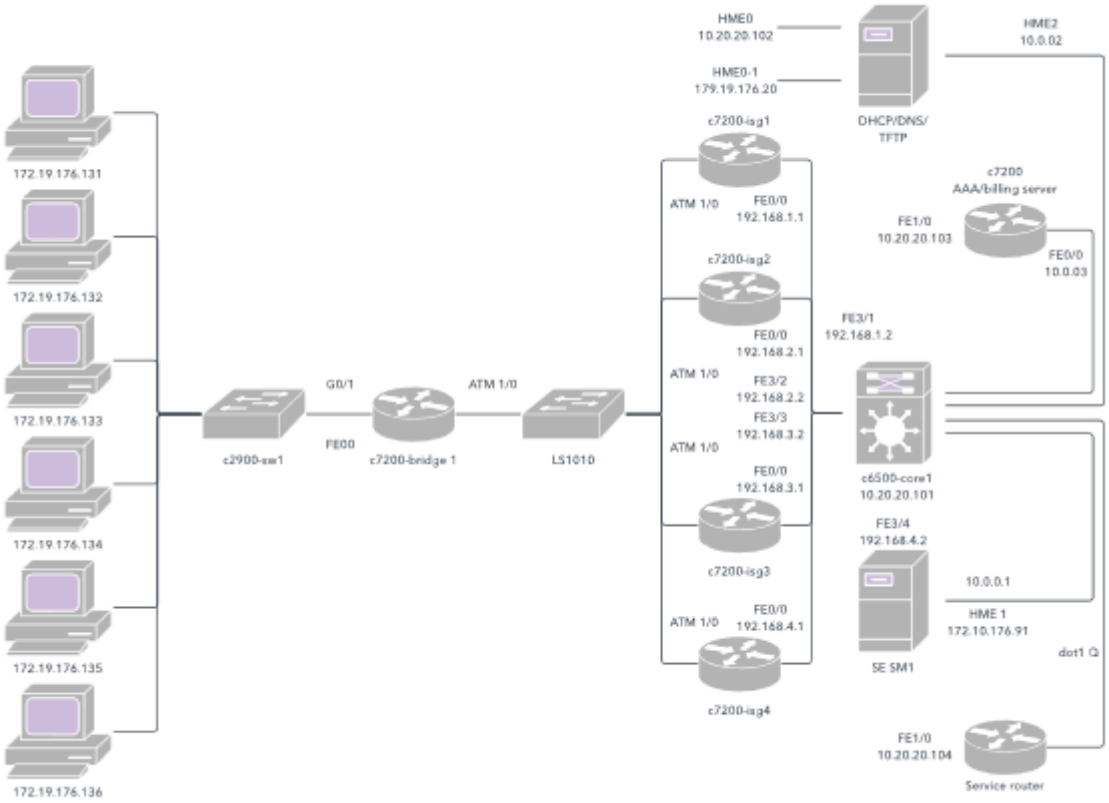


Depending on its scope and purpose, a network diagram may contain lots of detail or just provide a broad overview. For instance, a diagram of a LAN might could show the IP addresses of individual computers, while the diagram of a MAN (metropolitan area network) could represent buildings or areas with a single node.

A network diagram can be either physical or logical.

Logical network diagrams

A logical network diagram describes the way information flows through a network. Therefore, logical network diagrams typically show subnets (including VLAN IDs, masks, and addresses), network devices like routers and firewalls, and routing protocols.



In the Open Systems Interconnection (OSI) model, logical network diagrams correlate with the information contained in layer 3 (L3). Also known as the "network layer," L3 is an abstraction layer that deals with packet forwarding through intermediate routers. Level 2 shows the data links between adjacent nodes, while level 1 shows the purely physical lawet.

Physical network diagrams

A physical network diagram shows the actual physical arrangement of the components that make up the network, including cables and hardware. Typically, the diagram gives a bird's eye view of the network in its physical space, like a floorplan.

How are network diagrams used?

With their capacity for showing how network components interact, network diagrams can serve a variety of purposes, including:

- Planning the structure of a home or professional network
- Coordinating updates to an existing network
- Reporting and troubleshooting network problems
- To comply with PCI or other requirements
- As documentation for external communication, onboarding, etc.
- To keep track of components
- Sending relevant information to a vendor for an RFP (request for proposal) without disclosing confidential information
- Selling a network proposal to financial stakeholders
- Proposing high-level, syslog infrastructure changes

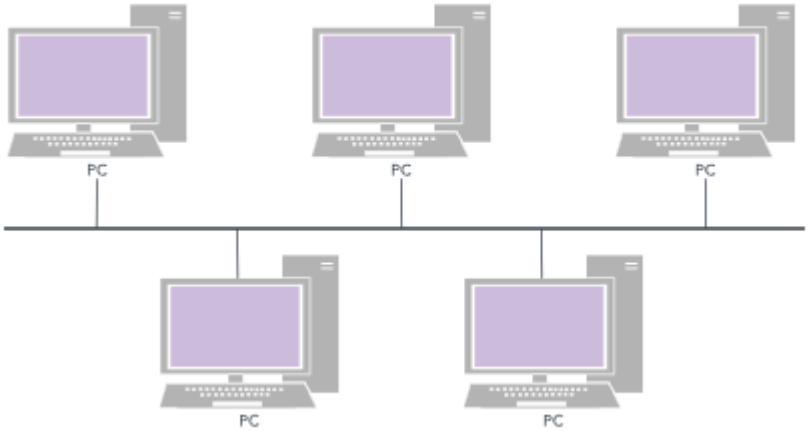
What is network topology?

Network topology refers to the arrangement of elements within a network. Like network diagrams, network topologies can describe either the physical or logical aspects of a network. Logical topology is also known as signal topology.

Different topologies are best for certain situations, since they can affect performance, stability, and other outcomes.

Bus topology

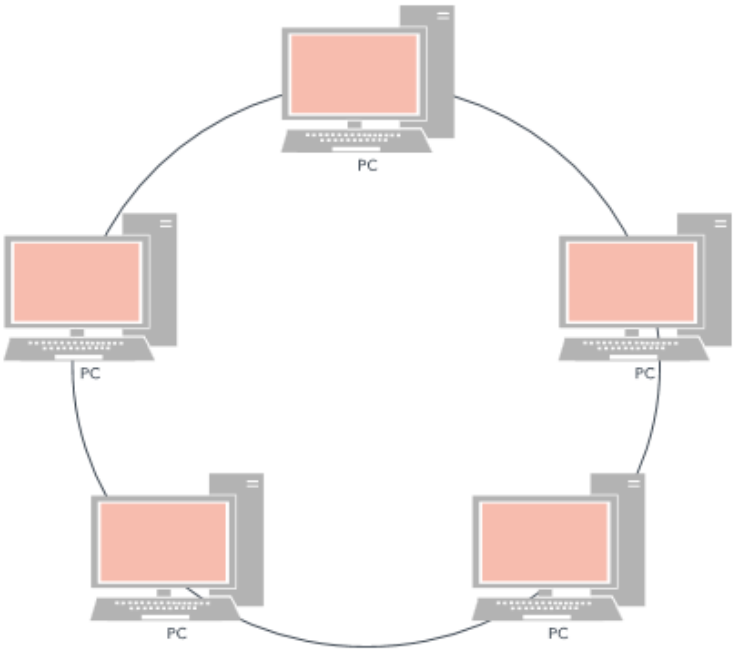
Also known as the backbone, linear, or ethernet topology, this type of network is distinguished for having all of the nodes connected by a central medium (the “bus”) which has exactly two endpoints.



Bus topologies are easy to configure and require less cable length than some other topologies. However, if the central bus breaks down, so does the whole network, and it can be difficult to isolate the problem.

Ring topology

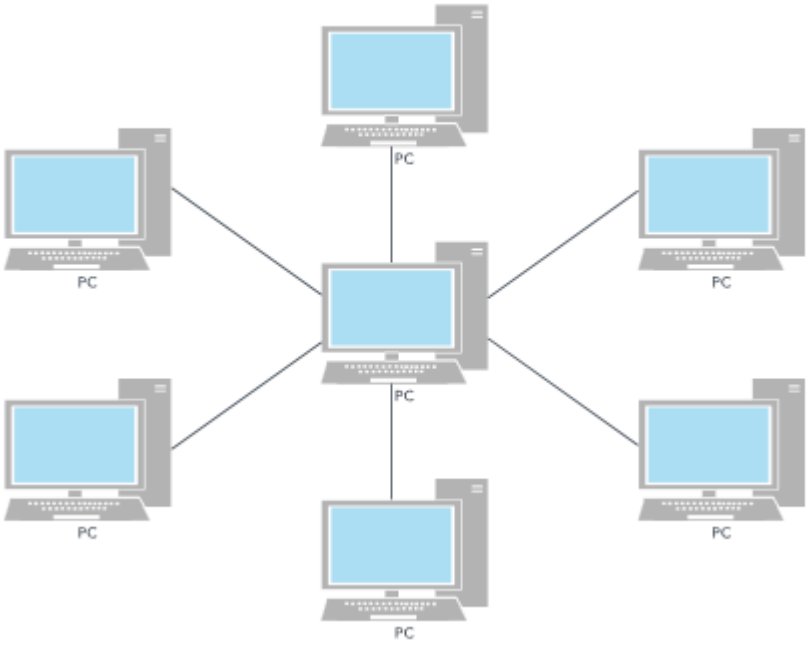
Nodes are connected in a circular pattern, and packets of information are sent through the ring until they reach their destination.



Ring networks can outperform those based on the bus topology, and they can be easily reconfigured to add or remove devices. However, they are still relatively vulnerable, since the whole network fails if a single node fails. Also, bandwidth must be shared across all the devices and connections.

Star topology

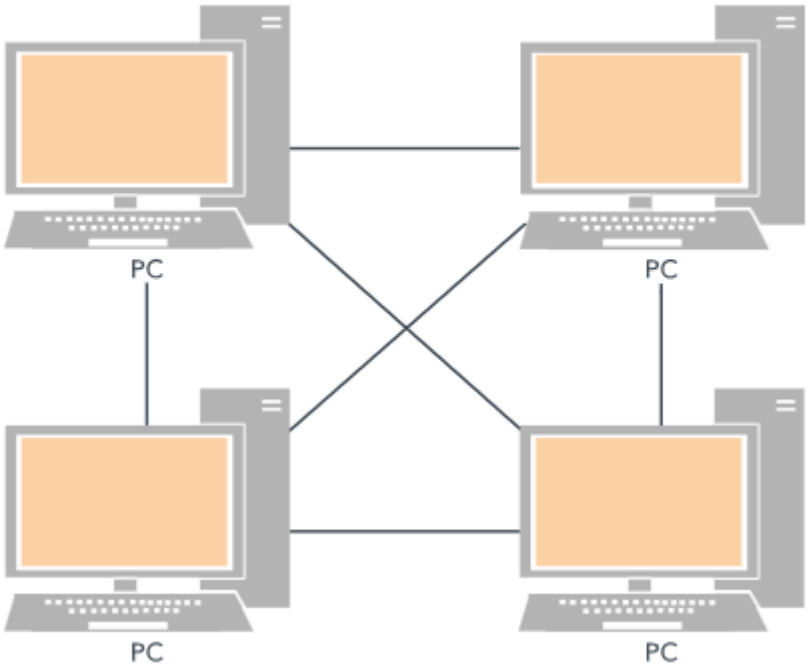
One of the most common topologies, the star topology consists of a central hub or switch, through which all of the data passes, along with all of the peripheral nodes connected to that central node.



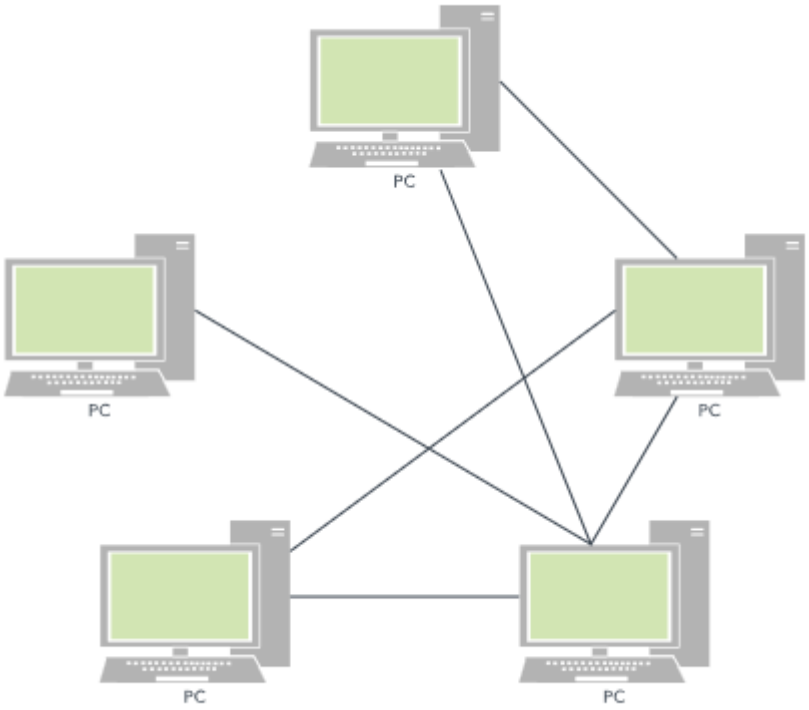
Star topologies tend to be reliable because individual machines may crash without affecting the rest of the network. But if the central hub or switch fails, none of the connected nodes will be able to access it. Cable costs also tend to be higher for star networks.

Mesh topology

There are two types of mesh topology. In the first, which is called full mesh topology, each node is directly connected to every other node.



In a partial mesh topology, nodes are only connected to the nodes they interact with most.



Most networks employ some combination of topologies to yield what's called a hybrid topology. For instance, the tree topology combines the bus and mesh topologies.

The logical and physical topology of a particular network may resemble one another, or they may be entirely different. For example, a twisted pair Ethernet network exists as a star topology physically but follows the bus topology logically.

EXPERIMENT:

AIM:-INSTALLATION OF NETWORK CARD & CONNECTING SYSTEMS IN A NETWORK SWITCH.

Install and configure a network card in Windows 7

Step 1: Install a network card. This could be PCI card or USB network card adaptor.

If we are installing a PCI card we need to open our computer case and push the PCI network card into an empty PCI slot. It is quite simple and straight forward. If we are using a USB network adaptor we simply need to plug it into an empty USB port.

PCI Network card : *USB Network Adaptor:*

Step 2: Install the device driver for the network card. Windows will detect that we have installed a new hardware. In most cases it will install the drivers automatically. If not, we need to install the drivers manually from the CD supplied with the network card. I am using Windows 7 operating system to demonstrate each step. If we are using Windows Vista the steps will be very similar. If we are using Windows XP it will be slightly different.

Step 3: After the drivers have been installed successfully we can see a network card listed under windows device manager. To go to the device manager click ***Start -> Control Panel -> System and Security -> Device Manager***.

We will see a network card listed under the device manager similar to the image below:

Step 4: Go to network sharing center by clicking ***Start -> Control panel -> Network and Internet -> Network and Sharing Center***. As we can see from the image below the computer name tiger is connected to a network and has access to the Internet. This indicates that our network card is installed correctly and managed to get connection to our network. In this case it is connected to a ADSL router.

Step 5: Check our local area connections by clicking on ***change adaptor settings*** link on the left side of Network and Sharing center. We will get an icon similar to below:

Step 6: Double click on ***Local Area Connection*** icon which will display our LAN status. It shows the network connection duration, the speed of the connection, number of bytes sent and received etc.

Step 7: Click ***Details*** to see the Network connection details. We will see some very import connection details. Inside the red highlighted area we will see DHCP Enable is set to Yes and our IP Address listed. DHCP means (Dynamic Host Configuration Protocol). Basically its a feature built into most Routers or server operating systems which automatically assigns an IP address to the client computer. In our case the Router is the DHCP server and our computer is the client. Please note the dynamic IP address assigned by a DHCP server is random and can change next time we reboot our computer or the router.

Step 8: Close the Network connection details. Click ***Properties -> (on Network area connections status) -> Internet protocol version 4 (TCP/IPv4) -> Properties***. As we can see everything is set to automatic. This means the DHCP server assigns everything automatically as mentioned above.

Step 9: If we have many computers on a network i.e. our Desktop PC, Our Laptop, and our PS3 console its a good idea to fix the IP Address for each device. This is called static IP address. By fixing the IP address we can easily identify each computer on the network. This is what i will do below. I will choose my IP address as **192.168.0.100**. The subnet mask will be automatically set to **255.255.255.0**. Default gateway is **192.168.0.1**. The gateway IP address is normally the IP address of our router. Preferred DNS server is also the IP Address of our router, although we can use other DNS server like Open DNS IP address.

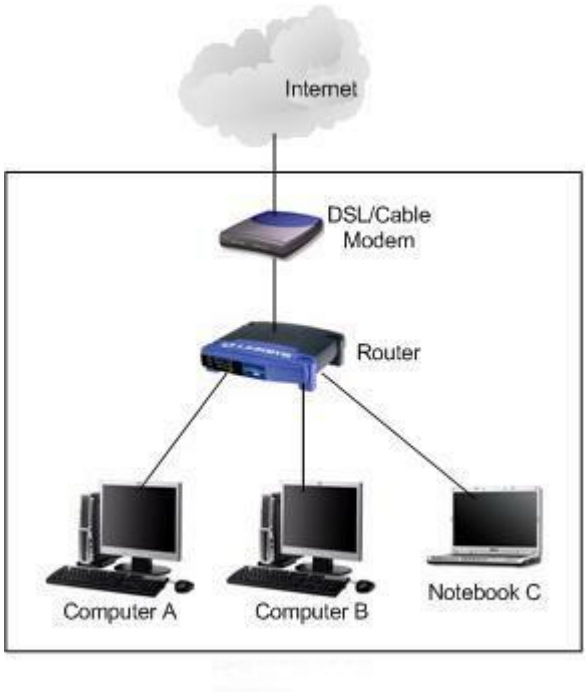
Step 10: We can now check if the static settings have taken effect by clicking on ***Details*** on Local Area connection status as we have done on Step 6. Finally we will see all the settings that we have made in the previous step has taken effect. We will notice that the DHCP enable is set to No, as we have set each value manually.

That's it, we have managed to install and configure our network device successfully. We have also learned how to use dynamic and static IP Address to connect to a network.

Expanding Network by Using Network Switch

Let say we have a network at home which shown as below. The router we bought only got 4 Ethernet LAN ports. 2 ports are connected to computers and 1 port is connected to notebook.

We then found out we still have 1 computer and 1 notebook to connect to network, but we only left 1 Ethernet LAN port on router, so how to connect both devices to the network and solve this problem?



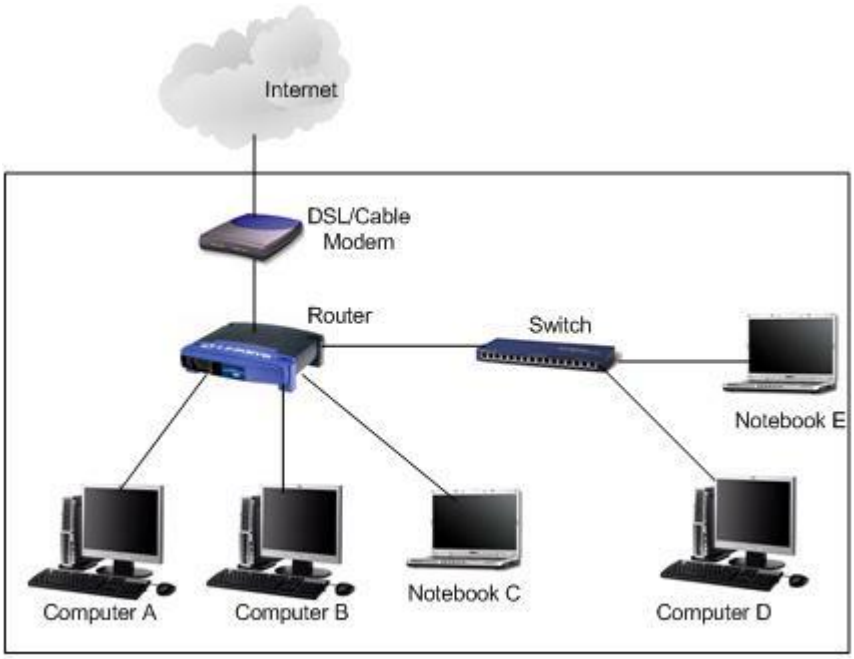
The solution is easy. We can use a network switch to solve our problem. This is a device that joins multiple computers in our network, and so those connected computers can communicate with each other. The switch is commonly used to expand wired network and the good thing is it's not expensive.

There are 4-port, 8-port, 16-port or 32-ports switch available in the market. The Ethernet that can be supported by the switch are 10Mbps, 100Mbps or 1000Mbps. Usually 100Mbps switch would be sufficient to support our network unless we run Gigabit network (1000Mbps).

This is what we need to do: Buying a switch and connect Ethernet LAN port from router to one of the normal ports on network switch by using crossover cable. If there is uplink port on the switch, we can connect it to router's Ethernet LAN port using straight cable, but usually this is not available for those entry level switches.

After that, we can connect computer and notebook to the switch's normal port by using straight cable, finally they are all connected to network and able to access Internet.

The LED on the switch will show we which ports are connected. Please read the switch manual to know more about how it works too.



Don't Use Network Hub if Possible

Maybe we heard about network hub and it can also be used to expand wired network. This is because hub is less intelligent then switch. If we have 4 computers connected to hub, if computer A wishes to talk to computer B, the traffic will be passed to all computers (usually called broadcast), but only computer B will accept it. This broadcasting feature will generate lot of traffic and slow down our network.

However it will be the other story if we use network switch, switch will be smart enough to determine that only computer B is needed to talk with in this situation, then the traffic is only sent to computer B. Overall switch improves our network performance, so don't go for hub. :

EXPERIMENT:

AIM:- CONNECTING SYSTEMS IN PEER-TO-PEER NETWORK&INSTALLING OF INTERNAL MODEM AND

CONNECTING TO INTERNET.

Peer-to-Peer network

Advantages and Capabilities:
Connect two commuters.
Able to share files, play network games.

Disadvantages:
Limited to two computers can connected to the network.

Estimated setup time:
10-15 Minutes

Required hardware and software:
- Two computers with 10/100 Ethernet network cards installed and working
- Network cross-over cable.

Microsoft Windows Steps:

1. Verify network cards are properly installed in Device Manager and that we have the latest network drivers for the installed network cards. If problems are found with the network cards, see the basic network troubleshooting page.
2. Connect the two computers to each other.
3. Open Network properties by clicking Start, Settings, Control Panel, and double-clicking "Network and Dial-up connections."
4. Double-click on the "Local Area Connection."
5. Click the "Properties" button.
6. Verify that TCP/IP and IPX/SPX are installed for our network adapter. If one or both of these protocols are not listed for our network adapter, install the protocol.
7. Once the protocols have been installed under the Network window verify that File and Print sharing is installed. If this is missing and we want to enable file and print sharing on this computer, click the install button and install File and Print sharing.
8. Setup the TCP/IP protocol by highlighting the Internet Protocol (TCP/IP) protocol for the network adapter and clicking the "Properties" button.
9. Within the properties, select the option "Specify an IP address." Enter a value similar to the below values.

   IP Address: 102.55.92.1
   Subnet Mask: 255.255.255.192

   The above IP address must differ for each computer. Therefore, on the other computer it could be 102.55.92.2 with the same subnet mask.
10. Once the IP address and Subnet mask have been specified, close out of all windows and reboot the computer.

Network with modem Internet sharing

Advantages and Capabilities:
All computers in house can share the same modem connection.

Disadvantages:
- Requires additional hardware and money.
- Because a modem does not have much bandwidth, if multiple users are browsing or downloading files, this can cause what appears to be a very slow connection.

Estimated setup time:
30-40 minutes.

Required hardware and software:
- Computers with 10/100 Ethernet network cards installed and working.
- Network Router, Switch or Hub
- Computer running a software proxy.

Microsoft Windows Steps:

1. Verify network cards are properly installed in Device Manager and that we have the latest network drivers for the installed network cards. If problems are found with the network cards, see the basic network troubleshooting page.
2. Connect each computer the network switch or hub.
3. Open Network properties by clicking Start, Settings, Control Panel and double-clicking "Network and Dial-up connections."
4. Double-click on the "Local Area Connection."
5. Click the "Properties" button.
6. Verify that TCP/IP and IPX/SPX are installed for our network adapter. If one or both of these protocols are not listed for our network adapter, install the protocol.
7. Once the protocols have been installed under the Network window verify that File and Print sharing is installed. If this is missing and we want to enable file and print sharing on this computer, click the install button and install File and Print sharing.
8. Setup the TCP/IP protocol by highlighting the Internet Protocol (TCP/IP) protocol for the network adapter and clicking the "Properties" button.
9. Within the properties, select the option "Specify an IP address." Enter a value similar to the below values.

   IP Address: 102.55.92.1
   Subnet Mask: 255.255.255.192

   The above IP address must differ for each computer. Therefore, on the other computer it could be 102.55.92.2 with the same subnet mask.
10. Once the IP address and Subnet mask have been specified, close out of all windows and reboot the computer.
11. Once the network has been setup and is working, install and setup a proxy on one of the computers on the network. This computer will manage the Internet connection for each of the other computers on the network.

EXPERIMENT:

AIM:- INSTALLING SWITCH (HUB) &PREPARING THE UTP CABLE FOR CROSS AND DIRECT CONNECTIONS USING CRIMPING TOO.

How to Install a Network Switch

Network switches for home and small office use are typically stand-alone units, while switches for larger networks are usually rack-mounted. Either way, they typically use either Cat5 or Cat6 ethernet cables. Switches allow multiple computers to connect to a single Internet connection, but rather than simply passing the signal through, like a network hub, a switch can manage that network traffic. Switches differ in the way they handle network traffic, but all of them are installed in a very similar way.

Step

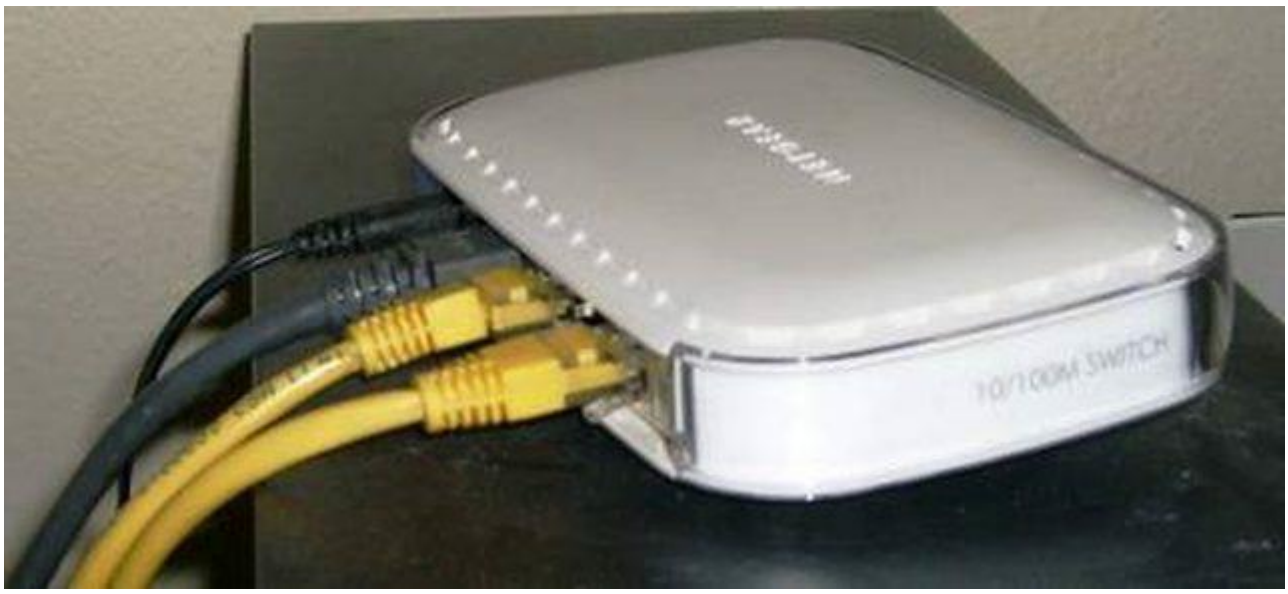
Provide power to the switch, if required. For a stand-alone switch, this simply means plugging in the power supply. For rack-mounted switches, this means using a slot that has power supplied to it.

Step

Connect the incoming network cable to the switch. Although any slot can be used on most network switches, it is a good idea to use the first slot so anyone can quickly identify the incoming cable. For home and small office applications, the incoming cable will be the one coming from our modem.

Step

Connect a Cat5 or Cat6 cable to another slot in the network switch. Connect the other end to a computer we want connected to the network.



A Home/Office Switch

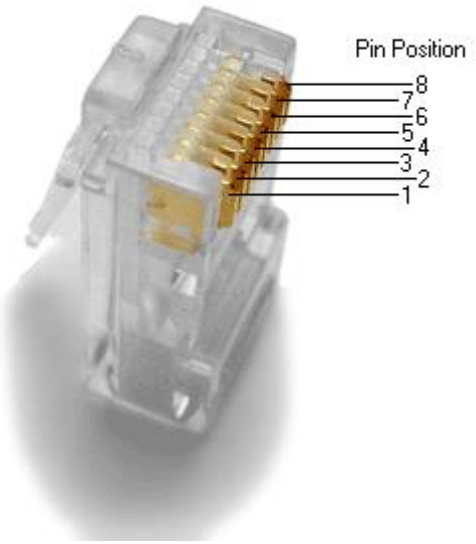
Repeat this process until all the computers are connected or all slots are filled.

How to make our own Ethernet cable

Before we get started, make sure we have the necessary tools, and decide whether we're going to use Cat 5e or Cat 6 network cables.

What we'll need:

- Unshielded twisted pair (UTP) patch cable
- Modular connector (8P8C plug, aka RJ45)
- Crimping tool
- Cable tester (optional, but recommended)



There are four pairs of wires in an Ethernet cable, and an Ethernet connector (8P8C) has eight pin slots. Each pin is identified by a number, starting from left to right, with the clip facing **away** from we.

The two standards for wiring Ethernet cables are T568A and T568B. T568B is the most common and is what we'll be using for our straight Ethernet cable. The tables below show the proper orientation of the colored wires to the pins.

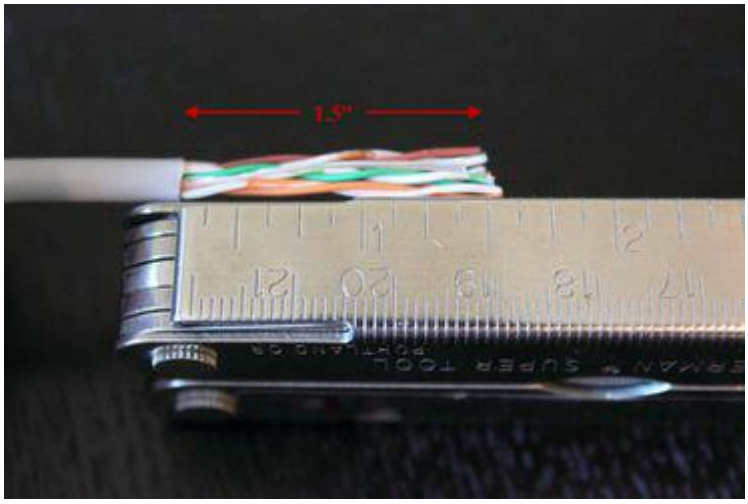
T568A Standard

Pin 1	White/Green
Pin 2	Green
Pin 3	White/Orange
Pin 4	Blue
Pin 5	White/Blue
Pin 6	Orange
Pin 7	White/Brown
Pin 8	Brown

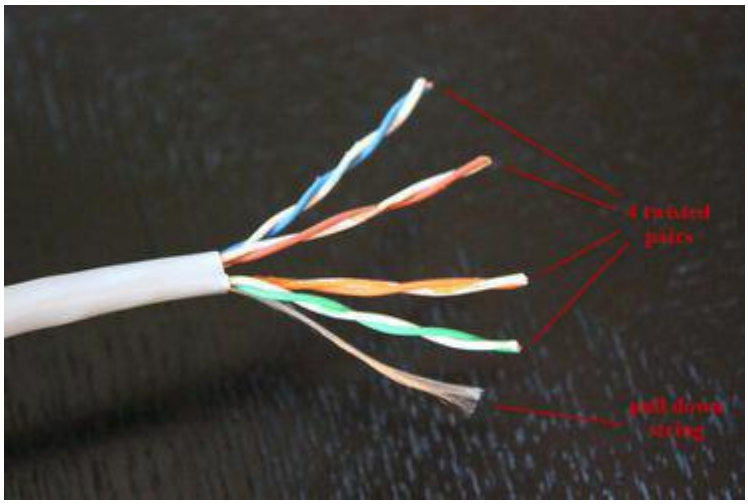
T568B Standard

Pin 1	White/Orange
Pin 2	Orange
Pin 3	White/Green
Pin 4	Blue
Pin 5	White/Blue
Pin 6	Green
Pin 7	White/Brown
Pin 8	Brown

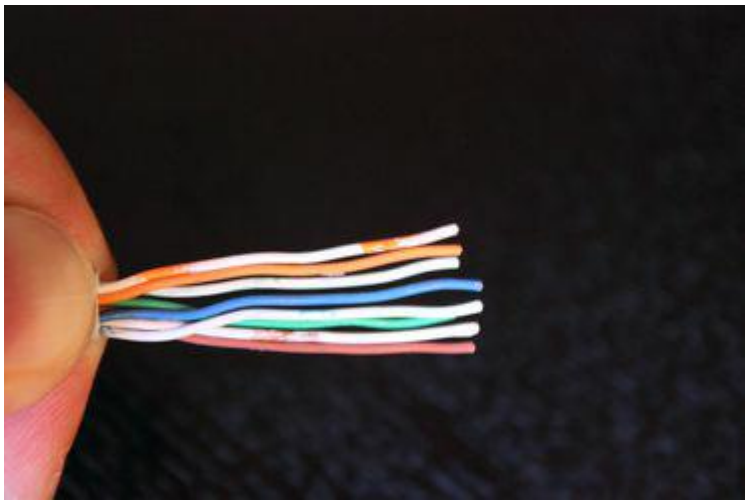
Step 1: Strip the cable jacket about 1.5 inch down from the end.



Step 2: Spread the four pairs of twisted wire apart. For Cat 5e, we can use the pull string to strip the jacket farther down if we need to, then cut the pull string. Cat 6 cables have a spine that will also need to be cut.

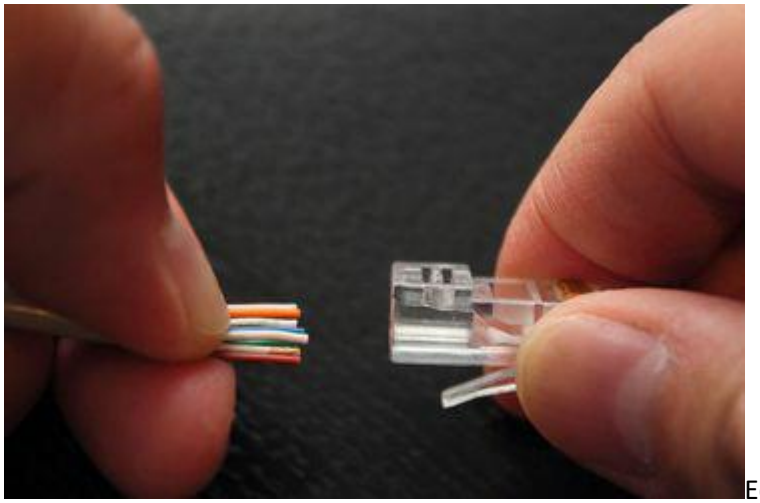


Step 3: Untwist the wire pairs and neatly align them in the T568B orientation. Be sure not to untwist them any farther down the cable than where the jacket begins; we want to leave as much of the cable twisted as possible.



Step 4: Cut the wires as straight as possible, about 0.5 inch above the end of the jacket.

Step 5: Carefully insert the wires all the way into the modular connector, making sure that each wire passes through the appropriate guides inside the connector.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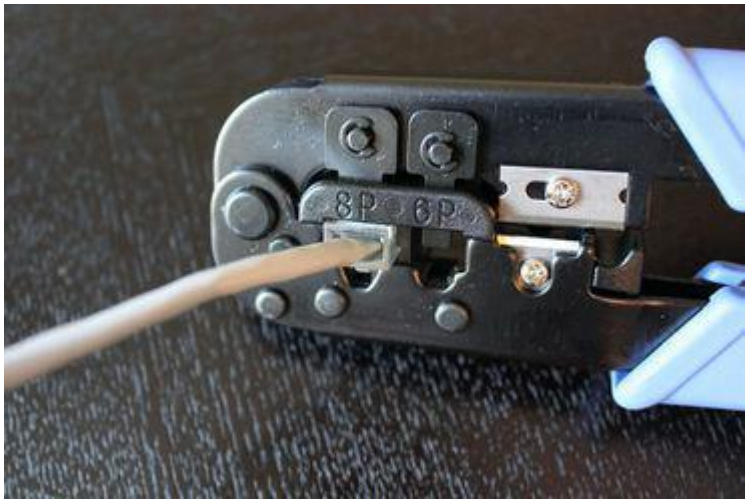
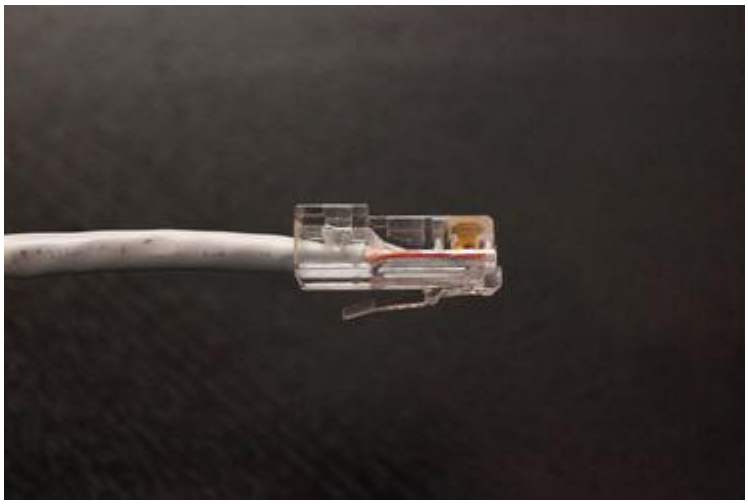
Step 6: Push the connector inside the crimping tool and squeeze the crimper all the way down.



Step 7: Repeat steps 1-6 for the other end of the cable.

Step 8: To make sure we've successfully terminated each end of the cable, use a cable tester to test each pin.

When we're all done, the connectors should look like this:



That's it. For crossover cables, simply make one end of the cable a T568**A** and the other end a T568**B**. Now we can make Ethernet cables of any length, fix broken connectors, or make ourself a crossover cable.

EXPERIMENT:

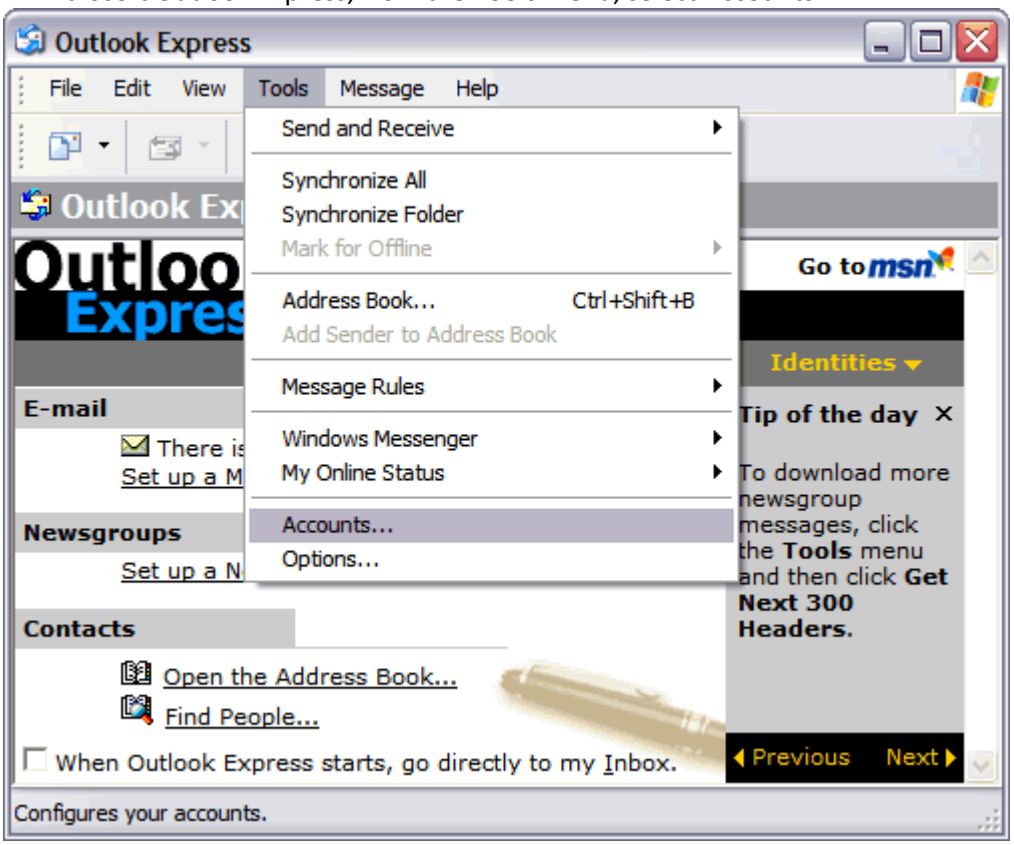
AIM:- INSTALLING AND CONFIGURING E-MAIL CLIENT MICROSOFT OUTLOOK EXPRESS.

Setting Up Our POP or IMAP Email Address in MS Outlook Express

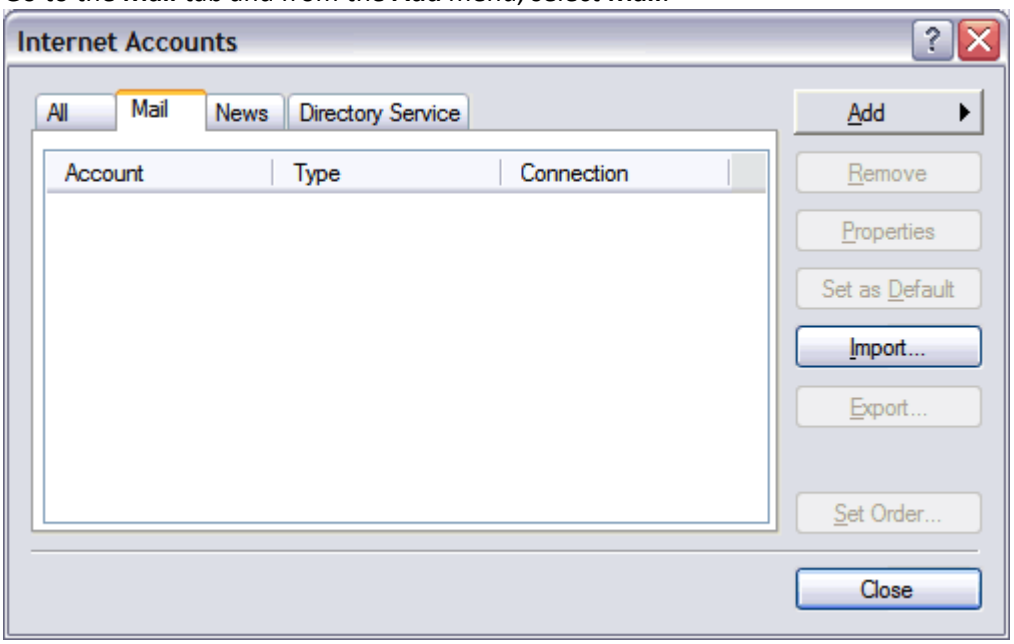
This tutorial shows we how to set up Microsoft Outlook Express 6 to work with our e-mail account. This tutorial focuses on setting up Microsoft Outlook Express 6, but these settings are similar in other versions of Microsoft Outlook Express®. We can set up previous versions of Microsoft Outlook Express by using the settings in this tutorial.

To Set Up Our E-mail Account in Microsoft Outlook Express

1. In Microsoft Outlook Express, from the **Tools** menu, select **Accounts**.

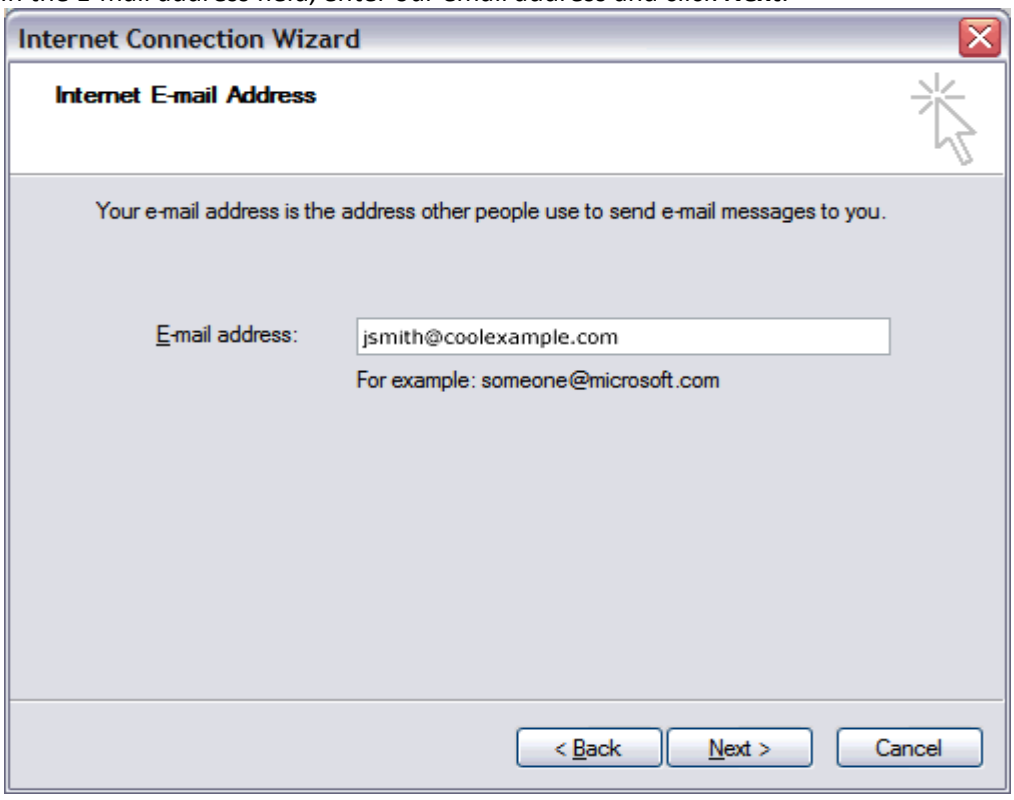


2. Go to the **Mail** tab and from the **Add** menu, select **Mail**.



3. In the **Display Name** field, enter we full name and click **Next**.

4. In the E-mail address field, enter our email address and click **Next**.



5. On the E-mail Server Names page, complete our information as follows:

   My incoming mail server is a
   POP3 or **IMAP**.

   Incoming mail (POP3, IMAP or HTTP) server

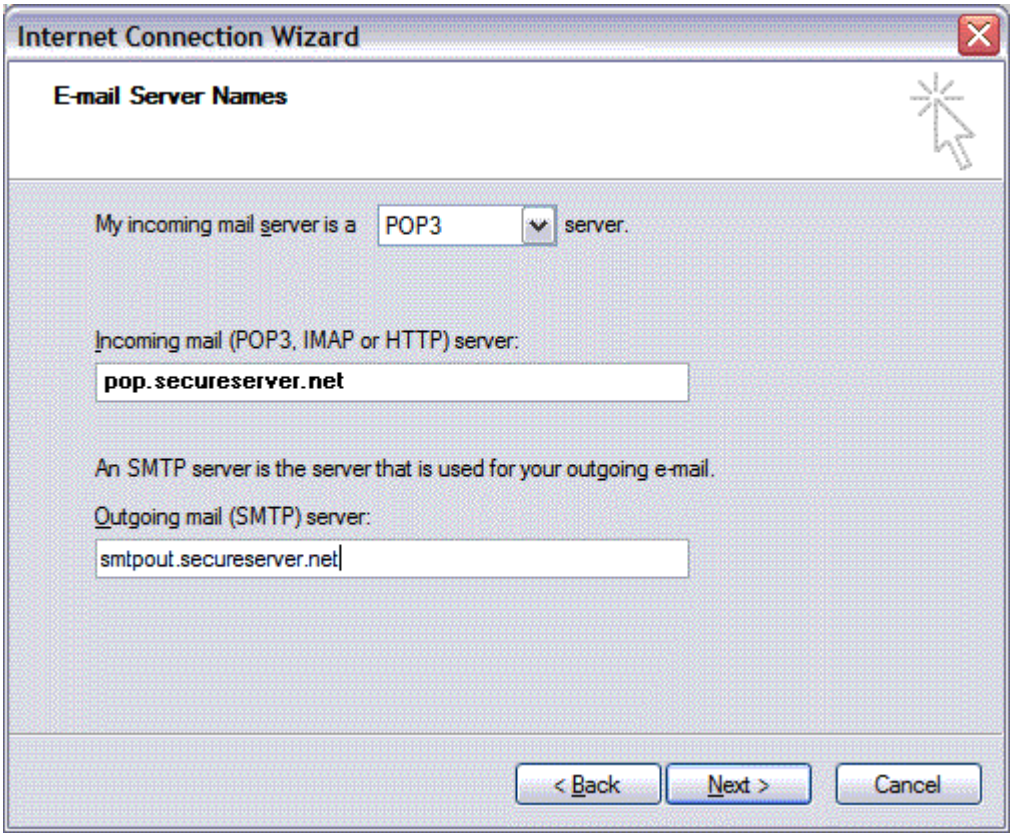
   POP **pop.secureserver.net**. or IMAP **imap.secureserver.net.**

   Outgoing mail (SMTP) server

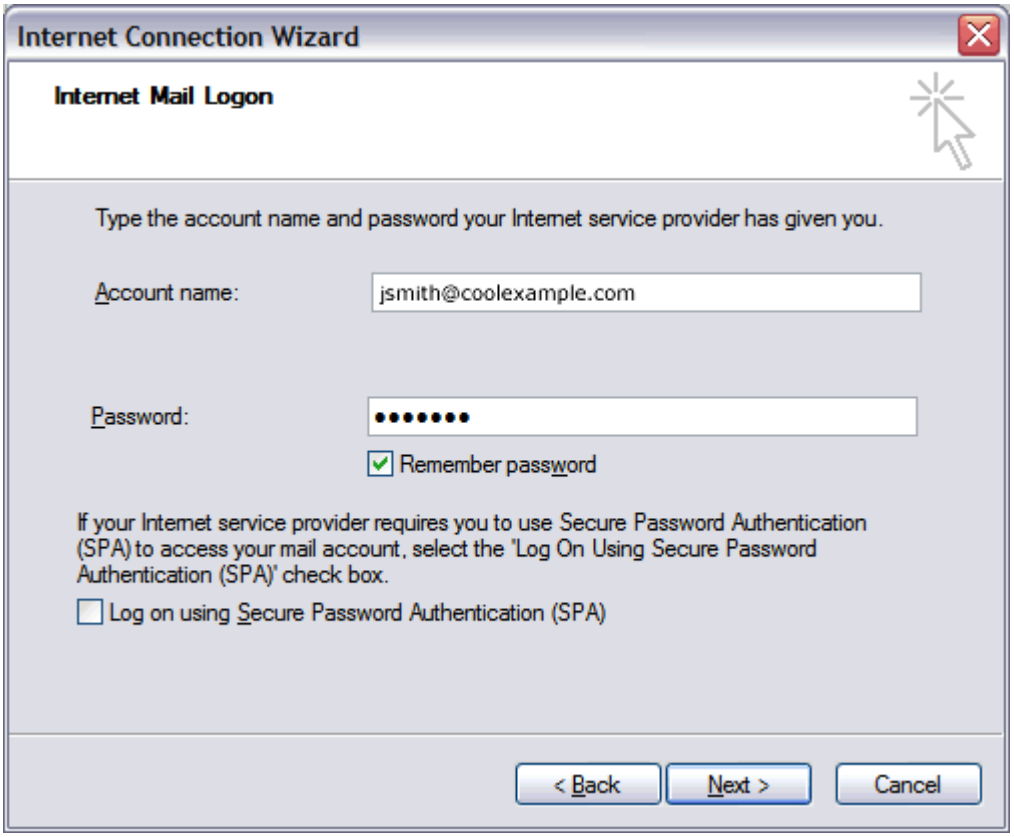
   smtpout.secureserver.net.

   Click **Next**.

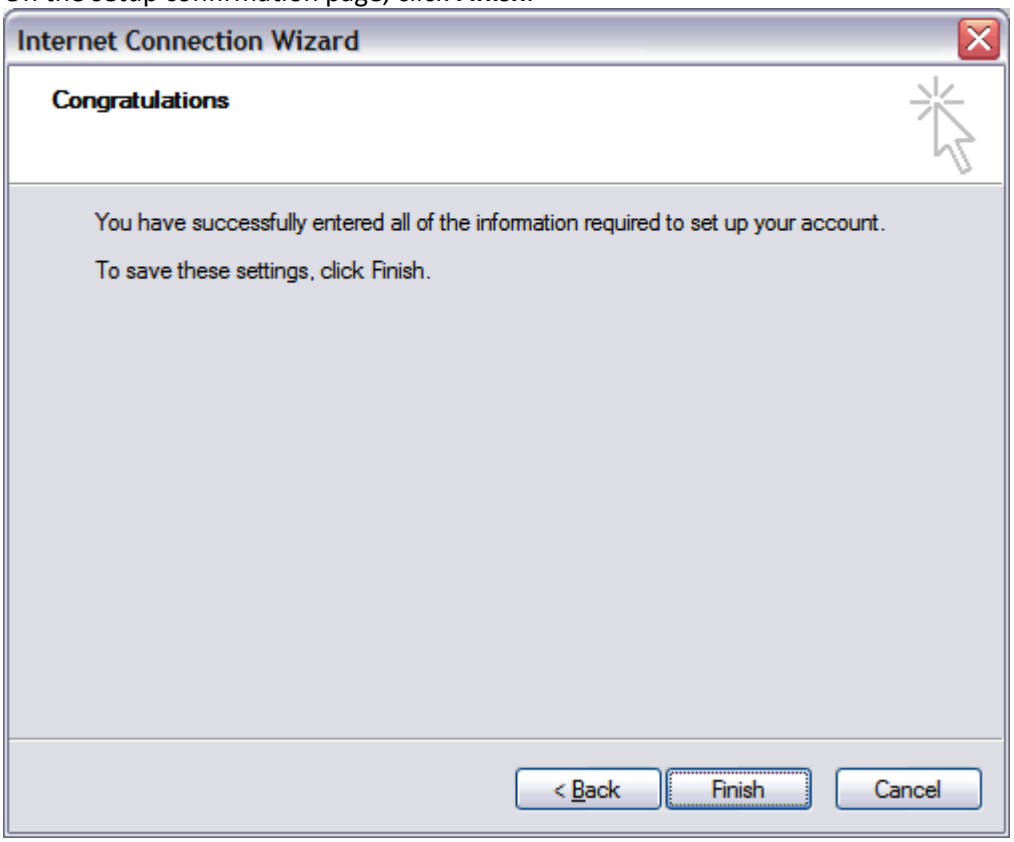
   NOTE: "smtpout.secureserver.net" is an SMTP relay server. In order to use this server to send e-mails, we must first activate SMTP relay on our e-mail account. Log on to our Manage Email Accounts page to set up SMTP relay. If we do not have SMTP relay set up and our Internet Service Provider (ISP) allows it, we can use the outgoing mail server for our Internet Service Provider. Contact our Internet Service Provider to get this setting.



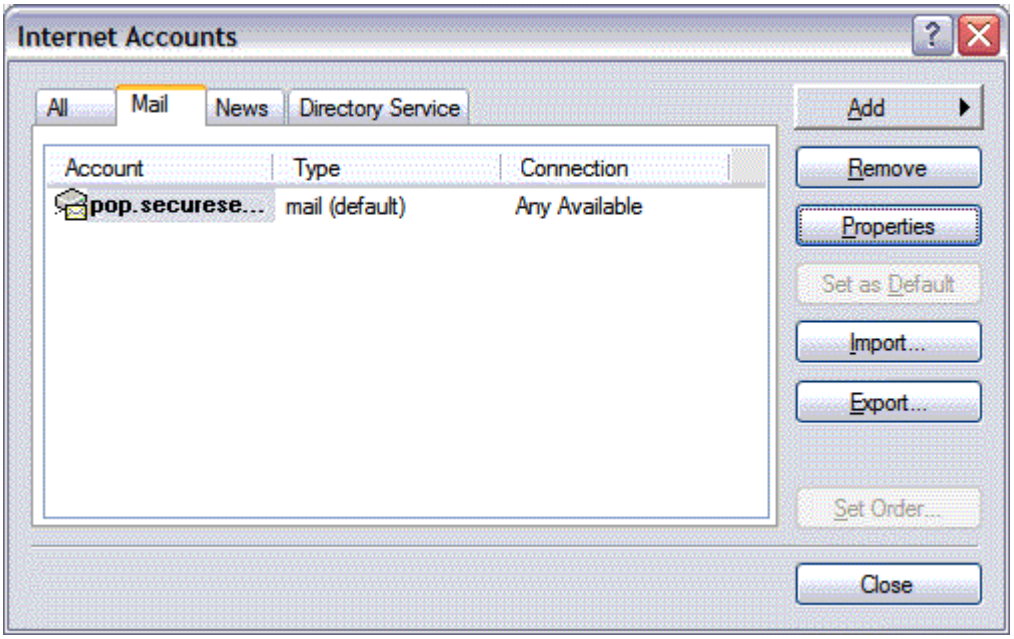
6. In the **Account Name** and **Password** fields, enter our email address and password, and then click **Next**.



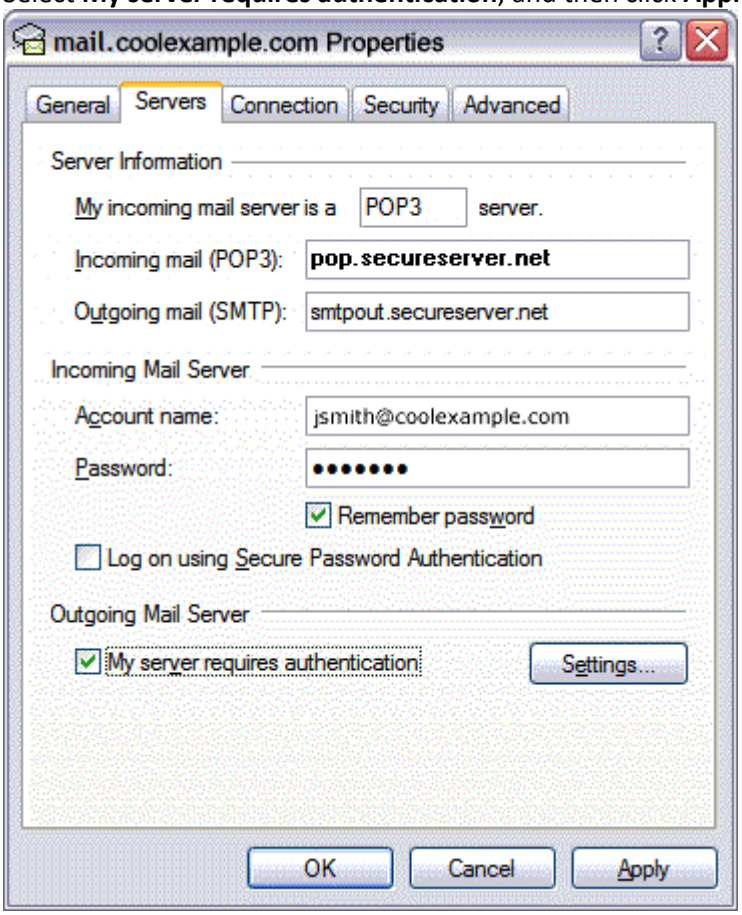
7. On the setup confirmation page, click **Finish**.



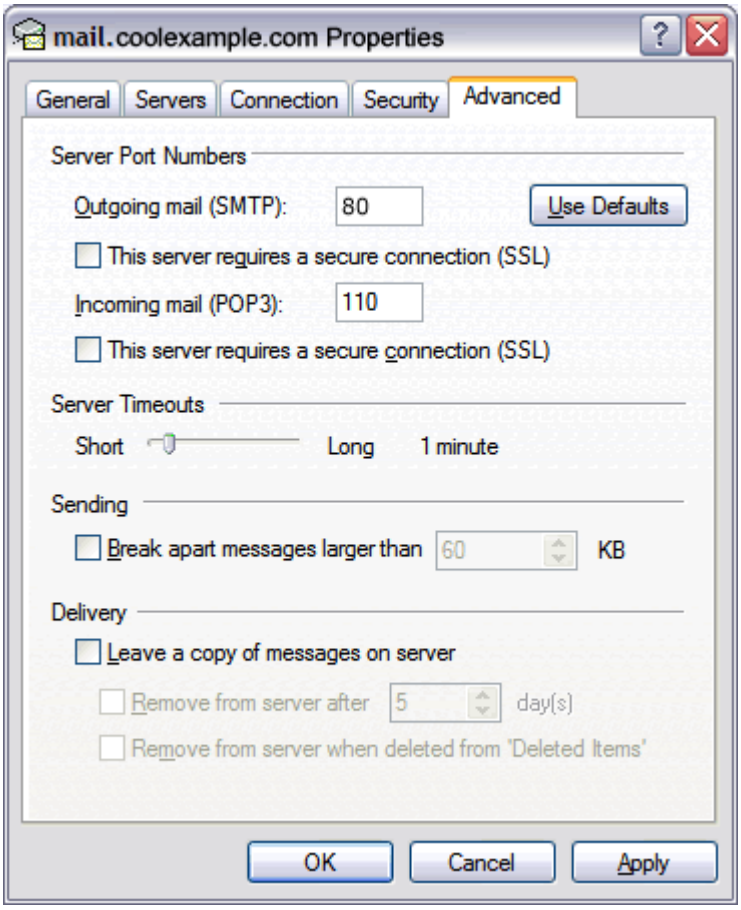
8. On the **Mail** tab, select the account we just created, and then click **Properties**.
9. Go to the **Servers** tab.



10. Go to the **Servers** tab.
11. Select **My server requires authentication**, and then click **Apply**.



12. Go to the **Advanced** tab.
13. In the Server Port Numbers section, change **Outgoing mail (SMTP)** to **80**, and then click **OK**.



14. (Optional) If we want to keep a copy of email messages stored on our email provider's servers, in the **Delivery** section, select **Leave a copy of messages on server**.

Our Outlook Express account is now set up. Click **Close** to close the Internet Accounts window and return to our Outlook Express.