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## BASIC LOGIC INSTRUCTION USING CX PROGRAMMER MANUAL CP SERIES

FA'IZAH YA'ACOB

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ELECTRICAL ENGINEERING DEPARTMENT



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### **BASIC LOGIC INSTRUCTION USING CX PROGRAMMER MANUAL CP SERIES**

### **FIRST EDITION 2021**

## ELECTRICAL ENGINEERING DEPARTMENT

@ JABATAN PENGAJIAN POLITEKNIK DAN KOLEJ KOMUNITI KEMENTERIAN PENGAJIAN TINGGI

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### **BASIC LOGIC INSTRUCTION USING CX-PROGRAMMER** MANUAL CP SERIES

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#### BISMILLAHIRRAHMANIRRAHIM

All praise is due to Allah who has bestowed the blessings of faith, health, prosperity and love. Blessings and peace be upon the Great Reverend Prophet Muhammad SAW, his family, the companions of the Prophet SAW, tabiin and all Muslims.

Recent technological advances have resulted in the development of the programmable logic controller and, as a result, a revolution in control engineering. This book is an introduction to programmable logic controllers, and it aims to make the tasks of practising engineers who are encountering programmable logic controllers for the first time easier. In addition, it offers a basic course for students on the course in Polytechnic, schools, college and vocational electrical engineering. This book is produced from practical worksheets used for students through practical work for the 5<sup>th</sup> semester PLC and Automation course at the polytechnic. This book also is a guide for students to create programs using cx-programmer, configure, inputting, transferring, simulation online and offline.

The book contains six chapter. The first chapter is an introduction to PLC which explains the definition and structure of PLC. The second chapter is to show the basics of ladder diagram symbols. While in third chapter, explain operation screen and inputting program to create a program using cx-programmer.

In chapter 5, explains the ways to transfer programs from computer to PLC. Many worked tutorials, multi-choice questions, and problems are included in the book to help the reader develop the skills needed to write programmes for programmable logic controllers.

The author expresses her high appreciation to the Department of Electrical Engineering and the Publishing Unit of the Sultan Salahuddin Abdul Aziz shah Polytechnic, through the support given to realize the production of this book. May it be of benefit to all students.

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### **CHAPTER 1**

DIAGNOSTIC

#### **Overview**

Programmable Logic Controller or PLC is a controller unit which is widely used in a control system. A control is an integration of various electronics components, devices and equipments that perform a specific task or job function to enable a process to be carried out efficiently. Control system can be configured or programmed (if a controller is involved) to perform that special task. For example, a control system can be use to control a sorting machine, a parking system, elevator control and etc.

#### **LEARNING OUTCOMES:**

- Understand building structure of a PLC.
- Know PLC hardware units.

# WHAT IS A PLC ?

### The National Electrical Manufacturers Association (NEMA)

defines a PLC as a "digitally operating electronic apparatus which uses a programmable memory for the internal storage of instructions by implementing specific functions, such as logic, sequencing, timing, counting, and arithmetic to control through digital or analog I/O modules various types of machines or processes."



### International Standard IEC 61131-1

defines a PLC as an "electronic system working digitally for the use in industrial environment with a programmable memory for the internal storage of user – orientated control instructions for the implementation of specific functions."

### **Structure of PLC**

#### A typical PLC consists of the following component:



#### Programming devices Block diagram of a typical PLC

#### Central Processing Unit(CPU)

The Processor, or commonly known as CPU is a microprocessor that coordinates the overall task description and activities of the PLC. It perform functions like processes the input and output signals, execute programs, communication with host computer, external I/O interfacing and etc.

#### Memory

 Memory can consist of various type of memory devices like RAM(Random Access Memory), ROM(Read Only Memory), EPROM(Erasable Programmable Read Only Memory) or EEPROM(Electrical Erasable Programmable Read Only Memory). The main function of the memory is to retain data while the data is being used by the CPU to perform various tasks.

#### Input Module

The input module function as a medium that connects the external input devices (sensors, switches, timers and etc.) to the CPU within the PLC.

#### Output Module

The output module function as a medium that connects the external outputs devices (lamps, solenoids, motors and etc.) to the CPU within the PLC.

#### NOTES

The structure of a PLC can be divided into 4 parts. Memory Unit

**Central Processing Unit/CPU** 

Input module unit

Output module unit

### Function of PLC In A Control System

A control system consists of various components which can be generally categorized as input and output devices. Example of input devices :

- Sensors
- limit switch
- Proximity switches
- Rotary encoders
- Push button and etc.

Examples of output devices :

- Motors
- lamps
- solenoids
- magnetic starters and etc.



In a typical control system using PLC, the PLC function as a controller that reads input signals from input devices and command the output devices to perform various task.

The task can be a simple function or maybe repetitive (depending on the task requirements).

### Conclusion

The CPU is the brain of the control system that governs the whole process to meet a specific requirements







### PLEASE WATCHING THIS VIDEO







### **CHAPTER 2**

**Overview** 

This topic will discuss about the PLC Programming system, logic instruction set, and ladder diagram symbols.

#### **LEARNING OUTCOMES:**

- PLC programming
- Definition of Ladder Diagram
- Symbol of Ladder diagram

### PLC Programming

#### Introduction

## PLC programming's process is a

## planning

activity to build and install programmed to do desired assignment. only discusses the types of ladder diagram programming languages



### Ladder Diagram

#### Definition



- Ladder diagram, better known as ladder logic, is a programming language used to program PLC.
- Ladder diagram are graphic type programming language that convert from control relay circuit diagram.

- Ladder diagram contain contact track from left to the right
- This contactor are connected to switching element namely as normally open (NO) or normally closed (NC). Ladder diagram are combination of control circuit, display function and operation model to every branch in line.

### Ladder Diagram

The symbols of the ladder diagram



**LOAD/ LD** instruction. Used at the bus bar or at the beginning of a rung block. Normally Open contact(NO)



LOAD NOT/ LD NOT instruction. Used at the bus bar or at the beginning of a rung block. Normally closed contact (NO)



**AND** instruction. Use as second contact at normally open state (NO) and series contact before it.



AND NOT instruction. Use as second contact at normally closed state (NO) and series contact before it.

### Ladder Diagram

#### The symbols of the ladder diagram



**OR** instruction. Use at second contact at normally open state (NO) and parallel to contact before it.



**OR NOT** instruction. Use at second contact at normally closed state (NC) and parallel to contact before it.



**OUT** instructions turn a relay coil ON when the execution condition is ON



**OUT NOT** instructions turn a relay coil OFF when the execution condition is ON



The instruction to completed the program. Last instruction for each programmed



- 1. Describe the ladder diagram
- 2. State the different between *LD* and *LD NOT*
- Draw a symbol of contact
   N/O and N/C
- 4. Determine **OUT** symbol in ladder diagram.

Discuss your answer with your lecturer

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	Timer number	sequence 2	
0 800	Set value	Sequence 2	
		sequence 3	
T0001		process tank	
4 start pulse TIM	100ms Timer (Timer) [BC	sequence 4	
0002	Timer number	universal reset	
5 Bod		canning	
	Set value	emergency stop	
s	1		
Sequence 1s SFT(010)	Shift Register		
	Starting word		
start pulse stopping the clemmergency st &7			

### **CHAPTER 3**

#### **Overview**

CX-Programmer is a programming tool (software) for writing the ladder programs that are to be executed by CP1E and others PLC models. In our discussion here, we will only introduce the CX-Programmer software as it is mostly used and it is friendly user.

#### **LEARNING OUTCOMES :**

- Explain CX-Programmer start-up
- Explain operation screen CX-programmer
- Explain Inputting Program to Create a program

Chapter 3 :Using Windows Based Programming Software

### Using Cx-Programmer

#### **Getting Started**

#### 1. Starting CX-Programmer

Select [Start] - [All Programs] from the desktop. - [OMRON] - [CX-One] - [CX-Programmer] - [CX-Programmer]. CX-Programmer will launch. The main window will be displayed first, followed by the title screen.



#### NOTE

The CX-Programmer version that we discussed here maybe a different version than the one you used. This discussion here is based on Windows 10 operating system. For other operating system, the window layout may be slightly different, but the process is the same.

This section describes the functions available on the main window of CX-Programmer.





o Displays the data file name, created in CX-Programmer

#### 2) Main Menu

Used to select CX-Programmer functions

#### $\overbrace{3}$ Tools Bar

 Displays icons for frequently used functions. Place the mouse cursor over an icon to display the corresponding function name.
 Select View - Toolbars from the main menu to show/hide toolbars. Drag the toolbars to change their position



#### **Project Tree**

 Used to manage programs and settings. Drag & drop items to copy the data

### $_{5}$ Section

• Programs can be split into and managed as multiple parts

This section describes the functions available on the main window of CX-Programmer. **MAIN WINDOW** 





#### 6) Project Workspace

• Select [View] - [Windows] - [Workspace] from the main menu to show/hide the workspace



#### **Diagram Workspace**

Used to create and edit ladder programs



#### I/O Comment Bar

Displays the name, address/value, and I/O comment for the Ο variable selected by the mouse cursor



#### **Output Window**

Select [View] - [Windows] - [Output] from the main menu to 0 show/hide the output window. Displays the following information: Compile, Find Report and Transfer



#### **Status Bar**

Displays information such as PLC name, offline/online status, 0 and active cell position

#### Diagram workspace

$\begin{bmatrix} 1\\ \\ \\ \end{bmatrix}$			
[Program Name : NewProgram1]     [Section Name : Section1]			
I: 0.01	• •	Q: 100.00	lamp
	· · ·	Q: 100.01	lamp
	• •	* * *	
		END(001)	End
			<u>(4</u> )
(1) Rung Number	<sup>2</sup> Program A	Address	
(3) Rung Header If a rung is incomple a red line will be displayed to the righ of its rung header.	(4) <b>Bus Bar</b> ete,		

#### Information window

Displays the most common shortcut keys used in CX-Programmer. To show/hide the information window, go to the main menu and select [View] - [Windows] - [Information Window].

CX-Programmer Information						
				Shift+0	Immediate Ref	Information Show/Hide
	Next	Previous	Next In/Out	Commented Rung	Jump to Error	Ctrl+Shift+I

#### **Creating New Projects**

- When using CX-Programmer for the first time, you will need to create a new project. When creating a new project, you must set the target device type and CPU type for the program and data being created.
- 1. Select [File] [New] from the main menu

📟 CX-Programmer	
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Dpen Ctrl+O	三関層 副 🎬 📅 🕞 - トークト 412 442 1
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]]\$P\$\$P\$ == ^*/*	× ×

2. Select [**CP1E**] from the Device Type drop-down list. Click on its Settings and choose CPU Type-[**NA**] and click [**OK**]

Change PLC ×	Device Type Settings [CP1E]
Device Name NewPLC1	General
CP1E Settings	
Network Type	Tetal Pregram Area Sizer
	Expansion Memory None  Read Only
^	File Memory
	Timer / Clock
	Make Default
	OK Cancel Help

3. Confirm that **[USB**] is displayed in the Network Type field. Click the **[OK**] button.

Change PLC	×
Device Name NewPLC1	
Device Type	▼ Settings
Network Type	▼ Settings
Comment	<u> </u>
	~
OK Cancel	Help

4. Main window for the new project will be displayed. Now we will create a simple ladder diagram for the basic logic I/O based on the ladder.

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[ <sup>19]</sup> File Edit View Insert PLC Program Simulation Tools Window Help	_ <i>6</i> ×
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I Program Name : NewProgram1]	<u> </u>
B ■ NewPLCIC(PEI)Offline [Section Name: Section1]	
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5. **Select** the **[NEW CONTACT] or [PRESS C]** icon of the tool bar clicking the icon using the mouse. Then place the close contact component to the highlighted box on the diagram workspace.



6. Click on the box and you will be asked to insert the address number. Key in '**0**' and click **[OK]** or press **[ENTER]**. You will get the next pop window to **[Edit Comment(1/1):0.00]**. You can enter/edit a comment for the component you just selected . **Click [OK]** or **[ENTER]** after you have keyed in the comment.



Chapter 3 :Using Windows Based Programming Software

7. Now, we want to insert an output coil to finish this rung of ladder diagram. Move your cursor to the **[NEW COIL]** icon, click it and move your cursor to the highlighted area. Click the mouse and the new coil will be placed. Again, you will be required to fill the output address as well as the comment. Click **[OK]** or **[ENTER]**.



8. Now, we want to insert the next rung. Move your cursor to the NO contact icon, click it and placed it at the beginning of the new rung. Click once, and then insert the required contact address and comment.

1.Section1 [Dia	agram]]	—	
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		CX-Programmer Information	
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	[Section Name : Section1]		
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		Section Name	Section1							
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1		I: 0.01						Q: 1	00.01	
	2	C)//1						(	) <u> </u>	
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2	]		<i>.</i> .							
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			*							

Now, **TRY THIS! Add** 3 more rungs by placing inputs and outputs. **GOOD LUCKS** Now your program has finished and is ready to be downloaded into **YOU PLC.** 

📟 Save CX-Programmer File		×
Save in: PLC 💌	← 🗈 💣 📰▼	
Name Pasic.cxp	Date modified 8/27/2021 11:28 AM	
<		>
File name:     BASICIO       Save as type:     CX-Programmer Project Files (*.cxp)	Save Cancel	

9. Save the created program by selecting [FILE]-[SAVE AS]. Browse for the folder and enter the filename. In example: the filename as BASICIO and click [SAVE]. The default file extension is \*.cxp

#### How to Insert Symbol Ladder Diagram



#### The command used is LDNOT/LOAD NOT

- To enter the N/C symbol, select [NEW CLOSED CONTACT] or press [/] and fill in the input/output address in the field.
- Then fill in the data in the column, click the comment content details and then click [OK]



### The command used is OR

- To enter the OR symbol, select [NEW CONTACT OR] or press [W] and fill in the input/output address in the field.
- Then fill in the data in the column, click the comment content details and then click [OK]

#### How to Insert Symbol Ladder Diagram





#### The command used is ORNOT

- To enter the OR NOT symbol, select [NEW CLOSED CONTACT OR] or press [X] and fill in the input/output address in the field.
- Then fill in the data in the column, click the comment content details and then click [OK]

### The command used is OUT

- To enter the OUT symbol, select [NEW COIL] or press [O] and fill in the ioutput address in the field.
- Then fill in the data in the column, click the comment content details and then click [OK]

#### How to Insert Symbol Ladder Diagram



#### The command used is AND

- To enter the AND symbol, select [NEW CONTACT ] or press
   [C] and place highlighted box series cursor with the first input address in the field.
- Then fill in the data in the column, click the comment content details and then click [OK]

#### The command used is AND NOT

- To enter the AND NOT symbol, select [NEW CLOSED CONTACT] or press [/] and place highlighted box series cursor with the first input address in the field.
- Then fill in the data in the column, click the comment content details and then click [OK]

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[Program Name : NewProgram1]	
[Section Name : Section1]	
ŚWO	
-[]- New Instruction ×	
TIM 000 #0050 Detail >> OK Cancel	
Edit Comment (1/2) : T000 ×	
TIMER 00 OK Cancel	
ŚWO TIM 100mSTimer (Timer)	
#0000 Set Value	



### The command used is INSTRUCTION

- To create instructions: Timer, Counter, Mov, Scaling, Difu, IL - ILC etc.
- Select [NEW PLC INSTRUCTION] or press the letter [I].
- Type in the field, the name of the Instruction to be used for example type TIM for Timer, type CNT for Counter etc..

#### The command used is END

- Ladder diagram must end with an END instruction.
- Double-click the [END] section to confirm the ladder diagram includes only the END instruction.

#### An Abbreviation of The Symbol Used in the Program

TIPS

[CTRL] + 1 = to draw a vertical line

Press the letter R to add a rung in the middle of another rung

#### NOTE

#### **Duplicated Coils**

- Coils should not be duplicated.
- Only the rung closest to the END instruction will be valid if the same address is specified for multiple outputs.
- This is because programs are executed sequentially from top to bottom.
- CX-Programmer will indicate invalid rungs caused by duplicated coils as an error.



The problem can be fixed by modifying the program as shown below.







1. Label with the correct answer

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Symbols Settings Error log PLC Clock Memory		I: 0.00 Q: 100.00	l: 0.01	*	•	•	Q: 100.00
							1
[	c				d		7

### Discuss your answer with your lecturer

Chapter 3 :Using Windows Based Programming Software



### **CHAPTER 4**

**Overview** 

Ladder diagram must be saved after they are created. This section describes how to verify, save, and load ladder diagram.

#### **LEARNING OUTCOMES :**

- Explain to Compiling Program
  - Explain to Saving Program
- Explain to Loading Program

### **Compiling Programs**

By Compiling, You Can Check For Errors In The Programs

From the Main Menu, select [Program] - [Compile All PLC Programs]



 The compilation process has begun. When the compilation is finished, the results of the program checks will be displayed in the output window.



### **Compiling Programs**

## 2. Double-click the error message in the output window if one has been detected.

The cursor is moved to where the error was detected.
 Correct the error.



### **Saving Programs**

#### 1. Select [File] - [Save As] from the main menu.

• The save file dialog box will be displayed.

Untitled - CX-Programmer - [NewPLC1.Ne	wProgram1.Section1 [	Diagram]]							
C D New CTRL+N C D New CTRL+N C Qpen CTRL+O Close		ж чиноом нер ж % (Ф % -и-чин и —	• ₩ <u>A</u> & • Ø च 3	<b>\$</b> 2   <b>2</b> 2   <b>3</b> 5   FE └─ \ <mark>&gt;</mark>   ]]				€	
Save CTRL+S	10 10 16 16 00 10 10	\$ \$ <b>然</b> [8	5   5   6 4		: ≌ >> >				K-Programmer Informatic
Reusable File		D [Program Na [Section Nam	me : NewProgr ne : Section1]	am1]				Ē	Att Offer
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Recent File Egit									*
		4 <b></b>   <sup>1</sup>				+	TIM	100ms Timer	r (Timer) [BCD Type]
							000	Timer 1 Timer numbe	er
				-	•		#0050	Set value	- ÷

- 2. Specify the save location, and input a file name. Click [Save].
- The CX-Programmer project file will be saved. Select specific folders so that they are easy to find



ct - CX-Programmer - [[Running] - NewPLC1.NewProgram1.Section1 [Diagram]]	– 🗆 🗙	TEST MODE-NewProject-000:Screen Page0000 - 🗆 🗙 K
Edit View Insert PLC Program Simulation Tools Window Help	- 6 ×	File View Options
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≣ ≌   <b>▲ % % %</b>		
0 [Program Name : NewProgram1]	-	high sensor
[Section Name : Section1]		
W0.00 T0002 T0008		Now sensor
Start capping timer TIM	100ms Timer (Timer) [BC	sequence 1 concentrate tank water tank
0001	Timer number	
5 Boo	Sat value	iou sensor
	Con Toma	sequence 3
T0001		process tank
4 start poise TIM	100ms Timer (Timer) [BC	sequence 4
0002	Timer number	universal reset
5 Boo	Set value	emergency stop
W0.01		
sequence 1s SFT(01	) Shift Register	
100 1001 1007 W5.09	Starting word	
start pulse stopping the clemmergency st 87		

### **CHAPTER 5**

#### **Overview**

This section explains how to transfer and execute programs online and offline.

#### **LEARNING OUTCOMES :**

- Explain to transfer programs from PLC to computer
- Use command work simulator

#### **Going Online**

- To configure CP1E settings, transfer programs, or execute programs, the computer and CP1E must first be online.
- 1. In CX-Programmer, open the program to be transferred.
- 2. From the Main Menu ,select [PLC]-[Work Online] or CTRL+W



3. Click [YES]



4. When the system goes online, the ladder section window will turn light grey



Online status is one in which the computer and CP1E are connected. To execute a program created with CX-Programmer on CP1E, the program will need to be transferred.

### NOTE

If the system fails to go online, check the PLC type setting and communication settings. To check the settings, double-click [NewPLC1[CP1E]Offline] in the project tree

#### **Transferring Program**

 A program created with CX-Programmer can be transferred to CP1E.

#### 1. From the Main Menu, select [PLC] - [Transfer] - [To PLC] The **Download Options** dialog box will be displayed.



#### 2. Click [OK]



3. Click [**YES**].



4. The dialog box is displayed . Click [**YES**]. The transfer will begin. The Download dialog box will be displayed.



5. Click [OK]. The transferring now complete



6. Click [YES]. The system change to RUN mode.



#### OR

7. Change to the RUN operating mode to start a production run.

The procedure for changing to mode is described below.

From the Main Menu, select [**PLC**] - [**Operating Mode**] - [**Run**]. A dialog box will be displayed to confirm the operating mode change.



8. The operating mode will be displayed on the title bar and on the project tree.



#### **Operating Mode**

- Change to **PROGRAM** mode. The procedure for changing to the PROGRAM operation mode is as follows :
- 1. From the Main Menu, select [**PLC**] [**Operating Mode**] [**Program**] A dialog box will be displayed to confirm the operating mode change.



#### 2. Click [YES]



3. The operating mode will be displayed on the title bar and on the project tree



Operating Mode CP1E has 3 operating modes: **PROGRAM, MONITOR, and RUN**. Change the operating mode to reflect the operation to be performed. The operation mode affects the whole user program, and is common to all tasks.

- PROGRAM mode: In this state, the program is stopped. This mode is used to prepare for program execution by performing initial settings such as PLC setup, transferring the program, checking the program, and force-setting/force-resetting.
- MONITOR mode: In this state, the program is executed. You can perform online editing, force-set/ force-reset, and change I/O memory values. This mode is also used for making adjustments during test runs.
- RUN mode: In this state, the program is executed. Use this mode for production runs.

#### **Online Edit**

- The CP1E program can be edited online.
- 1. Change CP1E to the MONITOR or PROGRAM operating mode.
- 2. Click the rung header of the rung you wish to edit.
- 3. From the Main Menu, select [**PLC**] [**Online Edit**] [**Begin**]. The grey shading in the diagram workspace will disappear, and the program becomes editable.



 To edit program. From the Main Menu, select [PLC] - [Online Edit] - [Send Changes]. The edited rungs will be transferred to CP1E

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#### **Work Simulator**

- Ways to view programs without connecting to a PLC. After the program is finished and the simulation will be performed then you have to click the icon circled in red.
- From the Main Menu, select [Simulation] [Work Online Simulator]. The grey shading in the diagram workspace will disappear, and the program

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2. The Download dialog box will be displayed.

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3. The ladder diagram is green means the simulator is ready to use. Double Click on input or contact N/O to Set New Value 1 or 0.



4. You can turn on the N/O contact on the ladder by blocking first. Press [**Ctrl + J**] to turn on N/O contacts and Press [**Ctrl + K**] to turn off contacts.





Questions 1 to 5 have four answer options: A, B, C or D. Choose the correct answer from the answer options.



Figure a

1.Decide whether each of these statements is True (T) or False (F).

Figure a shows a ladder diagram rung for which:

(i) The input contacts are normally open.

(ii) There is an output when there is an input to the contacts.

- A (i) T (ii) T
- B (i) T (ii) F
- C (i) F (ii) T
- D (i) F (ii) F

A (i) T (ii) T B (i) T (ii) F C (i) F (ii) T

D (i) F (ii) F



2. Decide whether each of these statements is True (T) or False (F).

Figure b shows a ladder diagram rung for which:

(i) The input contacts are normally open.

(ii) There is an output when there is an input to the contacts.

Figure b

ire b



Figure c

3. Decide whether each of these statements isTrue (T) or False (F).Figure c shows a ladder diagram rung for which:(i) When only input 1 contacts are activated,

there is an output.(ii) When only input 2 contacts are activated,there is an output.

- A (i) T (ii) T
- B (i) T (ii) F
- C (i) F (ii) T
- D (i) F (ii) F



4. Decide whether each of these statements is True (T) or False (F).
Figure d shows a ladder diagram rung for which there is an output when:
(i) Inputs 1 and 2 are both activated.

(ii) Either one of inputs 1 and 2 is not activated.

- A (i) T (ii) T B (i) T (ii) F
- C (i) F (ii) T
- D (i) F (ii) F



5. Decide whether each of these statements is True (T) or False (F).
Figure 5.46 shows a ladder diagram rung with an output when:
(i) Inputs 1 and 2 are both activated.
(ii) Input 1 or 2 is activated

A (i) T (ii) T B (i) T (ii) F C (i) F (ii) T D (i) F (ii) F Discuss your answer with your lecturer



### **TUTORIAL**

"A TUTORIAL IS A DOCUMENT, PRESENTATION, SOFTWARE, OR OTHER MEDIA DESIGNED FOR THE PURPOSE OF INSTRUCTION FOR ANY OF A WIDE VARIETY TASKS AND IS OFTEN DESIGNED TO COMPLEMENT LECTURES"

**MAXIMILLAN SIMMONS** 

#### **Running Light**

**STEPS OF MAKING A PROGRAM** 



#### **Running Light**

EXAMPLE : I will create a program with sequential as below :

 You need to design the ladder diagram for "4 RUNNING LIGHT" system with 3 seconds time intervals running light. The system will run for 10 time in cycle.

2. List I/O assignment and address.

INPUT DEVICES	INPUT DATA	OUTPUT DEVICES	INPUT DATA
Push Button Start	0.00	Lamp 1	100.01
		Lamp 2	100.02
		Lamp 3	100.03
		Lamp 4	100.04

#### 3. Draw a Ladder diagram



#### **Running Light**

#### 4. Test and check programm

#### □ Select [Simulation] - [Work Online Simulator] from the main menu.



0 0	[Program Name : NewProgram1]		
	[Section Name : Section1]		
	1: 0.00 T004 C005		
	SW00 TIMER 4 COUNTER	TIM	100ms Timer (T
	3,	000	TIMER 0
		0 Bcd	niner number
	THE PROGRAM IS RUNNING	# <del>003</del> 0	Set value
1	T000		

#### **CONVEYOR SYSTEM**



#### **Sequence Explanation :**

Figure above shows the transfer of a ball from station A to station B.

When the start button is pressed, the conveyor motor A will move and carry the ball. When optical sensor A detects the presence of a ball and this causes the pneumatic cylinder to push the ball to conveyor B. When optical sensor B detects the presence of a ball the motor of conveyor B will move. When optical sensor C detects the presence of a ball the conveyor motor B will stop.

By referring to figure above and the sequence explanation, propose a complete i/o wiring and PLC ladder diagram

PROPOSE A COMPLETE I/O WIRING

#### **RECYCLE BOTTLES**

#### Effects on the environment:

Plastic bottle creates damaging effect to environment. Our water resources are clogged with bottles and it's also affect life and quality of marine lives.





#### Sequence Explanation :

Referring to above statement and pictures, you are assigned to create a Plastic Bottle Crushing Machine that will cut the bottles into very small pieces that will be used for recycling purpose. You should come out with its control system where it should run as a fully automated system. The system should come complete with PLC program as well.

IDENTIFY INPUT OUTPUT DEVICE ASSIGNMENT

## TELL ME YOUR EXPERIENCE

Email : kakpai75@gmail.com

## GIVE ME YOUR FEEDBACK



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"A programmer is an individual that writes/creates computer software or applications by giving the computer specific programming instructions."

By Techopedia

"Coding refers to creating computer programming code. In a more general sense, the word coding is used to refer to assigning a code or classification to something."

### THANK YOU

