272-T08

MECHATRONICS ENGINEERING TECHNOLOGY

NAME: _____ ***START DATE:*** _____/_____/_____
COMPLETION DATE: _____/_____/_____

TASK: T08 Programmable Logic Controllers and Digital Logic

PERFORMANCE OBJECTIVE: After completing the PLC training system the student will build and program a circuit from a diagram and it will function with 100% accuracy

ENABLING OBJECTIVE: Complete Q01-Q24, and T03, T04, T07

TOOLS REQUIRED: Instructor theory lesson, training system

SAFETY FACTORS: Complete Q01-Q02, T03 and observe all school/classroom safety rules at all times

ACADEMIC ANCHORS:
M11.A.1.1.2 Express numbers using scientific notation
M11.A.2.1.1 Solve problems operations with rational numbers using rates and percentages
R11.A.1.3.5 Demonstrate after reading understanding of non-fiction text
R11.A.2.1.2 Identify meaning of content specific words used in text

CAREER & WORK ANCHORS:
13.2.11.E Demonstrate essential workplace skills.

PERFORMANCE CHECKLIST:

STUDENT CHECK	***TASK TO BE COMPLETED***	***TEACHER SIGN OFF***
_____	1. Identify academic anchors and complete learning guide AA01	_____
_____	2. View PLC videos listed on the next page	_____
_____	3. Complete PLC units @ www.learnamatrol.com	_____
_____	4. Review your notes and memorize ladder logic and gates	_____
_____	5. Complete performance sheets	_____

PERFORMANCE LEVEL:
MASTERY ***SATISFACTORY*** ***FAMILIARIZATION*** ***INSTRUCTED/CANNOT PERFORM***

BUCKS COUNTY TECHNICAL SCHOOL – August 25th, 2021

_____
INSTRUCTOR'S SIGNATURE

The videos listed below will assist you in programming some of the PLC tasks that you need to complete. They are not exact programming solutions, but will be helpful in creating your PLC program.

RSlinx 500 Setup - https://youtu.be/YYnEWfGFyW0

RSlogix500 Setup - https://youtu.be/IYVIfnHVhNE

Programming inputs in series - https://youtu.be/fWFg0U734t4

Programming inputs and outputs in parallel – https://youtu.be/5DHyyVFMoWo

Programming hints and tricks/shortcuts - https://youtu.be/n-ToGbKllEA

Seal in/memory circuit - https://www.youtube.com/watch?v=V8TxYQ8mUpc

Timer on TON - https://youtu.be/A4dewWWMnVA

Timer off TOF– https://youtu.be/lMQsF1g1ijs

Retentative timer RTO - https://youtu.be/WBC7WKBc09I

Count up CTU - https://youtu.be/8PM0NQhSdNc

Count down CTD - https://youtu.be/f75mjo21zaQ

Program a Directional Control valve - https://youtu.be/V8TxYQ8mUpc

Analog inputs - https://youtu.be/okV_Cw5DU1s

Analog outputs - https://youtu.be/Rbfja90BHpo

Analog signal controlling a binary process - https://youtu.be/3AfVi5z-fQs

Performance Sheets

After viewing the PLC programming videos, program and wire the following tasks on the PLC trainer/simulator

Task #1
Program a seal in/motor start circuit. There should be two momentary pushbutton switches; one for start, and one for stop. When you push the start button a green pilot lamp should illuminate indicating motor run. When you push the stop button a red pilot light should illuminate indicating motor stop.

Instructor signoff _____

Task #2
Program a timer circuit. There should be one momentary push button and one green indicator lamp. When the momentary button is pushed once the green lamp should light up in ten seconds.

Instructor signoff _____

Task #3
Program a timer circuit/motor start delay. There should be two momentary push buttons, one green, and one red indicator lamp. When the momentary button is pushed the green lamp(motor run) should illuminate in ten seconds. When the second button is pushed the program should reset and the red lamp(motor stop) should illuminate.

Instructor signoff _____

Task #4
Program a timer circuit/motor run. There should be two momentary push buttons, one green, and one red indicator lamp. After the momentary push button is held for 10 seconds the green lamp should illuminate. When the second button is pushed the program should reset and the red lamp should illuminate.

Instructor signoff _____

Task #5

Program a counter circuit. There should be two momentary push buttons, one green, and one red indicator lamp. When the momentary button is pushed 10 times the green lamp should illuminate. When the second button is pushed the program should reset and the red lamp should illuminate.

Instructor signoff _____

Task #6

Program a retentive timer circuit. This program keeps track of how long a motor runs. After 1 minute of time the motor requires a drop of oil from a pump to lubricate the motor bearing. There should be two momentary push buttons, one green, one red, and one yellow indicator lamp. When the momentary button is pushed the green light will illuminate indicating motor run. The timer should keep track of how long the motor runs. When you stop the motor the red lamp should light. When you restart the motor the timer should continue to count. After multiple motor stop/starts and one minute of time the yellow light should light for 2 seconds indicating the oil pump has lubricated the bearing.

Instructor signoff _____

Task #7

Program a reversing motor starter. Three push buttons- one for forward, one for reverse, and one for stop. Three lights- Green for forward, Yellow for reverse, Red for stop.

Very important safety step: Your program must not allow the user to go from forward to reverse without hitting stop first. If a user can push the forward button and go to reverse without stopping, the motor will be damaged.

Instructor signoff _____

Task #8

Program railroad stop lights and gate. Use a toggle switch to simulate a sensor. When the sensor is on the train is coming. A red and yellow light should alternately blink at .5 second intervals. Ten seconds later another light should come on indicating the gate has come down to block traffic. When the train is done passing flip the switch (sensor) off. The gate light should go off in 5 seconds and the lights should stop blinking after 10 seconds indicating a safe situation.

Instructor signoff _____

Task #9

Pneumatic control of a cylinder. The double acting cylinder will extend for 5 seconds, then retract for 5 seconds, and continue to repeat.
There should be a pushbutton to start the process and a stop button to stop the process.
A red indicator light should illuminate when the cylinder is retracted.
A green indicator light should illuminate when the cylinder is extended**.**

Instructor signoff _____

Task #10

Program a conventional traffic light with red, yellow, green, walk, and do not walk indicators. Green lights should be 15 seconds, walk should be 10 seconds, yellow lights should be 2 seconds.

Instructor signoff _____

GRADING RUBRIC

	Instructed/Cannot 0 points	Familiarization 1 point	Satisfactory 2 points	Mastery 3 points
Safety	Student rarely follows industry standard safety rules	Student needs to be frequently reminded to follow industry standard safety rules	Follows all industry standard safety rules, but required one reminder.	Student always follows all industry standard safety rules
Task	Student is unable to complete task	Student requires frequent assistance to complete task, and/or is familiar with some parts of the task	Student requires very little assistance to complete task, or has only completed task once or twice, but completed it satisfactorily with little to no assistance	Student can perform task with no assistance and has completed the task many times with no errors.

Mastery = 6 points
Satisfactory = 4-5 points
Familiarization = 2-3 points
Instructed cannot perform = <2 points