

Name: _____

Alpha: _____

SY486K

12 Weeks Exam

Spring AY2023

Apr 04, 2023

Open Slides, Notes, and Internet (no AI).

Please copy, verbatim, the honor pledge in the box and sign your name on the line below.

“The Naval Service I am a part of is bound by honor and integrity. I will not compromise our values by giving or receiving unauthorized help on this exam.”

Question 1 (8 pts)

Explain in your own words what a PLC is and does.

Question 2 (8 pts)

Circle all the components from the list below that are typically in PLCs

Power Supply

Processor

Hard Drive

Input Modules

Video Graphics Array port

Driver Modules

Output Modules

Interface Modules

USB port

Programming Interface

Question 3 (10 pts)

Label the five layers of the Purdue Enterprise Reference Architecture (PERA). Also for each, give two examples of the types of devices usually found at that level

- Level 0 _____
- Level 1 _____
- Level 2 _____
- Level 3 _____
- Level 4/5 _____

Question 4 (6 pts)

Describe the difference between LD, FBD, and ST programming standards?

Question 5 (7 pts)

Describe the function of a relay as they were used in older control systems.

Question 6 (10 pts)

Match the following symbols to the LD Names



Normally Open Contact



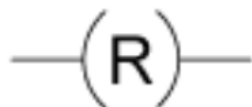
Normally Closed Contact



Reset Latch Coil



Set Latch Coil



Coil

Question 7 (8 pts)

Fill in this table with information about Modbus Object Types

Object Type	Access	Size	Address space
Coil	R/W		
Discrete Input			10001 - 19999
		16 bits	30001 - 39999
	R/W	16 bits	

Question 8 (9 pts)

Describe the difference between Modbus RTU, ASCII, and TCP.

Question 9 (8 pts)

Match the following Modbus Function Codes to the Action and Table Name of the message.

0x01	Read Holding Registers
0x02	Read Coils
0x03	Write Multiple registers
0x04	Read Discrete Inputs
0x05	Write Single Coil
0x06	Write Single Register
0x0F	Write Multiple Coils
0x10	Read Input Registers

Question 10 (6 pts)

Describe how the HART protocol can encode both digital and analog data on the same legacy wire.

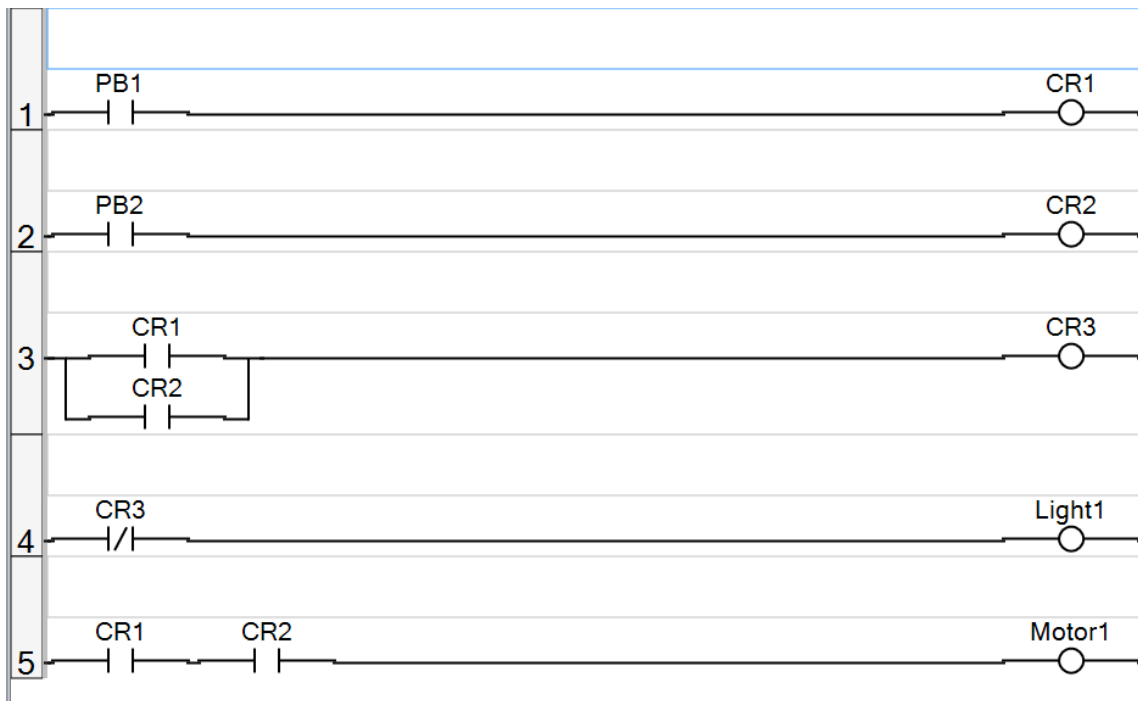
Question 11 (10 pts)

Decode the following Modbus message and describe in plain english what it means.

0x04 0x02 0x01 0x03 0x60 0x84

Question 12 (10 pts)

Describe what the following Ladder Diagram is doing.



Bonus Points: if you can code this into CCW and figure out how to run it using the Simulator.