

ET345:Control Systems
Homework Assignment #3

1. When the logic of a relay control panel needs to be changed, it usually involves _____.
 - a. a software update
 - b. installing higher-voltage relays
 - c. wiring changes
 - d. adding transistor drivers

2. In relays and switches, the abbreviations NC and NO stand for _____.
 - a. Normally Closed and Never Open
 - b. No Contact and Normally Open
 - c. Normally Closed and Normally Open
 - d. Negative Capacitance and Negative Ohms

3. NC or NO are the state of relay contacts when _____.
 - a. the coil is energized
 - b. the coil is unenergized
 - c. the contacts are in an AC circuit
 - d. the contacts are in a DC circuit

4. A PLC can have _____ discrete I/O modules.
 - a. only 24VDC
 - b. only 120VAC
 - c. a mix of dc and ac
 - d. only one type of

5. Discrete I/O modules interface with _____ field devices.
 - a. binary (on/off)
 - b. analog
 - c. programming terminal
 - d. communication

6. The Allen-Bradley Discrete Input address of a proximity switch connected to Module 3, Terminal 4 is _____.
- a. O: 3 / 4
 - b. I: 2 / 4
 - c. I: 3 / 4
 - d. I2: 3 / 4
7. In the address I1: 2.0 / 3 , the data file number is _____.
- a. 0
 - b. 1
 - c. 2
 - d. 3
8. The file where each bit represents the state of a Discrete Input is the _____ .
- a. input image file
 - b. output image file
 - c. user application program file
 - d. status file
9. A field device which connects to +DC power voltage and sends current to a Discrete Input module is called _____ field device.
- a. a 4-to-20 mA
 - b. a normally-closed
 - c. a current-sinking
 - d. a current-sourcing
10. A programming device is usually _____ connected to the _____ module.
- a. permanently ... CPU
 - b. temporarily ... CPU
 - c. permanently ... communication
 - d. temporarily ... communication

11. *True or False:* In a SLC500 PLC, a new program can be downloaded to the CPU while the prior program is running.

- a. True
- b. False

12. Software which converts graphical Ladder Logic to machine code is _____.

- a. DOS
- b. Compiler
- c. Interpreter
- d. Translator

13. Internal CPU logic circuits are isolated from the external input circuits by _____.

- a. a Faraday cage
- b. a guard ring
- c. an optoisolator
- d. a fiberglass enclosure

14. Program scan is _____.

- a. the CPU repeatedly reading inputs, solving the logic, setting outputs
- b. the programmer reading over the ladder diagram to find errors
- c. downloading a program from a PC scanner
- d. single-stepping from rung to rung.

15. In a register _____ is the LSB.

- a. bit 0, furthest to the left
- b. bit 0, furthest to the right
- c. bit 15, furthest to the left
- d. bit 15, furthest to the right

16. The portion of the program scan which has the largest effect on scan time is _____.

- a. reading inputs
- b. solving logic
- c. setting outputs
- d. communication and memory management

17. The most common programming language for PLC's is _____.
a. Statement lists
b. Sequential Function Chart
c. Ladder Logic
d. BASIC
18. Ladder Logic is called that because it _____.
a. allows the PLC to climb to a higher level of performance
b. looks like a ladder
c. allows memory to use higher addresses
d. holds together program blocks and subroutines
19. In Ladder Logic, a horizontal group of instruction symbols to control an output is called a _____.
a. subroutine
b. function group
c. rail
d. rung
20. In Allen-Bradley PLC logic, the main program is Program File _____.
a. 0
b. 1
c. 2
d. 3
21. Contacts in series are equivalent of logic _____, and contacts in parallel are equivalent of logic _____.
a. NAND ... NOR
b. AND ... OR
c. OR ... AND
d. XOR ... NOT
22. Each rung of Ladder Logic must end in _____ instruction.
a. an END
b. a STOP
c. a Return
d. an output type of

23. The purpose of a seal-in contact is _____.
- to keep a coil energized after a momentary start (turn-on) instruction
 - to protect relays from moisture
 - to unlatch the coil
 - to bypass the start instruction for Forcing

24. Both inputs on the logic rung below are addressed to N.O. pushbuttons. What condition will cause the output to be energized?

PB1 PB2

|-----] [-----] [----- ()---- |

- Neither pushbutton pressed
- PB1 pressed, PB2 not pressed
- PB1 not pressed, PB2 pressed
- Both pushbuttons pressed

25. What is the error in the logic rung below?

I1 I2 I3

|-----] [-----] / [----- ()----] / [----- |

- I1 should be N.C.
- I2 should be N.O.
- I3 should precede the output instruction
- I1 and I2 should be reversed.