

Chapter 1

Test Questions for learning objectives. (Select the best answer from the choices given)

1-1. Write the definition of a PLC

- 1) PLCs are _____ designed for use in the control of a wide variety of manufacturing machines and systems.
 - a) special-purpose industrial computers
 - b) personal computers
 - c) electromechanical systems
 - d) All of the above

- 2) The PLC was invented by _____.
 - a) Bill Gates
 - b) Dick Morley
 - c) Bill Landis
 - d) Tod Cunningham

- 3) The first company to build PLCs was _____.
 - a) General Motors
 - b) Allen Bradley
 - c) Square D
 - d) Modicon

1-2. Describe the similarities and differences between PLC ladder logic and relay ladder logic.

- 4) Which of the following statements is not correct?
 - a) The PLC rung output [-()] is a discrete output instruction or bit in memory.
 - b) Each rung of the ladder logic represents a logical statement executed in software - inputs on the right and outputs on the left.
 - c) Input and output instructions in ladder logic do not directly represent the switches and actuators.
 - d) PLC input instructions are logical symbols associated with voltage at the input module terminals.

- 5) Which of the following statements is correct?
- a) Ladder logic is a PLC graphical programming technique introduced in the last 10 years.
 - b) A ladder logic program is hard to analyze because it is totally different when compared with the equivalent relay logic solution.
 - c) **The number of ladder logic virtual relays and input and output instructions is limited only by memory size.**
 - d) The number of contacts for a mechanical relay is limited to number of coils on the relay.
- 6) Which of the following statements is NOT correct?
- a) The status of each input can be checked from one location and outputs can be forced on and off.
 - b) All symbols in the RLL represent actual components and contacts present in the control system.
 - c) **PLCs are not as reliable as electromechanical relays in RLL.**
 - d) Input (-| |-) and output (- () -) instruction symbols in the ladder logic represent only data values stored in PLC memory.
- 7) Which of the following statements is NOT correct?
- a) If a problem in a PLC module occurs, the module can be changed in a matter of minutes without any changes in wiring.
 - b) Outputs can be paralleled on the same rung.
 - c) The physical wires between the input and output field devices and the PLC input and output modules are the only signal wires required in the PLC system.
 - d) **The cost and size of PLCs have increased significantly in the last 10 years.**
- 8) Which of the following statements about a single pole double throw relay is NOT true?
- a) It is called an SPDT type of relay.
 - b) It has one common contact.
 - c) It has two positions (NC and NO).
 - d) **It has a center off position.**

- 9) Which of the following statements about a single pole double throw relay is true?
- a) Insulators are used in the armature to isolate the electrical switching contacts from the rest of the relay components.
 - b) The NC contact and the pole are in contact when the relay is off.
 - c) It has just one coil.
 - d) **All of the above.**
- 10) Which of the following statements about RLL is NOT true?
- a) NO contact symbol has two parallel lines to indicate an open contact.
 - b) RLL stands for Relay Ladder Logic.
 - c) NC contact symbol has the same two parallel lines with a line across them to indicate closed contacts.
 - d) **The right power rail is positive or the high side of the source, and the left power rail is the power return or ground.**
- 11) The _____ is moved toward the relay electromagnet when the relay is on.
- a) **Armature**
 - b) Coil
 - c) NO contact
 - d) NC contact
- 12) When a relay is NOT energized:
- a) There is an electrical path through the NO contacts
 - b) **There is an electrical path through the NC contacts**
 - c) Neither the NO or the NC contacts have an electrical path
 - d) Both the NO and the NC contacts have an electrical path
- 13) Which of the following RLL applications is not normally performed in early automation systems?
- a) On/off control of field devices
 - b) Logical control of discrete devices
 - c) On/off control of motor starters

d) **Proportional control of field devices**

1-3. **Draw a PLC input and output interface for a typical application.**

14) Current flows into the _____.

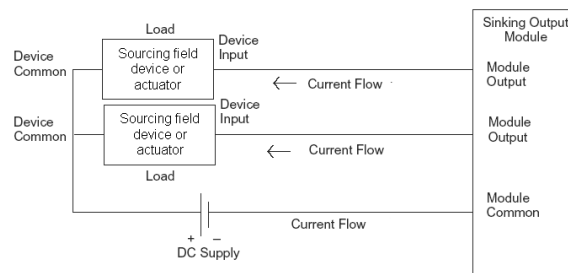
- a) Input terminal of a sinking DC input module
- b) Input terminal of a sinking output field device
- c) Output terminal of a sinking input field device
- d) **All of the above**

15) In a current sinking DC input module _____.

- a) **The current flows out of the input field device**
- b) Requires that a AC sources be used with mechanical switches
- c) The current flows out of the input module
- d) Currents can flow in either direction at the input module

16) AC output field devices can interface to _____.

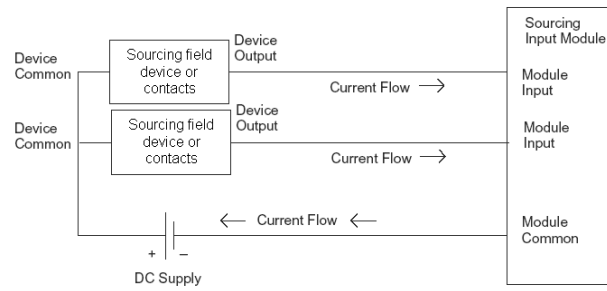
- a) AC output modules
- b) Relay output modules
- c) **Both a and b**
- d) Neither a or b



17) What one item in the output module circuit above should be changed to make it correct.

- a) The battery polarity
- b) Output module should be sourcing
- c) Field device should be sinking

d) **Current flow direction**



18) What one item in the input module circuit above should be changed to make it correct.

- a) The battery polarity
- b) **Input module should be sinking**
- c) Field device should be sinking
- d) Current flow direction