Title: **Symbols and Basic Motor Controls** Test: 3

Course: Intro to Automation Unit: Manual Motor Control CLO: 1

Name ANSWER KEY Grade 60pts Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall identify the National Electrical Manufactures Association (NEMA) symbols and the components that they represent plus whether they are an input or an output.
2. Student shall list each component as either an input or an output device.
3. Student shall recall the components of a ladder diagram.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Test. Grading shall be based on the answer key.

**Instructions**

Label each NEMA symbol with the appropriate description and identify whether the symbol is an input or an output.

|  | Symbol | Description | Input/Output |
| --- | --- | --- | --- |
|  |  | Three-position selector switch | Input |
|  |  | Normally Closed Held Open Limit Switch | Input |
|  |  | Normally Open Flow Switch | Input |
|  |  | Normally Closed Temperature Switch | Input |
|  |  | Yellow Pilot Light | Output |

1. Select all the correct terms used to describe the state of a component that is not wired within a circuit. (2 pts)
   1. Normal
   2. Made
   3. Shelf
   4. Switched

**Instructions**

Answer each of the individual questions below.

1. An input device such as a pushbutton or selector switch that has normally open contacts would have terminal numbers 3 and 4. (2 pts)
2. If a circuit has four inputs, in how many possible states can that circuit be placed? 24 = 16
3. When designing a control schematic, input devices (pushbuttons, selector switches) should be labelled by?
4. The type of device they are.
5. The action that they will perform
6. The type of contacts that they use
7. All the above
8. When hand drawing a control schematic, rung numbers are denoted to the right of the ladder rail?
9. True
10. False
11. Construct a truth table, compose the formula and identify the type of Boolean logic represented in the circuit below. (15 pts)



1. The purpose of the circuit below is to start and stop a motor with lights to indicate that state of the motor (green running, red stopped)? Will this circuit works as designed? Why or why not? No, it won’t seal. It will only jog. (5 pts)



1. Mark up the drawing below to fix items that are incorrect and/or omitted. (10 pts)



1. Match the schematic symbols to the components of a relay. (3 pts)

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| --- | --- | --- | --- | --- |
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1. An eight-pin relay, like the one we use in class, may also be labelled as a?
2. STST Relay
3. DPDT Relay
4. SPDT Relay
5. DPST Relay
6. The follow graphic is what type of ANSI symbol.
7. Form A Contact
8. Form B Contact
9. Form C Contact
10. Form D Contact

**Instructions**

Match each P&ID symbol with its appropriate description.

1. Centrifugal Pump C
2. Two-State Valve (Open or Closed) A
3. Manual Valve D
4. Instrument Location B
5. Process Tank E

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