Station 1
Four Pole/Single Throw Magnetic Relay

1. The coil in this relay can control what horsepower single phase motor off 1-pole at 230 volts?
   a. 2 HP
   b. 5 HP
   c. 10 HP
   d. 15 volt
   e. no correct answer provided

2. This relay is of which type?
   a. 2PST
   b. 8PDT
   c. 4PST
   d. 2P4T
   e. no correct answer provided

3. Terminal A is a/an:
   a. coil control terminal
   b. N/C terminal
   c. N/O terminal
   d. hold down screw
   e. no correct answer provided

Station 2
Pressure Switch

4. The horsepower rating for this switch to control a 240 volt 3-phase motor is:
   a. 1/4
   b. 1 ½
   c. 2
   d. 3
   e. no correct answer provided

5. This device is set from the factory to turn the pump off when the system pressure reaches:
   a. 115 PSI
   b. 20 PSI
   c. 32 PSI
   d. 40 PSI
   e. no correct answer provided

6. The terminals that connect to the pump motor are:
   a. L1 & L2
   b. T1 & T2
   c. L1 & T1
   d. L1 & T2
   e. T2 & L1

Station 3
Circuit Troubleshooting

Rip Taylor has decided to wire his garage shop. The code says it must be done in EMT, which he did. However, when he turns anything on, he gets shocked when he touches the conduit. He suspects there are some problems with the wires inside the conduit. Set your multi-meter up correctly and check them out for him and record your conclusions for each wire color indicated.

7. The white wire is/has:
   a. open
   b. grounded to the conduit
   c. shorted to another wire
   d. high resistance
   e. normal

8. The green wire is/has:
   a. open
   b. grounded to the conduit
   c. shorted to another wire
   d. high resistance
   e. normal

9. The red wire is/has:
   a. open
   b. grounded to the conduit
   c. shorted to another wire
   d. high resistance
   e. normal

10. The black wire is/has:
    a. open
    b. grounded to the conduit
    c. shorted to another wire
    d. high resistance
    e. normal

Station 4
24-Hour Dial Time Switch to Control a Feeding System

11. The voltage required to operate the clock motor from the source is:
    a. 24
    b. 120
    c. 240
    d. 440
    e. not enough information given

12. The voltage out to the feeding unit is:
    a. not enough information given
    b. 440
    c. 240
    d. 120
    e. 24

13. As it is wired, the time switch will control:
    a. the hot side of the relay
    b. the neutral side of the relay
    c. the coil inside the relay
    d. the motor directly
    e. not enough information given

Station 5
Manual Motor Starter

14. The maximum horsepower rating of this device with a 240 volt 3-phase motor is:
    a. 1
    b. 2
    c. 3
    d. 5
    e. not enough information given

15. When ordering a replacement from the A-B catalog, the catalog number for this device is:
    a. Bulletin 609
    b. 120 Volt Controller
    c. 120-240-408
    d. 609-AAW
    e. no correct answer provided

16. When connected to 3-phase power, the power enters and connects to:
    a. L1 – L2 – L3
    b. T1 – T2 – T3
    c. T5 & T8
    d. L1 & L3
    e. T1 – L1 – T2

Station 6
Dayton Wattrimmer® 5 Horsepower 3-Phase Motor

17. To hook this motor up to run on low voltage, connect (not all leads may be included):
    a. 7 – 1
    b. 8 – 2
    c. 9 – 3
    d. 4 – 5 – 6
    e. all of the above

18. As it is wired, the motor will pull:
    a. 460 amps
    b. 4.2 amps
    c. 230 amps
    d. 8.4 amps
    e. no correct answer provided

19. To change rotation of this motor:
    a. interchange leads T5 & T8
    b. don't be silly…it's a one direction motor
    c. interchange any two line leads
    d. interchange leads 6-9 / 4-7 / 5-8
    e. no correct answer provided

Station 7
Magnetic Relay

20. The coil can control what horsepower motor off the two poles at 200 – 600 volts?
    a. 30 amp
    b. 2 HP
    c. 1 ½ HP
    d. 120 volt
    e. no correct answer provided

21. This relay is of which type?
    a. SPST
    b. SPDT
    c. DPST
    d. DPDT
    e. no correct answer provided

22. Terminal #3 is connected to the:
    a. coil control terminal
    b. N/C terminal
    c. N/O terminal
    d. hold down screw
    e. no correct answer provided

Station 8
Environmental Control System

A livestock confinement building is to have humidity and temperature controls installed. The circuit is to consist of a line voltage thermostat and humidistat that control a ventilation fan motor. The fan (motor) will operate to remove excess heat or humidity. This facility will be washed and disinfected regularly. Use the diagram and sample circuit to answer the questions pertaining to this project.

23. The thermostat is a device that helps to control or maintain:
    a. light levels
    b. humidity
    c. static air volume
    d. temperature
    e. no correct answer provided

24. As it is wired, the controllers are wired in:
    a. series
    b. harmonic balance
    c. conjunctions
    d. parallel
    e. no correct answer provided

25. In order for the ventilation fan to be turned on:
    a. both controllers must be in the “on” condition
    b. both controllers must be in the “off” condition
    c. either controller must be in the “on” condition
    d. one controller must be disconnected from the system
    e. no correct answer provided

Station 9
Determining NEMA Motor Frame Designations

26. The dimension “U”:
    a. 1/2"
    b. 5/8”
    c. 7/8”
    d. 1-1/8”
    e. no correct answer provided

27. The dimension “D”:
    a. 5.00
    b 4.50
    c. 3.75
    d. 3.50
    e. no correct answer provided

28. The frame designation for this motor is most likely:
    a. 56
    b. 145T
    c. 182
    d. 215
    e. 11304

Station 10
Baldor Industrial Motor

29. The rated speed of this motor is:
    a. 3450 RPM
    b. 1725 RPM
    c. 1150 RPM
    d. 800 RPM
    e. pretty fast

30. The style of the face of this motor is:
    a. foot mount
    b. “C” face
    c. “D” face
    d. motor mount
    e. flange mount

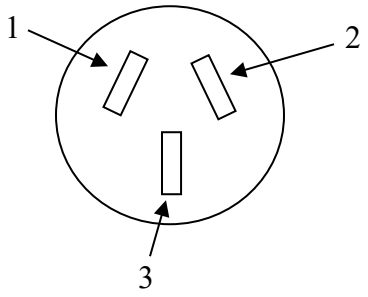
31. To reverse the rotation of this motor:
    a. switch any two power leads
    b. hook a grounding wire to lead #4
    c. connect leads 5 & 8 together
    d. interchange leads 5 & 8
    e. reconnect the ground wire to the frame

Station 11
Voltage Testing with a Multi-Meter

Scenario:
The 240-volt Porta-Power® at Simonson Fabrication in Sacramento was working fine until yesterday…and now it doesn't work at all. They have hired you to inspect the problem. They are also having problems with the 120V outlet…the grinder doesn't work. Using your meter, inspect the plugs and determine the problems.

240V Outlet

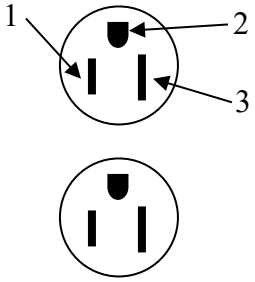
32. Is the voltage within acceptable limits between all slots and terminals?
    A. yes B. no



33. The most likely cause of the problem you found in the 240V outlet is:
    a. there are no problems…it checks out perfectly
    b. disconnected neutral wire
    c. the neutral is connected to the wrong terminal
    d. tripped circuit breaker
    e. disconnected basket wires

120V Outlet

34. Is the voltage within acceptable limits between all slots and terminals?
    A. yes B. no



35. The most likely cause of the problem you found in the 120V outlet is:
    a. there are no problems…the problem must be with the grinder
    b. broken neutral wire
    c. the hot and neutral wires are connected to the wrong terminals
    d. broken grounding wire
    e. a tripped breaker

Station 12
Load Center Box

36. The 20-amp circuit breaker is of which type?
    a. SPST
    b. DPST
    c. SPDT
    d. DPDT
    e. no correct answer provided

37. This duplex outlet circuit is of which type?
    a. 3-phase
    b. interphase
    c. high phase
    d. single phase
    e. no correct answer provided

38. This load center is a/an:
    a. SEP panel
    b. overload panel
    c. sub-panel
    d. hyperphase panel
    e. no correct answer provided

Station 13
Weighted Float Switch

This is a float switch which turns on a pump when the water level in a sump reaches a given level. Using the multi-meter, test the terminals and answer the questions about this switch

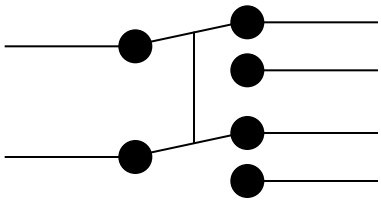
GIVEN: The RED wire is the common

39. With the float hanging, which wire is normally closed?
    a. white
    b. black

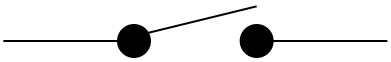
40. This device is best suited for:
    a. regulating the pressure in a tank
    b. adjusting the gallons per minute in an irrigation system
    c. controlling water level in a water storage tank
    d. releasing pressure in a tank if it overregulates
    e. controlling the amount of water going out a pipe

41. Which diagram would best describe the switching mechanism inside the float ball?

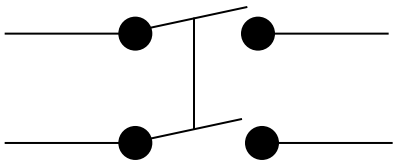
a.



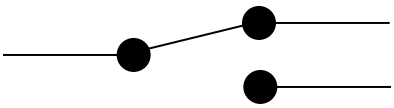
b.



c.



d.



Station 14
Submersible Pump Motor

42. This pump motor is best suited for which type of pump.
    a. manure lagoon pump
    b. chemical sprayer pump
    c. water well pump
    d. hydraulic pump
    e. no correct answer provided

43. The voltage required to run this pump is:
    a. 120V
    b. 345V
    c. lightening voltage
    d. 230V
    e. no correct answer provided

44. What type of circuit does this pump motor require?
    a. single phase
    b. 3-phase
    c. quadruple phase
    d. interactive phase
    e. no correct answer provided

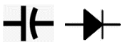
Station 15
Motor Capacitor Testing

45. What is the microfarad (MFD) rating of this capacitor?
    a. 126
    b. 12.0
    c. +70C
    d. 230V
    e. no correct answer provided

46. The correct part number to fit a Baldor motor is:
    a. OC3012F12
    b. RA2000/37-126
    c. #456
    d. 1222048
    e. no correct answer provided

47. Follow the directions below to test this capacitor with your multimeter. What is your microfarad reading? Does this capacitor pass the test?
    a. yes
    b. no
    c. maybe and maybe not
    d. I have no idea
    e. no correct answer provided

Directions for testing a capacitor:

- Make sure your leads are plugged in as BLACK into COM and RED into V Ω 
- Set your multimeter to the capacitor  setting
- Touch the ends of your test probes to the terminals on top of the capacitor
- Note the reading on the screen of your multimeter
- If the reading is “0”, the capacitor is does not pass and is faulty

Station 16
Automatic Lighting Circuit

48. The device controlling the light outlet is called a/an:
    a. photoelectric switch
    b. gell cell battery
    c. cycling timer
    d. percentage of light switch
    e. solar battery charger

49. The red wire in the circuit is the;
    a. load lead
    b. neutral wire
    c. hot wire
    d. grounding wire
    e. safety wire

50`. Normally, these types of circuits are found in which application?
    a. yard lights
    b. outdoor safety lights
    c. nighttime security lights
    d. all of the above
    e. only A and C