

Construction Electrician **Practice Interprovincial Red Seal Exam**

Disclaimer: This is NOT an Interprovincial Standards (Red Seal) Examination. This is a practice examination that has been developed using similar weighting, question distribution, question taxonomies and question styles to that of a red seal examination. Success on this examination will NOT result in certification or qualification. This examination is intended to be used for self assessment in preparation for attempting a red seal examination. More information about the standard that the red seal examination is based on may be found within the National Occupational Analysis for the occupation at www.red-seal.ca .

Section 1

OCCUPATIONAL SKILLS

1. When laying-out receptacle and switch locations, which type of drawing would take precedence for referencing receptacle location measurements?
 - A. Architectural.
 - B. Schematic.
 - C. Mechanical.
 - D. Electrical.

2. When installing an isolated circuit in a patient care area; what color conductor is required to be terminated on the nickel-plated screw of a receptacle?
 - A. Orange.
 - B. Yellow.
 - C. White.
 - D. Green.

3. A product you are planning to use is marked with this symbol:



What personal protective equipment would you expect to wear?

- A. Supplied air respirator and full face mask.
 - B. Chemically resistant gloves, apron and a face shield.
 - C. Fire resistant clothing.
 - D. Dust mask and leather work gloves.
4. A company charges out their journeymen at \$80 per hour, charges out their apprentices at \$60 per hour and marks up parts and material 15%. A job takes two journeymen and one apprentice eight hours to complete. They use \$2800 worth of parts and material. How much should the customer be charged?
- A. \$4 980
 - B. \$4 500
 - C. \$3 800
 - D. \$4 340
5. How many horizontal rails are required for a site-constructed guard rail?
- A. 1
 - B. 2
 - C. 3
 - D. 4
6. Who may remove a lock and tag that has been placed on a motor disconnect?
- A. Any competent worker.
 - B. Any supervisor/foreman.
 - C. Only the worker who placed it.
 - D. Only a worker who carries a key for the lock.

7. Which of the following items should be delivered to a jobsite earliest?
- A. Trade size 27 EMT.
 - B. 12 AWG stranded conductors (various colors).
 - C. Ivory 347 V rated switches.
 - D. Fluorescent lay-in luminaires.
8. Which of the following statements best describes ENT?
- A. Rigid metallic raceway.
 - B. Flexible metallic raceway.
 - C. Rigid non-metallic raceway.
 - D. Flexible non-metallic raceway.
9. Two years after receiving your journeyman certification, you are given a new apprentice to work with. The new apprentice seems to make simple mistakes when installing receptacles and switches. Which of the following strategies is best?
- A. Correct all of the incorrect installations and give the apprentice another task.
 - B. Have the apprentice “shadow” you for a day, until you are satisfied with his/her ability.
 - C. Spend one entire day going over schematic drawings for all possible installations.
 - D. Ask your supervisor to fire the apprentice.

10. Referring to the following diagram, which fuses are blown?

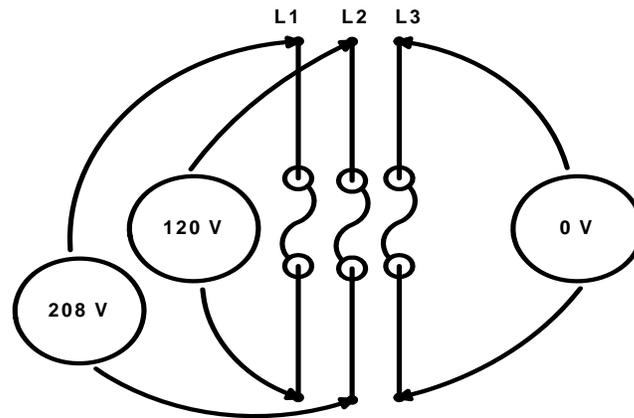


Diagram 15

- A. L1 and L3.
 - B. L1 and L2.
 - C. L1 only.
 - D. L3 only.
11. This symbol is found on a pair of safety boots :



What does this symbol mean?

- A. The boots have protective plates.
- B. The boots are made of natural leather.
- C. The boots have rubber soles.
- D. The boots are electrically insulating.

12. You need to make a 2" diameter round hole in a piece of 5/8" plywood. Which tool is best suited for this application?
- A. A drill with an auger bit.
 - B. A reciprocating saw.
 - C. A drill with a hole saw.
 - D. A hacksaw.

Section 2

DISTRIBUTION AND SERVICES

13. An apartment building consists of 16 units. Eight units are 99 m² and eight units are 140 m². Each unit has a 14 kW range, a 3v kW water heater and 15 kW of electric heating.

The common area loads are:

- 4 - 6 kW electric clothes dryers
 - 4 - 12 A, 120 V electric washing machines
 - 2 - 5 kW electric heaters
 - 8 kW of miscellaneous lighting
- The building service is 120/240 V 3-wire.

What is the minimum size of T-90 Nylon copper conductor in steel conduit required to feed one of the larger units?

- A. 4 AWG
 - B. 3 AWG
 - C. 2 AWG
 - D. 1 AWG
14. When calculating the ampacity of the service conductors for a residence, which of the following are considered to be an additional load?
- A. Lighting.
 - B. The dishwasher.
 - C. The refrigerator.
 - D. The range.
15. When installing conductor loops for current transformers, what is the minimum length of spare conductor required?
- A. 300 mm
 - B. 450 mm
 - C. 750 mm
 - D. 900 mm

16. A three-phase delta-wye 125 kVA dry-type transformer has a primary voltage of 600 V and a secondary phase voltage of 120 V. The nameplate is marked with the following symbol: 1.0 %Z. Which of the following fuses could be installed in the secondary circuit and properly protect the transformer?
- A. 500A, 200 000A IR.
 - B. 600A, 10 00A IR.
 - C. 750A, 20 000A IR.
 - D. 1 000A, 100 000A IR.
17. What is the maximum voltage to ground permitted in a single family detached home?
- A. 120 V
 - B. 150 V
 - C. 240 V
 - D. 300 V
18. A UPS system is supplied by a 600V ac circuit. Voltage measurements indicate 600V at the line side terminals, but 0V at the dc bus inside the cabinet. Which section of the UPS is most likely defective?
- A. The batteries.
 - B. The rectifier.
 - C. The inverter.
 - D. The busbar assembly.
19. You have just finished connecting a new three-phase squirrel cage induction motor. Your foreman asks you to “bump” the motor. What will this test indicate?
- A. The stability of the motor mounts.
 - B. The resistance of the windings.
 - C. The amount of inrush current.
 - D. The direction of rotation.

20. When installing a sub-panel in the basement of a house what modification might be required in the sub-panel?
- A. Disable one phase.
 - B. Remove the neutral terminals.
 - C. Connect the bond to one phase.
 - D. Ensure that the neutral pad is isolated from ground.
21. A sub-panel has been installed in an attached garage in a single family dwelling. How is the sub-panel grounded?
- A. A second, separate grounding electrode is installed.
 - B. The sub-panel is bonded to the main panel with the sub-panel feeder cable.
 - C. The sub-panel is grounded through the system neutral connection.
 - D. Grounding and bonding are only required at the service panel.
22. A three-phase wye service is installed using four RW90 conductors per phase in a parallel run. One of the phase B conductors is not conducting. Which of the following options is the only permissible solution?
- A. Make a splice in the bad conductor.
 - B. Replace the bad conductor with a T90 conductor.
 - C. Replace all of the phase B conductors with T90 conductors.
 - D. Remove the bad conductor.
23. When installing single conductor metal-sheathed cables which of the following is an acceptable method for reducing the sheath current?
- A. Bond the sheath to all non-current carrying components.
 - B. Bond all of the sheaths together with #6 AWG bare copper.
 - C. Float the sheaths at the load end.
 - D. Use the sheath as the bonding conductor.
24. Which of the following is one disadvantage of an autotransformer?
- A. Primary current is limited.
 - B. Secondary current is excessively high.
 - C. Impedance increases with heat.
 - D. There is no primary-secondary electrical isolation.

25. An ohmmeter is connected to the H1 and X1 points of an isolation transformer before the transformer is installed. The ohmmeter displays 103Ω . What can you infer about the transformer?
- A. The windings are in good condition.
 - B. It is a step down transformer.
 - C. A winding need servicing.
 - D. It is additive.
26. Three step-down transformers are connected in parallel. After donning the appropriate personal protective equipment what is the first step in disconnecting one of the transformers for maintenance if it is impractical to lock out the circuit?
- A. Pull the primary fuses.
 - B. Disconnect the primary side.
 - C. Short the secondary of the transformer to be serviced.
 - D. Disconnect the secondary of the transformer to be serviced.
27. Which of the following is suitable for use as a bonding conductor?
- A. Rigid PVC conduit.
 - B. Electrical Metallic Tubing.
 - C. Flexible metal conduit.
 - D. Liquid-tight flexible conduit.
28. What is the main purpose of bonding a motor frame to ground?
- A. Increased motor lifespan.
 - B. Increased power factor.
 - C. Limit inductive reactance.
 - D. Limit the voltage to ground.
29. When is it permitted to use the neutral conductor to bond equipment to ground?
- A. Only if #2 AWG or larger conductors are installed.
 - B. Only if the neutral conductor is bare.
 - C. Only on the supply side of the service connection.
 - D. Only if it is not practical to ground the equipment.

30. Is an insulated green grounding conductor required for amateur radio equipment?
- A. Yes, all electrical equipment must be grounded.
 - B. Yes, the conductor must be insulated because it may be installed exposed.
 - C. No, a bare conductor is permitted for amateur radio equipment.
 - D. No, amateur radio equipment would not function properly if grounded.
31. A GFCI device measures and compares the current in which two conductors?
- A. Ungrounded conductor and identified conductor.
 - B. Neutral conductor and bonding conductor.
 - C. Hot wire and ground wire.
 - D. Switched leg and ground.
32. Which of the following factors influence the voltage regulation of an AC alternator?
- A. Output voltage and rotor impedance.
 - B. Field current and rotor reactance.
 - C. The IR drop of the field winding.
 - D. Load and power factor.
33. In a generator, what does the term “mechanical degrees” refer to?
- A. The revolution of the armature conductor.
 - B. The temperature rating of the equipment.
 - C. The amount of time required to generate one cycle.
 - D. The torque requirement of the mounting fasteners.
34. When installing a solar photovoltaic array which type of cable is required for interconnecting modules?
- A. SJOO
 - B. SJOW
 - C. STOO
 - D. SEWF-2

35. Corona discharge around 750 kV conductors would produce which of the following safety hazards?
- A. Dangerous gasses.
 - B. Extreme, long-lasting heat.
 - C. Dangerous noise levels.
 - D. An overcurrent condition.
36. Which of the following requirements apply to fuses for high voltage installations?
- A. The fuses must be time-delay type.
 - B. The fuses must have an isolation device ahead of them.
 - C. High voltage fuses may only be installed indoors.
 - D. The fuses must have visual indication of continuity.

Section 3

BRANCH CIRCUIT WIRING

37. A motor is connected to a junction box with a trade size 12 flexible conduit. What is the maximum permissible length of the flexible conduit?
- A. 1 m
 - B. 1.5 m
 - C. 2 m
 - D. 3 m
38. When can a heating fixture be used as a raceway?
- A. For any reason.
 - B. Under no circumstances.
 - C. If used to feed adjacent receptacles.
 - D. If the fixture is marked as suitable for uses as a raceway.
39. What type of non-metallic conduit is suitable for exposed installation in an area that will be heated to 115° C?
- A. Rigid PVC.
 - B. Rigid HFT.
 - C. Rigid type DB2.
 - D. Rigid RTRC.
40. Which of the following is an acceptable method for dealing with unused openings in junction box?
- A. They may be left open.
 - B. They may be covered with tape.
 - C. They may be filled with putty.
 - D. The box must be discarded and replaced.

41. When installing service conductors underground, which of the following locations requires the deepest burial?
- A. Conductors under a walkway.
 - B. Conductors under a grass lawn.
 - C. Conductors under a driveway.
 - D. Conductors under a concrete slab.

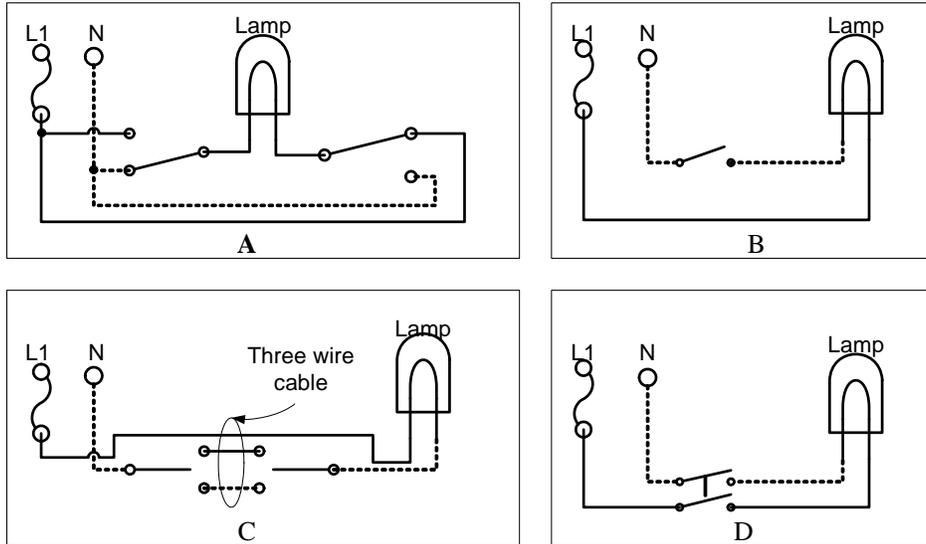
42. What needs to be done with this installation in order to comply with fireproofing requirements?



- A. Install a T-bar ceiling below the cables.
 - B. Patch with drywall compound.
 - C. Install a PVC sleeve and fill with fireproof caulking.
 - D. Install a metallic sleeve and fill with fireproof caulking.
43. What is the minimum size of box that can accommodate four 12/3 NMD-90 cables when five solderless wire connectors are used to make connections?
- A. 4" x 2 $\frac{1}{8}$ " octagon box.
 - B. 4" x 2 $\frac{1}{8}$ " square box.
 - C. 4 $\frac{11}{16}$ " x 2 $\frac{1}{8}$ " square box.
 - D. 4" x 4" x 3" square box.

44. A rigid metal conduit is used to protect 12 #8 AWG T-90 Nylon conductors. The conduit is installed in a room with a 75° C ambient temperature. What is the maximum allowable ampacity of these conductors?
- A. 13.55 A
 - B. 19.35 A
 - C. 31.5 A
 - D. 45 A
45. Which of the following cables would be acceptable for the greatest variety of installations?
- A. NMD 90
 - B. MNWU 75
 - C. SJOOW
 - D. Teck-90
46. Why are pendant style fixtures not permitted in clothes closets?
- A. The lamp cord could overheat.
 - B. The fixture could be held against combustible materials.
 - C. The fixture would not provide a uniform lighting pattern.
 - D. A pendant fixture would not meet the minimum height requirement.
47. A fluorescent ballast is marked with the letter "A". What does this marking represent?
- A. The ballast has passed the factory quality testing.
 - B. The ballast has a high power factor rating.
 - C. The ballast has a low noise rating.
 - D. The ballast is thermally protected.
48. If a 130V rated lamp is installed in a circuit with a measured voltage of 112.76 V which of the following will be increased?
- A. Lumens total output.
 - B. Lumens per watt efficiency.
 - C. Waste heat.
 - D. Lamp lifespan.

49. Which of the following diagrams represent an acceptable installation?



- A. A
- B. B
- C. C
- D. D

50. A switch is described as SPDT. How many lighting circuits can this switch control?

- A. 1
- B. 2
- C. 3
- D. 4

51. What is the difference between a box that is intended for use with a 120V rated switch and a box intended for use with a 347V rated switch?

- A. Only 120V rated boxes are available in ganged configurations.
- B. Only 120V rated boxes can have conduit knockouts.
- C. 347V rated boxes are made from thicker steel.
- D. 347V rated boxes have switch mounting holes that are farther apart.

52. When installing a post light with photocell control, where is the photocell mounted?
- A. Under the luminaire, facing up.
 - B. Above the luminaire, facing down.
 - C. Under the luminaire, facing away from any other light source.
 - D. Above the luminaire, facing away from any other light source.
53. While reviewing the drawings for the construction of an office building you notice that under-carpet type CFC wiring is to be installed on floor with radiant heating. Is this combination acceptable?
- A. No, since CFC cable is a power application and would overheat.
 - B. No, CFC cable cannot be used in an office occupancy.
 - C. Yes, if the CFC conductors are covered with tape.
 - D. Yes, but only if the CFC cable is rated for use on heated floors.
54. When heating panels are embedded in a concrete driveway what is the minimum required thickness of the concrete slab?
- A. 25 mm
 - B. 50 mm
 - C. 100 mm
 - D. 150 mm
55. Can fixed electric space heating equipment be installed on the same circuit as lighting fixtures or general purpose receptacles?
- A. Yes, heating appliances may be connected to any convenient circuit.
 - B. Yes, if lights, but not receptacles, are incorporated into the heating equipment.
 - C. No, heating appliances must have their own circuit.
 - D. No, unless the circuit conductors are de-rated 50%.
56. What is the purpose of the evaporator unit in a cooling system?
- A. Regulate the refrigerant flow.
 - B. Absorb heat from the building air.
 - C. Release heat to the building exterior.
 - D. Absorb heat from the refrigerant.

57. Which of the following would occur if you exchanged the wiring for the high-limit switch with the wiring for the fan switch on a furnace?
- A. The fan will run continuously, the burner will run continuously.
 - B. The fan will run continuously, the burner will not ignite.
 - C. The fan will not run, the burner will not run.
 - D. The fan will not run, the burner will run continuously.
58. Which of the following devices can be connected to a circuit that supplies exit light fixtures?
- A. HVAC equipment.
 - B. General lighting fixture.
 - C. Housekeeping receptacles.
 - D. Emergency lights.
59. Which of the following devices is needed in an emergency light installation?
- A. Automatic transfer switch.
 - B. Two-pole breaker.
 - C. Three-way switch.
 - D. Overload protection.
60. What is the maximum distance that a self-contained battery-powered dual head emergency light can be mounted from its corresponding receptacle?
- A. 2.5 m
 - B. 1.5 m
 - C. 1 m
 - D. 500 mm

Section 4

MOTOR AND CONTROL SYSTEMS

61. What is the purpose of “reduced voltage starting” for a motor?
- A. Increase the starting torque.
 - B. Reduce the inrush current.
 - C. Improve circuit efficiency.
 - D. Increase line voltage.
62. What is the purpose of the auxiliary contacts on a motor starter?
- A. They prevent accidental use of the jog button.
 - B. They prevent nuisance tripping of the overloads.
 - C. They are used as spares in case one of the main contacts is damaged.
 - D. They seal the coil in the energized state when the start button is pressed.
63. An IEC rated starter is to be installed in a motor control circuit that permits the squirrel cage induction motor to be jogged in either direction. Which of the following IEC ratings would be required on this starter?
- A. AC-1
 - B. AC-2
 - C. AC-3
 - D. AC-4
64. Which of the following pairs of motor data determines the NEMA size of the starter for a motor?
- A. FLA and service factor.
 - B. Service factor and horsepower.
 - C. Horsepower and voltage.
 - D. Voltage and FLA.

65. Which of the following does a Variable Frequency Drive insert into the stator of an AC induction motor in order to achieve electric frictionless braking?
- A. Inverted AC.
 - B. Resistance.
 - C. Capacitance.
 - D. Direct current.
66. What is the minimum number of overload contacts required to properly protect a 2 hp, 240 V single-phase, capacitor start motor?
- A. None.
 - B. One set of contacts.
 - C. Two sets of contacts.
 - D. Three sets of contacts.
67. What is the purpose of overload protection in a motor control circuit?
- A. Protect the operator of the motor.
 - B. Protect the windings of the motor.
 - C. Protect the branch circuit conductors.
 - D. Properly bond the case of the motor to ground.
68. The overload protection device should be installed at what point in a motor control circuit?
- A. Before the branch circuit overcurrent device.
 - B. After the motor windings.
 - C. Within the holding circuit.
 - D. Between the motor control contactor and the motor.
69. Which of the following is required when automatic restarting of a motor is likely to create a hazard?
- A. Mechanical interlocks.
 - B. Lock out, tag out procedures.
 - C. Undervoltage release.
 - D. Low voltage protection.

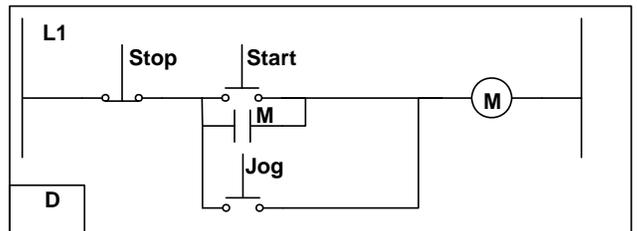
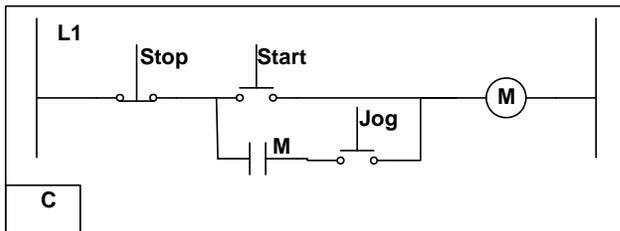
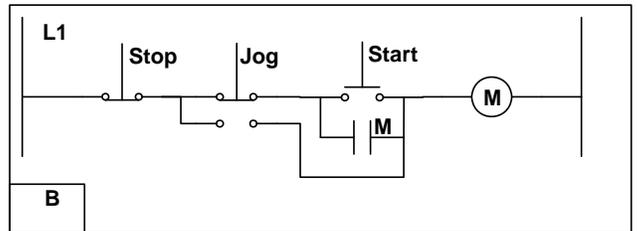
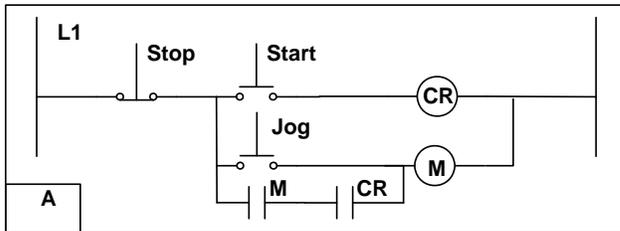
70. Your customer has a machine that requires a fan to continue running for 30 seconds after a motor is shut off. Which of the following components will you need to use to build the control circuit for this machine?

- A. On-delay timer.
- B. Off-delay timer.
- C. Normally closed timer.
- D. Normally open timer.

71. How are automatic pilot devices normally shown in schematic drawings?

- A. Un-activated and de-energized.
- B. Un-activated and energized.
- C. Activated and de-energized.
- D. Activated and energized.

72. Which of the following diagrams represents a circuit that will allow both starting and jogging?



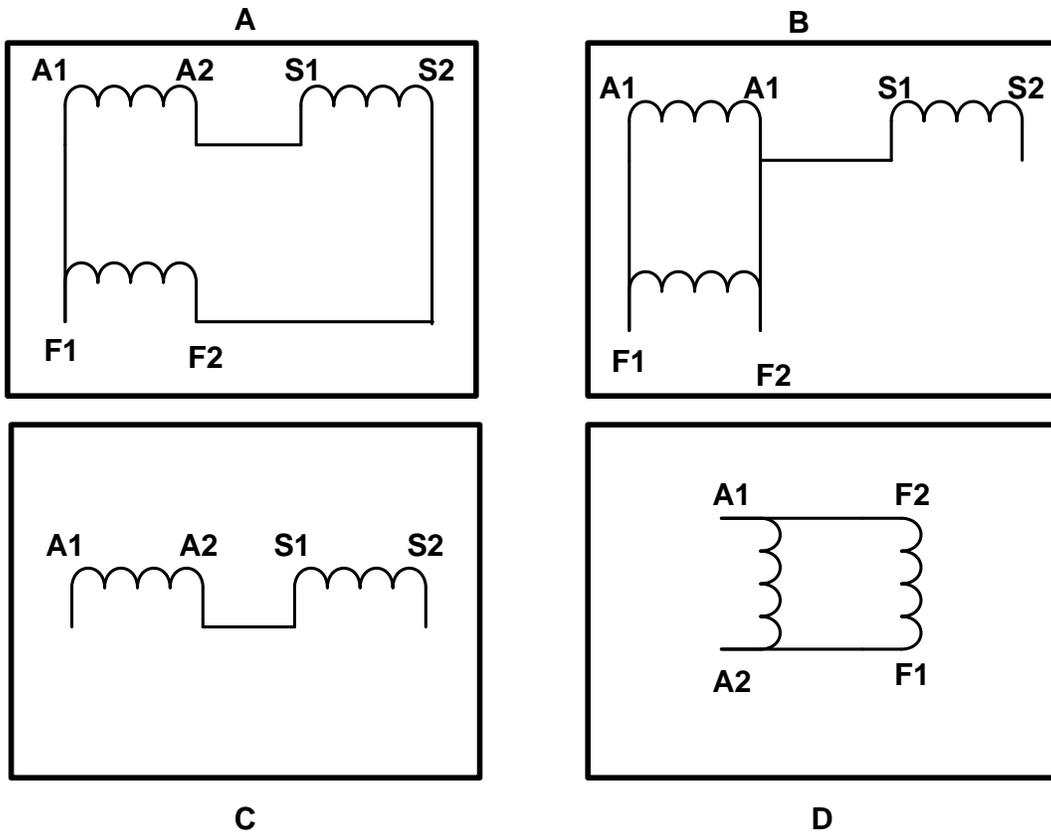
- A. A
- B. B
- C. C
- D. D

73. When multiple stop buttons are connected to a PLC how are the individual pushbuttons connected?
- A. They must be in series.
 - B. They are required to be in parallel.
 - C. They are connected as individual inputs.
 - D. They are connected in series as a single input.
74. How is the rotation direction of a single phase AC capacitor-start, induction-run motor reversed?
- A. Interchange the start winding and run winding.
 - B. Reverse the connection of the start winding.
 - C. Reverse the connection of the run winding.
 - D. Reverse the supply connection.
75. The centrifugal switch contacts fail to close when a resistance-start, induction-run motor is de-energized. What will happen when the motor is re-energized?
- A. The motor will start as normal.
 - B. The motor will chatter, and start after a short time.
 - C. The motor will hum, but not start.
 - D. The motor will start, then the overload will trip.
76. Which is the most likely application for a capacitor-start capacitor-run motor?
- A. In a machine tool.
 - B. In a crane or hoist.
 - C. In a printing press.
 - D. In a fan assembly.

77. A motor has an FLA of 112 A. What is the smallest size RW90 XLPE conductor that can be run from the fused disconnect to the motor if flexible metallic conduit is used as the wiring method?

- A. 2 AWG
- B. 1 AWG
- C. 0 AWG
- D. 00 AWG

78. Which of the following DC motors is most likely to turn in the opposite direction from the other three?



- A. A
- B. B
- C. C
- D. D

79. A motor nameplate gives the following information:

Voltage: 600 V	Phase: 3
Current: 25.7 A	Design: B
Ser Fac: 1.15	Type: P
Class: F	Duty: Cont.

Which of the following is the proper size of time delay fuse for the feeders that supply three of these motors if all three motors start simultaneously?

- A. 45 A
- B. 100 A
- C. 135 A
- D. 150 A

Section 5

EXTRA LOW VOLTAGE SYSTEMS

80. What would be the result if a pull station developed a short circuit in a conventional-system Class A fire alarm circuit?
- A. The fire alarm panel will indicate a trouble condition.
 - B. The branch circuit overcurrent device will operate.
 - C. The fire alarm panel will indicate a ground fault.
 - D. The fire alarm panel will be triggered to alarm.
81. Which of the following fire detectors would be most suitable for use in a service garage with a large roll-up door?
- A. Fixed temperature heat detector.
 - B. Photo-electric smoke detector.
 - C. Ionization smoke detector.
 - D. Rate-of-rise heat detector.
82. When a tamper-proof switch is activated in a class B fire alarm system, what is the required state of the control panel?
- A. Alert.
 - B. Alarm.
 - C. Trouble.
 - D. Supervisory.
83. What is the minimum number of conductors (installed in conduit) for a 30-lamp nurse's call station?
- A. 30
 - B. 31
 - C. 60
 - D. 62

84. What distance must be maintained between the Class 2 conductors of a nurse call system and any 347V lighting conductors?
- A. 50 mm
 - B. 100 mm
 - C. 300 mm
 - D. 600 mm
85. Which of the following locations is best place for mounting the siren of a residential intruder alarm system?
- A. Beside the front door.
 - B. Inside a cold air return.
 - C. On an exterior wall.
 - D. Above the refrigerator.
86. What are the common names of the conductors in single pair telephone cable?
- A. Tip and ring.
 - B. Top and bottom.
 - C. Hot and ground.
 - D. Receiver and transmitter.
87. Why are the individual pairs of UTP and STP cable twisted?
- A. Twisting helps the installer identify the pairs.
 - B. Twisting adds strength to the fragile cable.
 - C. Twisting increases bandwidth.
 - D. Twisting decreases crosstalk.
88. When referring to the capacity of communications cable, what does the term **attenuation** refer to?
- A. The range of frequencies that can be transmitted in the cable.
 - B. A signal that is induced in a cable by a signal in another cable.
 - C. The ratio of signal strength at the transmitting and receiving ends of the cable.
 - D. The impedance of the cable, as determined by length

89. In a commercial building with an integrated building automation system, what effect should the fire alarm system have on the HVAC system?
- A. The fire alarm must close all supply dampers.
 - B. The fire alarm must close all exhaust dampers.
 - C. The fire alarm must shut down the HVAC system.
 - D. The fire alarm must not interfere with the HVAC system.

Section 6

UPGRADING, MAINTENANCE, AND REPAIR

90. Which of the following instruments would be most useful for measuring the existing level of lighting in an office space?
- A. Noise dosimeter.
 - B. Incident-light meter.
 - C. Infra-red thermometer.
 - D. Thermal imaging camera.
91. Which megohmmeter test(s) should be used to determine if an existing three phase, four wire circuit is acceptable for re-use before an upgrading renovation?
- A. Separate all conductors; test each conductor to all others and to ground.
 - B. Join all conductors; test each conductor to all others and to ground.
 - C. Separate all conductors; test each ungrounded conductor to ground.
 - D. Connect all conductors in a series circuit and test to ground.
92. Which of the following service power factor values is likely to be permitted by the local distribution company without the required use of a power factor penalty meter?
- A. 3% lagging.
 - B. 13% leading.
 - C. 23% leading.
 - D. 33% lagging.
93. Which of the following lighting products has the longest useful lifespan?
- A. LED
 - B. Compact fluorescent.
 - C. Low pressure sodium.
 - D. Metal halide.

94. Which of the following is a permissible method for installing a three-prong receptacle in an existing ungrounded box that previously contained a two-prong receptacle?
- A. Install the new receptacle, but leave the green screw unconnected.
 - B. Use a bare wire to connect the green screw to the existing box.
 - C. Use the identified conductor as a bond wire.
 - D. Install a GFCI device and leave the green screw unconnected.
95. You suspect that a circuit has a problem with harmonic distortion. Which of the following test instruments should be used to confirm your suspicion?
- A. A digital voltmeter and a digital ammeter.
 - B. An RMS voltmeter and an average-ranging voltmeter.
 - C. An analog wattmeter.
 - D. A Wheatstone Bridge.
96. How would a second start button be incorporated into a simple start/stop magnetic motor control circuit?
- A. In series with the existing holding contacts.
 - B. In parallel with the existing stop button.
 - C. In series with the existing start button.
 - D. In parallel with the existing holding contacts.
97. You have been called to repair a fluorescent light fixture. One of the twelve fixtures on a circuit has been cycling on and off for the last day. What is the most likely cause of this problem?
- A. The ballast is overheating.
 - B. One of the lamps is the wrong color rating.
 - C. The circuit is experiencing harmonic distortion.
 - D. The circuit is experiencing voltage spikes.

98. A size 53 rigid metal conduit has three 120/208 V (with neutral) circuits inside. All of the conductors are #4 R90XLPE (without jacket). Recent equipment modifications require several 120/208 V (with neutral) control circuits to be installed. How many #10 R90XLPE (without jacket) conductors can be pulled into this conduit?
- A. 0
 - B. 15
 - C. 35
 - D. 96
99. Which of the following test instruments is best suited for determining if one conductor of a four wire three-phase service is overloaded?
- A. Analog ammeter.
 - B. Digital voltmeter.
 - C. Ohmmeter.
 - D. Thermal imaging camera.
100. A wet electrolytic capacitor is tested and found to have a punctured dielectric; what can be done to restore the capacitor?
- A. Nothing, the capacitor must be discarded and replaced.
 - B. Freezing will seal the puncture.
 - C. Re-connect with the proper dc polarity.
 - D. Re-connect to an ac source.