

Questions for the Grounding and Bonding Correspondence Course, Part 2

81. The grounded conductor of each separately derived system must be bonded to the nearest point of the metal water pipe and metal building frame:

- A) with the grounding conductor of the circuit most likely to impose a current.
- B) from the transformer 'XO' terminal.
- C) with a conductor sized by 250.66 based on the largest ungrounded conductor.
- D) from a floating terminal in the panel.
- E) and to a supplemental grounding electrode.

82. Where listed flexible metal conduit is used to connect equipment requiring flexibility due to equipment vibration:

- A) fittings must be listed as suitable for grounding.
- B) a wire type equipment grounding conductor must be installed.
- C) circuit conductors may not exceed 20 amps.
- D) fittings must be bushed to protect wiring.
- E) flex must not exceed 6 feet in length.

83. Bonding of equipment, enclosures, and raceways in an ungrounded system is done:

- A) to make sure overcurrent devices trip if a fault occurs.
- B) to provide a point for the measurement of voltage to ground.
- C) to stabilize line to line voltage.
- D) only when a zig-zag transformer is installed.
- E) to keep non-current carrying surfaces at or near ground potential.

84. A replacement fixture constructed with conductive materials may be installed on a branch circuit where no equipment grounding conductor exists:

- A) if the fixture is mounted above 8 feet.
- B) in residential applications only.
- C) in commercial applications only.
- D) if the circuit is GFCI protected.
- E) if the circuit overcurrent device does not exceed 15 amps.

85. Copper, aluminum, or copper clad aluminum equipment grounding conductors of the wire type are to be sized from table _____ according to _____.

- A) 250.122, the overcurrent device rating.
- B) 250.122, the ungrounded conductor size.
- C) 250.66, the size of the largest ungrounded conductor.
- D) 250.66, the overcurrent device rating.
- E) 4, the size of the raceway.

86. When conduit is used as an equipment grounding conductor:

- A) approved fittings must be used for each conduit type.
- B) all fittings shall be made up tight using suitable tools.
- C) A and B.
- D) support intervals must be decreased.
- E) ground wedges and bonding jumpers must be used.

87. A spiral-interlocking-metal-tape type MC cable with an internal bonding strip of copper or aluminum, and an insulated copper grounding conductor:

- A) is approved for exposed installations on concrete walls.
- B) can provide redundant grounding for use in patient care facilities.
- C) is not approved for use with isolated ground receptacles.
- D) is designed for direct burial in earth.
- E) is commonly used for wiring chain hung lighting fixtures.

88. Listed liquid-tight flexible metal conduit with fittings listed for grounding is permitted to serve as the equipment grounding conductor:

- A) for 20 amp circuits in 3/8 and 1/2 inch trade sizes.
- B) for up to 60 amp circuits in 3/4 through 1 1/4 trade sizes.
- C) if the combined length of flex in the ground path does not exceed 6 feet.
- D) all of the above.
- E) if flexibility is required for the connection to vibrating equipment.

89. A 200amp sub-panel feeder is to be installed in a detached shop building 250 feet from the service panel, and 250kcmil copper conductors are used to accommodate voltage drop. What size equipment grounding conductor is required for this installation?

- A) #6 copper.
- B) #2 copper.
- C) 2 AWG sizes smaller than the phase conductors.
- D) #3 copper.
- E) #4 copper.

90. When multiple circuits are routed in the same raceway:

- A) an equipment grounding conductor must be installed for each circuit.
- B) an oversized equipment grounding conductor must be installed.
- C) the breaker handles must be tied together.
- D) a single equipment grounding conductor is permitted.
- E) Ground Fault Protection is required.

91. A 3/4 hp, 120 volt motor is wired with #12 copper branch circuit conductors, and fed from a 30 amp breaker. What size equipment grounding conductor is required?

- A) #12 copper.
- B) 250.122 indicates a #14 is required.
- C) 430.52 allows 250% of FLA for inverse time breaker, so #10 is required.
- D) flex is less than 6 feet in length, no grounding conductor is required.
- E) 250.122 indicates a #10 is required.

92. When instantaneous trip circuit breakers are installed in motor circuits, the size of the equipment grounding conductor is based on _____.

- A) 50% of the breaker rating.
- B) the size of the circuit conductors.
- C) the motor overload protective device.
- D) 250.122(A) using the maximum dual element fuse rating permitted.
- E) the locked rotor current of the motor.

93. A 600 amp sub panel is fed with two parallel runs of 300kcmil copper conductors per phase installed in two raceways. What is the minimum size equipment grounding conductor required in each raceway?

- A) #4 copper.
- B) #1 copper.
- C) 1/0 copper.
- D) 3/0 copper.
- E) 1/0 aluminum.

94. The sub panel in the question above is fed with two runs of 300kcmil MC cables that have been manufactured with a #4 equipment grounding conductor. What conditions are required for this to be a legal installation?

- A) ground fault protection equipment is installed.
- B) only qualified persons service the installation.
- C) ground fault protection is set at not more than 285 amps.
- D) GFP is listed for the purpose of protecting the equipment grounding conductor.
- E) all of the above conditions are met.

95. Where a ground rod is driven at the base of a metal light pole in a parking lot:

- A) an additional equipment grounding conductor is not required.
- B) 25 ohms resistance is required.
- C) it is considered supplementary, not required by the NEC.
- D) a #4 bond to the pole is required.
- E) exothermic bonding to the rebar in the pole base is required.

96. Equipment grounding conductors are required to be installed in the same raceway, or otherwise be run with the circuit conductors. Which of these statements is true?

- A) article 250.134(B) addresses this issue.
- B) physical separation of grounding and circuit conductors can result in high impedance.
- C) high ground impedance can result in delayed operation of overcurrent protection.
- D) all of the above.
- E) if the raceway is conductive, this is not an issue.

97. Generally, it is not permitted to ground equipment with the grounded circuit conductor on the load side of the service disconnecting means. Which of the following conditions is not an exception to this rule?

- A) existing range and dryer circuits per 250.140.
- B) where needed to bond a section of raceway that has been separated by corrosion.
- C) grounding at a separate building per OAR 918-305-0160(2)
- D) load side meter sockets per 250.142(B) exc. 2.
- E) DC systems per 250.164.

98. A conductive metal raceway elbow installed _____ for service conductors, is not required to be bonded to the grounded service conductor.

- A) in a nonmetallic raceway at least 18 inches deep.
- B) at the base of a utility power pole.
- C) in a concrete foundation below a meter base.
- D) as a pulling elbow at a utility vault.
- E) there are no exceptions to the bonding requirement.

99. Exposed non-current carrying metal parts of cord and plug connected equipment that are likely to become energized shall be grounded, with this exception:

- A) portable handlamps.
- B) hedge clippers.
- C) information technology equipment.
- D) tools supplied by an isolating transformer with an ungrounded secondary under 50v.
- E) electrical aquarium equipment.

100. When extensive metal siding on pole buildings may become energized and is subject to personal contact:

- A) it must be bonded to the grounded circuit conductor at the panel.
- B) bonding to the equipment grounding conductor of a receptacle circuit is required.
- C) it must be bonded to the ground rod.
- D) the NEC recommends bonding for additional safety.
- E) it is non-electric equipment, and is not referenced in the NEC.

101. The zigzag or T connected grounding auto transformer is identified in the code, and is used:

- A) to provide different voltages from a 277/480 volt system.
- B) to feed special equipment in a commercial building.
- C) to create different voltages from a 120/208 volt system.
- D) to reduce the high leg on a 120/240 volt, three phase system.
- E) primarily to create a neutral reference point in a 3 wire, 3 phase system.

102. Metal clad and enclosed service equipment rated over 600 volts is now required by the National Electrical Code to:

- A) be rendered inaccessible to anyone but the utility companies.
- B) include a ground bus that extends into the area for service conductor termination.
- C) have an 8 foot fence erected around it.
- D) be listed by UL.
- E) this type of equipment is not regulated by the NEC.

103. There are several different methods or means of connecting equipment to grounding conductors or bonding jumpers. Which of these methods is not required to be listed?

- A) pressure connectors.
- B) grounding clamps.
- C) exothermic welding.
- D) bonding bushings.
- E) grounding wedge.

104. Special provisions have been made for grounding specific appliances through the grounded circuit conductor of existing branch circuit installations. Which of these appliances is covered by these provisions?

- A) electric ranges.
- B) wall mounted ovens.
- C) clothes dryers.
- D) counter mounted cook tops.
- E) all of the above.

105. Conductive boxes provided for the installation of devices or conductors are required to be grounded. Which of the following statements is false?

- A) listed raceway fittings made up wrench tight meet this requirement.
- B) an equipment grounding conductor that terminates on a device in that box must be bonded to that box.
- C) a grounding screw must be used for no other purpose.
- D) all equipment grounding conductors passing through the box must be bonded.
- E) some conduit bodies are not equipped with grounding screws.

106. In general, with regard to the termination of grounded and grounding conductors in panelboards, which of the following statements is true?

- A) grounded and grounding conductors of the same circuit are allowed to share a terminal.
- B) each neutral is required to be terminated in an individual hole on the terminal bar.
- C) ground and neutral terminals must be separated in all panelboards.
- D) all grounding conductors entering a panelboard must be terminated in that panelboard.
- E) all of these statements are false.

107. Routing all of the conductors of an electrical branch circuit or feeder together is an essential and fundamental design criteria that:

- A) helps achieve low overall circuit impedance.
- B) helps facilitate the operation of overcurrent devices.
- C) helps insure consistent installation procedures.
- D) addresses some of the issues of electro-magnetic induction.
- E) all of the above.

108. When considering the rating and operation of overcurrent protective devices, a line to line fault is called:

- A) a ground fault.
- B) a current limiting event.
- C) a short circuit.
- D) a time delay fuse.
- E) an inverse time circuit breaker.

109. When an ungrounded conductor makes accidental contact with a non-current carrying conductive surface, it is called:

- A) a time delay fuse.
- B) a short circuit.
- C) an inverse time circuit breaker.
- D) a ground fault.
- E) a current limiting event.

110. Localization of an overcurrent condition to restrict outages to the circuit affected, accomplished by the choice of protective devices and their ratings or settings. This is the definition for:

- A) selective co-ordination.
- B) time delay fuse.
- C) inverse time circuit breaker.
- D) instantaneous trip circuit breaker.
- E) available fault current.

111. When a ground fault occurs in the service equipment ahead of the service disconnecting means, the _____ is the most vital link to operation of the primary overcurrent device.

- A) grounding electrode.
- B) main bonding jumper.
- C) lightning protector.
- D) grounding electrode conductor.
- E) A and D.

112. An important factor in determining the impedance of a ground fault current path is:

- A) the length of the raceway.
- B) the integrity of the raceway fittings.
- C) the size of the raceway.
- D) the use of a supplemental equipment grounding conductor.
- E) all of the above.

113. An insulated copper conductor with a bolted connection to source voltage can carry 1 ampere per 42.25 circular mils for 5 seconds before it fails. This is generally referred to as:

- A) a meltdown.
- B) the fuse effect.
- C) catastrophic failure.
- D) conductor withstand rating.
- E) engineering who-haw.

114. A general rule of thumb is that the equipment grounding conductor should have about _____ percent of the ampacity of the ungrounded conductor(s) of the circuit.

- A) 10.
- B) 40.
- C) 25.
- D) 50.
- E) 60.

115. A system bonding jumper is required to connect the equipment grounding conductors of a separately derived system to its grounded conductor:

- A) at the termination of the grounding electrode conductor.
- B) at the transformer secondary lugs.
- C) at the first system disconnecting means.
- D) at any point along the secondary conductors.
- E) at both ends, (source and final overcurrent device).

116. When the same individual patient vicinity is served by two or more panelboards from separate emergency systems as well as normal power:

- A) all circuits shall be GFCI protected.
- B) the equipment grounding terminals in the panels shall be bonded together.
- C) life safety grounding must be kept electrically separate from normal power.
- D) all critical system grounding must be isolated.
- E) conductors of these systems can be routed in a single conduit.

117. In a building where multiple separately derived systems are installed, individual grounding electrode conductors are permitted to be tapped to a common grounding electrode conductor, using a method of:

- A) exothermic welding.
- B) split bolt connectors.
- C) mechanical lugs on a splice plate.
- D) listed pressure connectors.
- E) any of the above.

118. When a generator is used to provide back-up power, and an automatic transfer switch is employed, a new grounding electrode:

- A) system must be constructed.
- B) must be created and bonded to the generator.
- C) is not required if the transfer switch does not open the grounded conductor.
- D) must be connected to the grounded conductor of the generator.
- E) is only required in the case of an emergency system.

119. Grounding and bonding on an electrical system in a building separate from the service has to be done in such a manner as to:

- A) make the system look just like a service.
- B) make the system look like a sub-panel.
- C) prevent parallel ground fault current paths.
- D) prevent parallel neutral current paths.
- E) both C and D.

120. Electrical supply to a separate building or structure on the same premises is required to have a disconnecting means inside or outside, nearest the point of entry:

- A) except for some multi-building installations under single management.
- B) as long as there are no parallel neutral current paths.
- C) unless there is a generator in the building.
- D) unless there are other utilities such as limited energy systems.
- E) only if metallic gas, water, or process piping also exists between buildings.

121. In a two family dwelling with firewall separation that meets the definition of, “two buildings on a common foundation”, and separate services are installed:

- A) four rod type electrodes are required.
- B) the grounding electrodes must be bonded together.
- C) a bonding jumper sized by table 250.66 is required between services.
- D) grounded conductor terminals shall be bonded with a #4 insulated conductor.
- E) bonding the electrodes together is desirable, but not required by the *Code*.

122. Separate generators supplying carnival rides must be bonded to the same grounding electrode system if the rides are located within _____ of each other.

- A) 6 meters.
- B) 12 feet.
- C) 15 feet.
- D) 25 feet.
- E) the length of the transport truck.

123. When a 4-wire, 120/240 volt, direct burial feeder is used to supply a building or structure that will be used to house livestock:

- A) the aluminum grounded conductor must be full size.
- B) the burial depth shall be increased by 12 inches.
- C) the equipment grounding conductor must be insulated or covered copper.
- D) oxide inhibitor must be used at the conductor terminations.
- E) a non-metallic raceway must be used to provide physical protection.

124. For agricultural buildings, all 125 volt, single phase 15 and 20 amp general purpose receptacles in these areas shall have GFCI protection.

- A) areas having an equipotential plane.
- B) outdoors.
- C) damp or wet locations.
- D) dirt confinement areas for livestock.
- E) all of the above.

125. Regarding electrical supply to buildings or structures on a farm, a site isolating device that is accessible from grade level:

- A) is required.
- B) is not allowed.
- C) cannot be mounted on a pole.
- D) must be permanently identified as a site-isolating device.
- E) must be installed by the utility company.

126. According to UL estimates, a current of 100 milliamps through the chest of a normal human for a period of _____ is likely to result in heart fibrillation.

- A) two seconds.
- B) .1 seconds.
- C) .01 seconds.
- D) this amount of current is not capable of causing fibrillation.
- E) fibrillation occurs instantaneously.

127. A typical class A Ground Fault Circuit Interrupter will open a 5 milliamp fault current in approximately:

- A) 1 second.
- B) .04 to .1 seconds.
- C) .5 seconds.
- D) .01 seconds.
- E) this current level will not open a GFCI device.

128. Non-grounding, 120 volt receptacles are permitted to be replaced with GFCI receptacles under this circumstance:

- A) only if a ground wire is routed to the nearest water pipe.
- B) only in residential applications.
- C) GFCI receptacle is marked, "no equipment ground".
- D) in commercial applications only.
- E) if a ground rod is driven and connected to the receptacle.

129. In the State of Oregon, the specific rule about a 120 volt receptacle provided for a washing machine located in a bathroom is as follows:

- A) a duplex receptacle is permitted if it is not readily accessible.
- B) it must be a single receptacle.
- C) it cannot be part of a multi-wire branch circuit.
- D) it must be accessible above the washing machine control panel.
- E) GFCI protection is required.

130. Ground Fault Circuit Interrupter protection for personnel is not required in the following locations and circumstances:

- A) a crawlspace receptacle for HACR equipment maintenance.
- B) a receptacle more than 6½ feet above grade for holiday lighting.
- C) a dedicated circuit for an outdoor vending machine.
- D) a dedicated circuit for rooftop snow melting and de-icing equipment.
- E) a receptacle provided for maintenance at an outdoor air conditioning unit.

131. Ground Fault Circuit Interrupter protection for personnel is not required in the following locations and circumstances:

- A) in a critical care area where the basin and toilet are in the patient's room.
- B) 125 volt 60 hrz. 20 amp receptacle in an aircraft hangar.
- C) 125 volt 15 amp receptacle inside a boat house.
- D) a receptacle within 6 feet of a mop sink.
- E) GFCI protection is required for all of the above.

132. Ground Fault Protection for equipment is required for electrical systems with these characteristics.

- A) over 1000amp, 120/240volt w/high leg.
- B) 480/277volt, 1000amps.
- C) 1200amp, 120/208volt.
- D) 800amp, 120/240volt single phase.
- E) all of these require GFP.

133. Ground Fault Protection equipment that operates on the principle of measuring current in the main or system bonding jumper only is referred to as:

- A) current transformer type.
- B) zero sequence type.
- C) cascading time delay type.
- D) zone interlocking system type.
- E) neutral ground strap type.

134. Where multi-level ground fault protection is required to localize a fault, one method of selective co-ordination that utilizes interconnecting cables is called a:

- A) zero sequence system.
- B) cascading time delay system.
- C) zone interlocking system.
- D) redundant ground system.
- E) selective cabling system.

135. Additional levels of Ground Fault Protection for equipment in a health care facility are required:

- A) to have at least 6-cycle separation.
- B) on the load side of an essential system transfer switch.
- C) between the generating unit and the transfer switch.
- D) on some high impedance grounded systems.
- E) to protect fire pumps from fault currents.

136. For the purpose of grounding all non-current carrying metal parts of a crane and hoist system, the trolley and bridge frames:

- A) shall be considered grounded through wheels and tracks.
- B) shall be provided with separate bonding conductors.
- C) are required to be grounded in accordance with article 230.
- D) are exempt from normal requirements.
- E) require a #6 copper conductor to the grounding electrode system.

137. Special provisions are required for grounding and bonding in hazardous (classified) locations. These requirements can be found in article _____ of the NEC.

- A) 501.30.
- B) 502.30.
- C) 503.30.
- D) 505.25.
- E) all of the above.

138. Bonding locknuts or grounding bushings with bonding jumpers are required for raceways installed in hazardous (classified) locations:

- A) unless the voltage is less than 15 volts.
- B) only from the point that the raceway enters the classified area.
- C) unless supplied from a separately derived system.
- D) even if supplemented by an equipment grounding conductor.
- E) only if flexible conduit is used.

139. Where livestock is housed, any portion of a direct buried equipment grounding conductor that is run to the building or structure:

- A) must be covered or insulated copper.
- B) must be installed in a raceway.
- C) must be buried at least 30 inches.
- D) can be aluminum if installed in a raceway.
- E) can be bare if installed in a metallic raceway.

140. When a submersible pump is used in a metal well casing, and the well casing is not used as a grounding electrode, the casing shall be:

- A) bonded according to table 250.66.
- B) bonded to a grounding electrode.
- C) connected to the pump circuit equipment grounding conductor.
- D) bonded using the process of exothermic welding.
- E) bonded with a #8 solid copper conductor.

141. Bonding of equipotential planes in areas of agricultural buildings used for livestock confinement is done:

- A) to facilitate operation of overcurrent devices.
- B) for protection of personnel.
- C) to improve their feeding habits.
- D) to protect the animal handlers.
- E) primarily to eliminate stray voltages or “step potential”.

142. Wet niche underwater lighting fixtures, piped to a junction box with non-metallic conduit:

- A) shall have a #8, insulated copper bonding jumper from j-box to forming shell.
- B) shall have an equipment grounding conductor in the cord to the fixture.
- C) shall have a long enough cord to reach dry pool deck for relamping.
- D) require GFCI protection if operating voltage exceeds 15 volts.
- E) all of the above are true.

143. Equipotential bonding of pool equipment and the equipotential grid is required to eliminate voltage gradients in the pool area. Which statement is true?

- A) A double insulated motor is not to be bonded directly to the grid.
- B) Rebar that is encapsulated for corrosion protection is not required to be bonded.
- C) All fixed metal within 5 feet of the water must be bonded.
- D) If encapsulated rebar is used, an equipotential grid must be created.
- E) All statements are true.

144. Which of the following items is not required to have a redundant means of grounding in a patient care area of a health care facility?

- A) a non-emergency light switch.
- B) a light fixture mounted above 7½ feet from the floor.
- C) a GFCI protected receptacle for general use.
- D) a hospital grade receptacle on the life safety system.
- E) a receptacle on the critical branch with GFP.

145. No switch, circuit breaker, or fuse shall be installed in a grounded conductor except in the case of:

- A) a molded case circuit breaker used as a disconnecting means.
- B) a multiwire branch circuit feeding office partitions.
- C) a ground fault protective device for a photovoltaic array.
- D) a feeder to a separate building on the same property.
- E) a GFCI protected circuit to a fountain pump.

146. The requirement to bond all conductive parts of electrical systems, structural rebar, metal ladders and fittings, etc. around a pool with a #8 copper conductor is done:

- A) primarily to eliminate voltage gradients.
- B) to facilitate overcurrent protective device operation.
- C) instead of providing Ground Fault Protection for equipment.
- D) to facilitate operation of GFCI devices.
- E) to eliminate the effect of electromagnetic induction.

147. The minimum size bonding conductor required between a neon transformer enclosure fed by a 15 amp circuit, and the neon sign it serves is:

- A) #12.
- B) #16 copper.
- C) #12 copper only.
- D) #14 copper.
- E) #10 if over 100 feet long.

148. Listed flexible metal conduit is considered by the *Code* as a suitable bonding means for neon secondary conductors in total accumulative lengths up to:

- A) 6 feet.
- B) 25 feet.
- C) 20 feet.
- D) 50 feet.
- E) 100 feet.

149. Equipment grounding conductors for isolated ground receptacles are permitted to pass through one or more panelboards, but must be terminated at the first:

- A) source of separately derived system.
- B) separate building disconnecting means.
- C) service equipment.
- D) any of the above locations.
- E) equipment grounding terminal.

150. Power systems derived within information technology equipment are not considered _____ for the purpose of applying article 250.20(D).

- A) grounded for objectionable currents.
- B) separately derived.
- C) connected to the signal reference grid.
- D) isolated.
- E) a broadband grounding system.

151. An intersystem grounding conductor is required to connect _____ to an external bonding means at the service equipment.

- A) telecommunication systems
- B) television and radio systems
- C) Community antenna TV systems
- D) network powered broadband communication systems
- E) all of the above

152. If the primary protector bonding conductor for a communications system cannot be less than _____ in length, an additional _____ must be installed and bonded to the grounding electrode system with a minimum _____ copper conductor.

- A) 20 feet, grounding electrode, #6
- B) 25 feet, ground rod, #4
- C) 6 feet, bonding jumper, #8 solid
- D) 50 feet, grounding electrode conductor, #4
- E) 20 feet, air terminal, #2

153. The primary protector grounding terminal for a communications system installed on a cord and plug connected mobile home must be bonded:

- A) to the service pedestal with a #10 copper conductor.
- B) to the nearest equipment grounding conductor.
- C) to the metal frame with a minimum #12 copper conductor.
- D) to the sheet metal 'skin' of the mobile home.
- E) by means of a grounding electrode system.

154. The shield of coaxial cables used in conjunction with CATV systems is required to be grounded with a conductor not smaller than _____, nor larger than _____.

- A) #12 copper, #6.
- B) #10, #8.
- C) #12, #6.
- D) #14, #6.
- E) #10 copper, #8 Aluminum.

155. A concrete encased grounding electrode must be located near the bottom of the footing or foundation and is required to be encased in at least _____ of concrete.

- A) one inch.
- B) two inches.
- C) six inches.
- D) four inches.
- E) three inches.

156. For customer owned power transmission, the grounded conductor of a solidly grounded electrical system is not permitted to be connected to a grounding electrode in more than one place. Which of these situations is an exception to this general rule?

- A) Some distribution systems operating at over 1000 volts.
- B) A 277/480 volt, 5-wire overhead feeder to a separate building.
- C) An existing 3-wire circuit to a residential dryer.
- D) An existing feeder to a pump house with a well casing.
- E) None of these are a legal exception to the rule.

157. When a transfer switch causes the neutral conductor to be switched between the normal and emergency sources:

- A) the alternate source neutral shall be grounded.
- B) warning signs must be installed.
- C) ground fault testing must be considered.
- D) all of the above are true.
- E) there are no special requirements.

158. The size of the grounding electrode conductor for a direct current system must not be smaller than the neutral conductor, and in no case, smaller than:

- A) #10 copper.
- B) #4 aluminum.
- C) #8 copper or #6 aluminum.
- D) #4 copper.
- E) #12 copper.

159. The primary protector grounding conductor for communication systems, broadband network systems, and CATV systems in one and two family dwellings:

- A) shall be connected to the nearest equipment grounding conductor.
- B) shall not exceed 20 feet in length.
- C) must be attached to a separate ground rod.
- D) is required to be connected to the galvanized rigid service mast.
- E) has to be connected with an irreversible splice.

160. Multiple grounding of solidly grounded neutral systems over 1000 volts is allowed under which of these conditions:

- A) services.
- B) underground circuits where a bare copper neutral is exposed.
- C) overhead circuits installed outdoors.
- D) all of the above.
- E) services that utilize current transformer metering.