

NEC Study Guide

1 According to the NEC, the maximum distance from the point of entrance to the building that the water pipe may be used as a grounding electrode interconnect is:

- A. 3'
- B. 4'
- C. 5'
- D. 6'

CORRECT: C NEC 250.52 (A)(1)

Comment: NEC 1996 reference is 250-81 and NEC 1999 reference is 250-50.

2 According to the NEC, what is the minimum number of receptacle outlets which must be installed within 20' of a permanently installed outdoor residential spa and the outside wall of the spa?

- A. 0
- B. 1
- C. 2
- D. 3

CORRECT: B NEC 680.22 (A)(3) & 680.42

Comment: NEC 1996 & 1999 references are 680-6 (a)(2) & 680-40.

3 A swimming pool and the area extending ___ feet horizontally from the inside of the walls of the pool shall be placed under an existing service drop.

- A. 5
- B. 10
- C. 15
- D. 20

CORRECT: B NEC 680-8 Table

NEC Study Guide

- 4 The purpose of NEC is to provide:
- A. requirements for safe electrical installations
 - B. an instruction manual for apprentice electricians
 - C. design spec for electrical installations
 - D. installations that are adequate for good service
- CORRECT: A** NEC 90.1 (A)

- 5 The purpose of the NEC is:
- A. an instructional manual for apprentice electricians
 - B. requirements for safe electrical installations
 - C. a design specification for electrical installations
 - D. installations that are adequate for good service
- CORRECT: B** NEC 90.1 (A)

- 6 The purpose of the NEC is to _____
- A. provide a minimum design specific
 - B. to provide a concise instruction manual for untrained individuals
 - C. to provide a manual of common electrical procedures
 - D. the safe guarding of persons from electrical hazards
- CORRECT: D** NEC 90.1 (A)

Comment: NEC 1996 & 1999 reference 90-1 (a).

NEC Study Guide

- 7 The National Electrical Code:
- A. does not include installations in powerhouses under exclusive control of electrical utilities
 - B. is not intended for design specifications
 - C. is not intended for an instructional manual for untrained persons
 - D. all of these
- CORRECT: D** NEC 90.1 (C) & 90.2 (B)(5)

- 8 According to the NEC, mandatory wording is characterized by:
- A. FPM
 - B. the word "shall"
 - C. the word "may"
 - D. the word "would"
- CORRECT: B** NEC 90.5 (A)

- 9 FPN stands for ____.
- A. fire protection note
 - B. fine print note
 - C. fire panel notation
 - D. neither A, B, nor C
- CORRECT: B** NEC 90.5 (C)

Comment: NEC 1996 reference is 90-5. _____

NEC Study Guide

10 It is the intent of the NEC that ___ wiring for the construction of equipment need not be inspected at the time of installation of the equipment if the equipment has been listed by a qualified electrical testing laboratory.

- A. factory installed internal
- B. factory installed external
- C. underground
- D. raceway

CORRECT: A NEC 90.7

11 The NEC is not intended to be suitable for mandatory application by inspecting authorities over:

I - electrical installations

II - railroad installations

- A. I only
- B. II only
- C. both I & II
- D. neither I nor II

CORRECT: B NEC 1

12 According to the National Electrical Code, a TV cable installation above a drop-in ceiling could be described as a/an ___ installation.

- A. exposed
- B. accessible
- C. readily accessible
- D. concealed

CORRECT: B NEC 100 Definitions - Accessible (as applied to wiring methods)

NEC Study Guide

- 13** According to the NEC, the ampacity of a conductor is defined as the current in amperes that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 100 Definitions - Ampacity

- 14** According to the NEC, that portion of the circuit between the final over-current protection device prior to the load is:

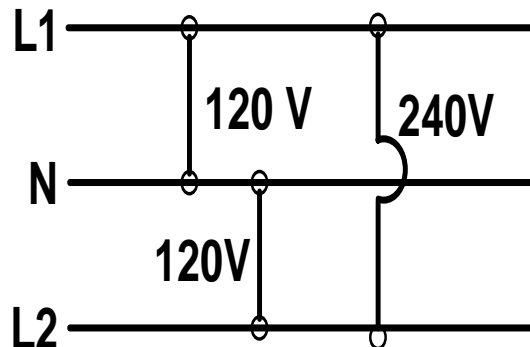
- A. main circuit
- B. feeder circuit
- C. branch circuit
- D. motor circuit

CORRECT: C NEC 100 Definitions - Branch Circuit

- 15** This circuit, accurate as drawn, is classified by NEC as multiwire branch circuit.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 100 Definitions - Branch Circuit, Multiwire



NEC Study Guide

- 16 According to the NEC, exposed wiring as applied to wiring methods, is on or attached to the surface or behind a panel designed to allow access.

A. True
B. False
C.
D.

CORRECT: A NEC 100 Definitions - Exposed

- 17 According to the NEC, the ____ is that portion of a wiring system between the service equipment or other power supply and just prior to the final over-current protective device protecting the current.

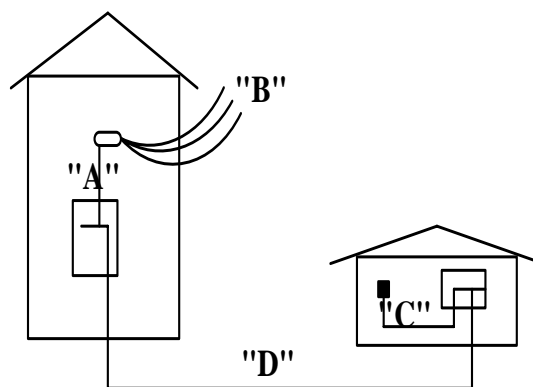
A. feeder
B. service
C. power
D. branch

CORRECT: A NEC 100 Definitions - Feeder

- 18 Which part of the figure represents or contains feeder conductors?

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

CORRECT: C NEC 100 Definitions - Feeder



NEC Study Guide

- 19** A string of outdoor lights suspended between two supports is known as:
- A. a messenger wire
 - B. festoon lighting
 - C. series wiring
 - D. festival lights
- CORRECT: B** NEC 100 Definitions - Festoon Lighting
-
- 20** The ground fault circuit protection for personnel works on the principle of unbalanced current between:
- A. the grounded and ungrounded conductor
 - B. the ungrounded conductors
 - C. the grounding conductor and the neutral
 - D. the service disconnect and branch circuit
- CORRECT: A** NEC 100 Definitions - Ground-Fault Circuit Interrupter
-
- 21** When an electrical disconnect switch must be within sight of a sign, the switch must be visible from and within ___ feet.
- A. 40
 - B. 45
 - C. 50
 - D. 55
- CORRECT: C** NEC 100 Definitions - In Sight From (Within Sight From, Within Sight)

NEC Study Guide

22 The Code specifically defines the term "when in sight" to mean as close as practical to equipment but in no case more than ___ feet.

- A. 20
- B. 30
- C. 40
- D. 50

CORRECT: D NEC 100 Definitions - In Sight From (Within Sight From, Within Sight)

23 A location classified as ___ may be temporarily subject to dampness and wetness.

- A. damp
- B. dry
- C. wet
- D. moist

CORRECT: B NEC 100 Definitions - Location, dry

24 A ___ box may be weatherproof

- A. watertight
- B. rain tight
- C. rainproof
- D. all of the above

CORRECT: C NEC 100 Definitions - Weatherproof

NEC Study Guide

- 25 According to the NEC, which of the following statements is true about installing listed or labeled equipment?
- A. the equipment may be installed in accordance with the listing instructions
 - B. the equipment may be installed in whatever manner the contractor determines best
 - C. the equipment needs only to be listed or labeled if it is installed in an industrial environment
 - D. the equipment may be subject to listed or labeled equipment if it is determined acceptable by the contractor
- CORRECT: A** NEC 110.3 (B)

- 26 What is the maximum number of unused raceway openings permitted to remain open for a service enclosure? (370-18)
- A. none
 - B. two if located on the bottom box
 - C. two if located in a dry location
 - D. two if service size is less than 100 AMPS
- CORRECT: A** NEC 110.12 (A)

- 27 According to the NEC, electrical equipment may NOT be mounted on concrete, cinder block, or brick walls with ____.
- A. lead plugs
 - B. wooden plugs
 - C. lag bolts
 - D. toggle bolts
- CORRECT: B** NEC 110.13 (A)

NEC Study Guide

28 According to the NEC, electrical equipment may not be mounted onto a masonry wall with:

- A. toggle bolts
- B. lead plugs
- C. lag bolts
- D. wooden blocks

CORRECT: D NEC 110.13 (A)

29 Any connection device between aluminum and copper shall be identified _____.

- A. for the purpose and conditions
- B. and color coded
- C. and copper clad
- D. if less than 600 volts

CORRECT: A NEC 110.14

30 What is the maximum size of solid conductor that is permitted by the Code to be connected by means of terminal parts having screws?

- A. #6 AWG
- B. #8 AWG
- C. #10 AWG
- D. #12 AWG

CORRECT: C NEC 110.14 (A)

Comment: NEC 1996 reference is 110-14 (a) exception.

NEC Study Guide

31 According to the NEC, splices shall be covered with insulation equivalent to that of at least the original wire size.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 110.14 (B)

32 The code has assigned the color ____ to the high leg of a 4-wire delta connected secondary.

- A. orange
- B. paungo pink
- C. red with green tracer
- D. turbo black

CORRECT: A NEC 110.15

Comment: Prior to NEC 2005 the reference is 215-/.8.

33 According to the NEC, the high-leg conductor for a 3-phase 4-wire delta secondary is identified by the color:

- A. blue
- B. orange
- C. black
- D. red

CORRECT: B NEC 110.15

Comment: Prior to NEC 2005 the reference is 215-/.8.

NEC Study Guide

34 With a 3 phase, delta-delta, high leg transformer system, the primary is 480 volts and the secondary is 240/120 volts. If a high leg is "C", the conductor from the "C" leg of the transformer will be:

- A. black
- B. red
- C. orange
- D. blue

CORRECT: C NEC 110.15

Comment: Prior to NEC 2005 the reference is 215-/8.

35 Disregarding exceptions, the panel board in a residence must have a clear space, for working, of ____ feet, measured from the front of the panel.

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

CORRECT: B NEC 110.26 (A)(1) & Table 110.26(A)(1)

Comment: NEC 1996 references are 110-16 (a) & Table 110-16 (a).

36 Disregarding exceptions, how much clear space must a residential panel board have, as measured outward from the front of the panel?

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

CORRECT: B NEC 110.26 (A)(1) & Table 110.26(A)(1)

Comment: NEC 1996 reference is 110-16 (a) & Table 110-16(a).

NEC Study Guide

37 What is the minimum width in inches required for the working space in front of a panel board that is 12" wide?

- A. 12"
- B. 24"
- C. 30"
- D. 96"

CORRECT: C NEC 110.26 (A)(2)

Comment: NEC 1996 reference is 110-16 (a).

38 Which of the following is permitted directly above a panel board?

- A. air duct
- B. gas pipe
- C. electrical conduit
- D. none of these

CORRECT: C NEC 110.26 (F)(1)(a)

Comment: NEC 1996 reference 384-4 (a)(1), NEC 1999 reference 384-4 & 110-26 (f)(1)(a).

39 According to the NEC, unless specified otherwise, live parts of electrical equipment operating at ____ volts or more shall be guarded.

- A. 40
- B. 50
- C. 60
- D. 70

CORRECT: B NEC 110.27 (A)

Comment: NEC 1996 reference is 110-17 (a).

NEC Study Guide

40 According to the NEC, live parts operating at 100 volts must be guarded at what height above the floor?

- A. 8'
- B. 7'
- C. 8 1/2'
- D. 7 1/2'

CORRECT: A NEC 110.27 (A)

Comment: NEC 1996 reference is 110-17 (a)(4).
Comment: When working at 1000 volts the reference is NEC 110.34 (E) & Table 110.34(E).

41 What is the minimum height required for installation of unguarded live parts in an equipment room given that the live parts are 120 volts between phase and ground?

- A. 6'-3"
- B. 6'-6"
- C. 6'-8"
- D. 8'-0"

CORRECT: D NEC 110.27 (A)(4)

Comment: NEC 1996 reference is 110-17 (a)(4).

42 According to NEC, the required minimum equivalent height of a guard fence in an electrical installation of over 600 volts nominal, shall be no less than ___ feet.

- A. 6
- B. 7
- C. 8
- D. 9

CORRECT: B NEC 110.31

NEC Study Guide

- 43 Electrical room equipment is operating at 249KV. Live parts are exposed when the front of the equipment is open. According to NEC the minimum allowed distance at "D" is:

- A. 6'
- B. 7'
- C. 8'
- D. 9'

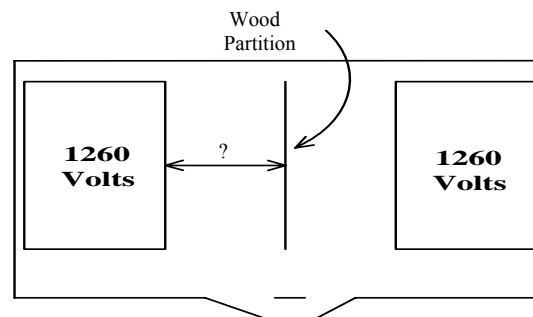
CORRECT: D NEC 110.34 (A)

- 44 Disregarding questions, using the information shown in the diagram, determine the minimum clear working space.

- A. 30"
- B. 34"
- C. 36"
- D. 38"

CORRECT: C NEC 110.34 (A) Table

Refer to the chart on page 32 of the 1999 NEC. You'll need to look at the diagram and interpret it to arrive at the correct answer. This drawing shows condition 1, for 600 Volts.



Electrical Equipment Room

- 45 Live parts operating at 1000 volts must be guarded. How high above the floor must they be elevated to meet this requirement?

- A. 7'
- B. 8"
- C. 9"
- D. 10'

CORRECT: C NEC 110.34 (E)

Comment: For NEC 1996 and 1999 the correct answer is 8½ feet.

NEC Study Guide

- 46** For tunnel installation, equipment grounding conductors installed in a metal raceway with the circuit conductors, shall be permitted to be:

- I. Bare
- II. Insulated

- A.** I only
- B.** II only
- C.** both I and II
- D.** either I or II

CORRECT: D NEC 110.54 (B)

Comment: NEC 1996 does not address this issue.

- 47** Conductors which are connected to terminal parts shall have a thoroughly good connection but must not damage the conductor. In the case of #8 AWG or larger wire, the following are approved methods EXCEPT:

- A.** Pressure connectors
- B.** Solder lugs
- C.** Wire binding screws.
- D.** Splices to flexible leads.

CORRECT: C NEC 110-14 (A)

- 48** Two wire attachment plugs need not have their terminals marked for identification unless polarized.

- A.** True
- B.** False
- C.**
- D.**

CORRECT: A NEC 200.10 (A) exc.

Comment: NEC 1996 reference is 200-10 (b) exception.

NEC Study Guide

49 According to NEC, the identification of terminals on a duplex receptacle to which a grounded conductor is to be connected must be substantially ___ in color.

- A. green
- B. white
- C. gray
- D. orange

CORRECT: B NEC 200.10 (B)(1)

50 According to the NEC, wires that have their outer covering finished to show a white or grey color but have colored tracer threads in the braid, shall be considered to meet the provisions of identification.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 200.6 (A)

51 Refer to the conductor colors in the feeders that represent circuits wired with non-metallic, sheathed cable. Assume all grounding conductors are installed correctly. Conductors have not been reidentified with color tape. Which figure is wired correctly according to NEC code?

- A. I
- B. II
- C. I and II
- D. neither I nor II

CORRECT: D NEC 200.7 (C.) (2)

NEC Study Guide

- 52 Two buildings are served with a single 240 single phase service. The second building is served by a 3 conductor feeder. This will require the grounded conductor to be:

I - identified with gray or white insulation.
II - insulated.

- A. I only
- B. II only
- C. both I & II
- D. neither I or II

CORRECT: C NEC 200-6 (D)

- 53 According to the NEC, when computing the minimum branch circuit ampacity rating, ___ % of the continuous load shall be added to the non-continuous load.

- A. 80
- B. 90
- C. 125
- D. 120

CORRECT: C NEC 210.19 (A)(1)

Comment: NEC 1996 reference is 210-22 (c) and NEC 1999 reference is 210-19 (a).

- 54 What is the minimum ampere rating permitted for a fuse providing overcurrent protection for a 240 volt range that is rated for 9,600 VA. Assume the conductors to the range are #4 AWG copper?

- A. 40
- B. 60
- C. 80
- D. 100

CORRECT: A NEC 210.19 (A)(3)

Find the amperage of the range: $9600 / 240 = 40$ amps.
The wire size nothing to do with this problem. The range meets the test of the NEC by being greater than $8 \frac{3}{4}$ Kw.
Comment: NEC 1996 reference is 210-19 (b) and NEC 1999 reference is 210-19 (c).

NEC Study Guide

- 55 The minimum branch circuit rating shall be ___ A for an 8 3/4 kW household range.
- A. 40
 - B. 35
 - C. 30
 - D. 50

CORRECT: A NEC 210.19 (A)(3)

Comment: NEC 1996 reference is 210-19 (b) and NEC 1999 reference is 210-19 (c).

- 56 What is the minimum copper conductor size permitted by Code for a 240 volt, single phase wall oven branch circuit, given that the wall oven load is continuous and 1700 VA.
- A. #10 AWG
 - B. #12 AWG
 - C. #14 AWG
 - D. #16 AWG

CORRECT: A NEC 210.19 (A)(3) exception 2

Solution: Since the oven is less than 8¾ kW according to exception 2 the conductor size can not be less than #10 AWG.

Comment: NEC 1996 reference 210-19 (b) exception 2 and NEC 1999 reference 210-19 (c) exception 2.

- 57 According to the NEC, the method for determining the minimum rating of a branch circuit over-current device serving both continuous and non-continuous is (do not consider exceptions):
- I. 100% of the continuous load
 - II. 125% of the non-continuous load
- A. I only
 - B. II only
 - C. both I and II
 - D. neither I nor II

CORRECT: D NEC 210.20 (A)

100% of non-continuous load + 125% of continuous load.
Comment: NEC 1996 reference is 210-22 (c).

NEC Study Guide

58 According to the NEC, where a branch circuit supplies continuous and or non-continuous loads, the rating of the overcurrent device shall not be less than ____ percent on the continuous load.

- A. 110
- B. 115
- C. 120
- D. 125

CORRECT: D NEC 210.20 (A)

Comment: NEC 1996 reference is 210-22 (c).

59 Fluorescent lighting fixtures each containing two ballasts rated at .8 amps each at 120 volts are to be installed for continuous general lighting in a store. The overcurrent devices are not listed for continuous operation at 100% of their rating. According to NEC, the number of these lighting circuits that may be wired to a 20 amp, 120V branch circuit may be no more than:

- A. 6
- B. 8
- C. 10
- D. 12

CORRECT: C NEC 210.20 (A)

Because the loads are continuous and the overcurrent devices are not listed for continuous operation the branch circuit needs to be derated by 125%, $20 \div 125\% = 16$ amps, $16 \text{ amps} \div (2 \times 0.8 \text{ amps}) = 16 \text{ amps} \div 1.6 \text{ amps} = 10$ fixtures.

60 According to the NEC, heavy duty lamp holders include:

- A. admedium lamp holders rated not less than 660 watts
- B. lamp holders connected to a branch circuit rated in excess of 20 amps
- C. any type rated not less than 750 watts
- D. all of these

CORRECT: D NEC 210.21 (A)

NEC Study Guide

61 The amperage rating of a single receptacle, installed on an individual branch circuit, shall have a rating of:

- A. Any rating.
- B. not less than that of the branch circuit.
- C. Any rating not under the branch circuit.
- D. 15 amp breaker can not be used on branch circuits.

CORRECT: B NEC 210.21 (B)(1)

62 Given: A 15 AMP branch circuit which has 2-15 AMP common receptacles. For each of these 15 AMP receptacles what is its' maximum connected load (cord and plug) _____.

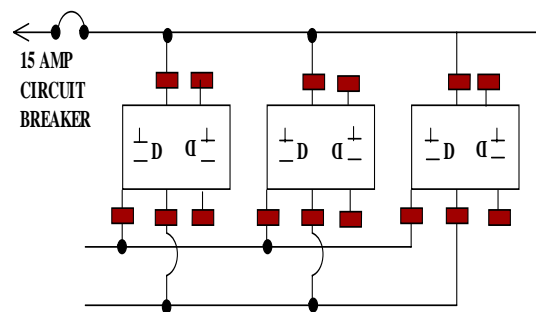
- A. 7.5 AMPS
- B. 12 AMPS
- C. 15 AMPS
- D. 16 AMPS

CORRECT: B NEC 210.21 (B)(2)

63 Using the information in the diagram, determine why it is inconsistent with the NEC.

- A. 20 AMP receptacles are too large for the circuit
- B. three receptacles are on one circuit
- C. wrong size wire
- D. use of a 15 AMP breaker

CORRECT: A NEC 210.21 (B)(3)



**NOTE: ALL RECEPTICALS ARE RATED AT 20 AMPS
ALL CONDUCTORS ARE SIZE 14 AWG WIRE**

NEC Study Guide

64 A 20 amp rated branch circuit, serves 4 receptacles.
The receptacle rating shall be _____.

- I. 15 amps
- II. 20 amps

- A. I only
- B. II only
- C. Either I or II
- D. Neither I or II

CORRECT: D NEC 210.21(B)(3)

65 The rating of a branch circuit that is recognized by Article 210 of the Code is determined by the:

- A. maximum ampere rating or setting of the overcurrent protection device
- B. computed branch circuit load
- C. actual branch circuit load
- D. branch circuit conductor ampacity

CORRECT: A NEC 210.3

66 Where conductors of _____ or higher are used for any reason the ampere rating or setting of the specified overcurrent device shall determine the circuit rating.

- A. 50 AMPS
- B. 60 AMPS
- C. 80 AMPS
- D. 100 AMPS

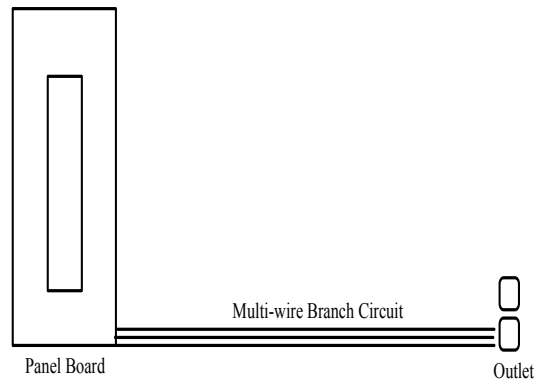
CORRECT: B NEC 210.3

NEC Study Guide

67 This circuit contains only the conductors shown. It is classified by NEC as a multi-wire branch circuit. Why or why not?

- A. NO. There is no third phase conductor.
- B. YES. conductors originate at the same panel.
- C. No. A grounded circuit conductor is not connected to the load.
- D. YES. Circuit conductors are by a dual pole circuit breaker.

CORRECT: B NEC 210.4 (A)



68 Given: A dwelling unit with a single phase service. Which of the following methods may NOT be used on a multi-wire branch circuit that supplies more than one device on the same yolk?

- A. 2 single pole circuit breakers with a tie handle
- B. circuit breaker with 1 double pole
- C. 2 pole fused disconnect
- D. 2 unswitched fuses

CORRECT: B NEC 210.4 (B)

69 Where conductors of different systems are installed in the same raceway, one system shall have a neutral having an outer covering of white or natural gray and each other system having a neutral shall have another covering of ____.

- A. white or natural gray
- B. white with green stripe
- C. white with colored stripe other than green or distinguished by other suitable approved means
- D. blue

CORRECT: C NEC 210.5 (C)

NEC Study Guide

- 70** Outlets may be installed in a dwelling unit for specific appliance such as laundry equipment. What is the maximum distance allowed between this outlet and the appliance?
- A. 4'
 - B. 6'
 - C. 5'
 - D. 3'

CORRECT: B NEC 210.50 (C)

- 71** When an appliance receptacle outlet is installed in a dwelling unit for a specific appliance, such as a washer and dryer, the outlets shall be installed within _____ of the intended location.
- A. 4' 6"
 - B. 6'
 - C. 5'
 - D. 5' 6"

CORRECT: B NEC 210.50 (C)

- 72** The minimum number of branch circuits required to serve a 12 foot by 14 foot single family dining room to serve both the lighting and receptacle outlets is:
- A. 5
 - B. 4
 - C. 8
 - D. 6

CORRECT: D NEC 210.52 (A)(1)

Since no point along the floor line can be more than 6 feet from an outlet there would have to be at least one outlet along each 12 foot wall and at least two outlets along the 14 foot wall, $1 \times 2 + 2 \times 2 = 2 + 4 = 6$ outlets.

NEC Study Guide

73 The smallest wall space requiring a receptacle is ___ ft.

- A. 2
- B. 3
- C. 5
- D. 6

CORRECT: A NEC 210.52 (A)(2)

74 According to the NEC requirements for residences, a wall space wider than ___ feet must be provided with a wall receptacle.

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

CORRECT: B NEC 210.52 (A)(2)(1)

75 In a living room, the floor receptacles that are installed shall not be counted as part of the required outlets unless located _____ the wall.

- A. close to
- B. within 20" of
- C. within 2' of
- D. within 18" of

CORRECT: D NEC 210.52 (A)(3)

NEC Study Guide

76 ___ small appliance circuit(s) is/are required for a kitchen.

- A. one
- B. two
- C. three
- D. four

CORRECT: B NEC 210.52 (B)(1)

77 A(n) ___ is permitted to be installed on a small appliance circuit.

- I. clock outlet
- II. outdoor receptacle

- A. I only
- B. II only
- C. both I & II
- D. neither I nor II

CORRECT: A NEC 210.52 (B)(2) exception 1

78 Of the following, the receptacles that may be connected to the required small appliance circuits in a residence are ____.

- A. hallway receptacles located close to the kitchen
- B. lighting outlets in the basement beneath the kitchen
- C. an outlet to supply and electric clock in the kitchen or dining room
- D. living room receptacles

CORRECT: C NEC 210.52 (B)(2) Exception No.

NEC Study Guide

79 Two 20 amp small appliances branch circuits are installed in a kitchen in a single family dwelling. An additional circuit is installed in this kitchen to supply a small plug-in microwave oven. This additional circuit may be used to supply lighting outlets in the living room of this dwelling. Explain.

- A.** yes, because only two circuits serving the kitchen are required
- B.** no, because lighting outlets must be supplied by separate circuits
- C.** no, small appliance branch circuits shall supply only the receptacles for small appliances
- D.** yes, because lighting outlets can be supplied by any outlet

CORRECT: C NEC 210.52 (B)(3) & 210.23 (A) exception

80 According to the NEC, the maximum number of feet allowed between any point along counter space wall line and a small appliance receptacle circuit in a kitchen is:

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

CORRECT: B NEC 210.52 (C)(1)

81 According to the NEC, in each kitchen and dining area a receptacle outlet shall be installed at each counter space wider than _____ inches.

- A.** 16
- B.** 14
- C.** 12
- D.** 10

CORRECT: C NEC 210.52 (C)(1)

NEC Study Guide

82 A receptacle outlet , in a kitchen or dining room, shall be installed at each wall counter space that is ___ or wider and the and no point along the wall line will be more than ___ ,measured horizontally , from a receptacle outlet in that space.

- A. 1'6" and 2' 6"
- B. 1' and 2'
- C. 2' and 2' 6"
- D. 2' 6" and 3'

CORRECT: B NEC 210.52 (C)(1)

83 The maximum distance between receptacles over a kitchen countertop is ___.

- A. 2'
- B. 12"
- C. 6'
- D. 4'

CORRECT: D NEC 210.52 (C)(1)

84 A counter space in a kitchen ___ inches or wider requires a receptacle.

- A. 12
- B. 24
- C. 20
- D. neither A, B, nor C

CORRECT: A NEC 210.52 (C)(1)

NEC Study Guide

- 85** Which of the following statements is/are correct?
- I. An outdoor receptacle may be connected to a general purpose branch circuit
 - II. The outdoor receptacle may be connected to a small appliance branch circuit
- A.** I only
 - B.** II only
 - C.** both I and II
 - D.** neither I nor II
- CORRECT: D** NEC 210.52 (E) & (B)(2)

- 86** Given: An unfinished basement in a one family dwelling unit. The laundry is in the basement but no bathroom is planned. What is the total number of 120 volt receptacle outlets required for this basement by the NEC?
- A.** None needed
 - B.** 1 for the laundry only
 - C.** 2, one laundry and one general receptacle
 - D.** 3, one laundry plus 2 others
- CORRECT: C** NEC 210.52 (F) & (G)

- 87** What is the minimum number of 15 or 20 AMP receptacle outlets required for a 600 square feet detached residential garage, if electrical service is provided to the garage?
- A.** 0
 - B.** 1
 - C.** 2
 - D.** 3
- CORRECT: B** NEC 210.52 (G)

NEC Study Guide

88 Given: A single family dwelling unit with a hallway 22' long measured along the centerline. What is the minimum number of receptacle outlets required for this hallway?

- A. No receptacle permitted by NEC.
- B. 0, None required by the NEC.
- C. 2 evenly spaced along the hallway
- D. 1 as a minimum

CORRECT: D NEC 210.52 (H)

89 One receptacle outlet shall be installed in ___ foot or longer hallways in a one-family dwelling.

- A. 6
- B. 10
- C. 15
- D. not required

CORRECT: B NEC 210.52 (H)

90 Using the information in the SPECS, is the additional outlet consistent with the NEC?

- I. Small appliance circuits may not supply lighting outlets
- II. Only two circuits serving the kitchen are required

SPECS: Two 20 ampere small appliance circuits are installed in a kitchen residence. An additional circuit is installed in this kitchen to supply a small plug-in microwave oven and lighting outlets in the living room.

- A. I only
- B. II only
- C. both I and II
- D. neither I nor II

CORRECT: A NEC 210.52(B)(2)

NEC Study Guide

- 91** For each ___ linear feet, show windows shall have a receptacle installed.
- A. 6
 - B. 20
 - C. 12
 - D. 10

CORRECT: C NEC 210.62

- 92** A heating and air-conditioning unit is located on the roof of a residence. For service, a 125 volt receptacle is required on the same level at a maximum of ____ feet from the unit.
- A. 20
 - B. 25
 - C. 30
 - D. 35

CORRECT: B NEC 210.63

Comment: NEC 1996 & 1999 does not require this for one and two family dwellings. NEC 2005 does not require this for one and two family dwellings with evaporative cooling.

- 93** Which of the following dwelling rooms or spaces must have a wall switch located at the entrance?
- A. kitchen
 - B. clothes closet
 - C. hall wall
 - D. utility room

CORRECT: D NEC 210.70 (A)(3)

NEC Study Guide

94 Switching and lighting requirements in the Code require how many wall switch lighting outlets for basements used for storage only?

- A. none
- B. 1
- C. 2
- D. 3

CORRECT: B NEC 210.70 (A)(3)

95 Which room shall have a lighting wall switch located at the point of entry?

- A. kitchen
- B. living room
- C. utility
- D. bathroom

CORRECT: C NEC 210.70 (A)(3)

96 Given: A bathroom in a dwelling unit.
What is the minimum requirements for receptacle outlets?

- A. The bathroom must be on its own isolated circuit
- B. There shall be at least 1500 VA service for each bathroom included in the dwelling unit load.
- C. An outdoor GFCI protected outlet must be used for the bathroom receptacle circuit.
- D. At least one 15 to 20 AMP GFCI must be provided.

CORRECT: D NEC 210.8 (A)(1)

NEC Study Guide

97 In a automotive repair shop where electrical diagnostic equipment, electric hand tools, and portable lighting devices are used both indoors and outside, ground fault circuit interrupter protection is NOT required on general purpose 125V 1-phase, 15 amp and 20 amp receptacles:

- A. in bathrooms or restrooms adjacent to the service area
- B. located outdoors where service may be performed
- C. in areas opening into the service area
- D. within the service area

CORRECT: C NEC 210.8 (B), 511.12 & 590.6

98 In the bathroom of a dwelling unit, there shall be at least ___ wall receptacle

- A. A total of 1500VA regardless of the number of bathrooms or wall receptacles.
- B. At least 1500VA regardless of the number of bathrooms or wall receptacles.
- C. Two circuits are required regardless of the number of bathrooms
- D. One circuit is required regardless of the number of bathrooms

CORRECT: D NEC 210-52 (D)

99 In a dwelling, light and switching requirements in the Code require the following for crawl spaces without storage or equipment:

- I - a lighting outlet is required
- II - a switch is required

- A. I
- B. II
- C. both I & II
- D. neither I nor II

CORRECT: D NEC 210-70 (a)(3)

NEC Study Guide

100 The ampacity rating of a feeder shall be equal to or greater than:

- A. 125% of the overcurrent protective device
- B. the sum of all branch circuits overcurrent protection devices
- C. the computed load
- D. the actual load

CORRECT: C NEC 215.2 (A)(1) & 220.40

Comment: Prior to NEC 2005 the second reference is 220-/.10.

101 The ampacity of a feeder conductor supplying 2 or more two-wire branch circuits shall not be less than ___ amps.

- A. 20
- B. 25
- C. 30
- D. 35

CORRECT: C NEC 215.2 (A)(2)(1)

Note: This section was deleted from the 2005 NEC.
Comment: NEC 1996 & 2002 reference 215-2 (a)(1).

102 On the plans for St. Stevens Church, the overcurrent protection for the feeder conductor serving Panel LP-A is:

- A. oversized and violates the Code because the load is continuous
- B. oversized because the conductor count requires de-rating
- C. undersized and violates the Code because the load is continuous
- D. sized in accordance with the Code

CORRECT: C NEC 220.10

NEC Study Guide

103 According to the NEC, when determining the unit load (volt-amp) for specific occupancies, the floor area for each floor shall be computed from the ____ dimensions of the building.

- A. average
- B. inside
- C. outside
- D. any of these

CORRECT: C NEC 220.12

Comment: Reference NEC 1996 is 220-3 (b), NEC 1999 is 220-3 (a) and NEC 2002 is 220.3 (A).

104 What is the minimum general lighting load in volt-amperes for an office building that has 5,000 sq. feet of floor area given the actual lighting load is 10,000 VA?

- A. 10,000
- B. 17,500
- C. 15,000
- D. 22,500

CORRECT: B NEC 220.12

Comment: NEC 1996 to 2002 reference is 220-/3 (b/B).
Solution: $5,000 \text{ kW} \times 3.5 = 17,500 \text{ kW}$.

105 According to the NEC, the basis for calculating the general lighting and receptacle load for a dwelling unit shall be no less than ____ volt-amperes per square foot.

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

CORRECT: C NEC 220.12

Comment: Reference NEC 1996 is 220-3 (b), NEC 1999 is 220-3 (a) and NEC 2002 is 220.3 (A).

NEC Study Guide

- 106** An apartment complex without cooking facilities has a total living area of 110,000 sq. feet. What is the maximum demand for general lighting?
- A. 69 KVA
 - B. 78 KVA
 - C. 90 KVA
 - D. 100 KVA

CORRECT: B NEC 220.12 & Table 220.42

Solution:
Comment: NEC 1996 & 1999 reference 220-3 (b) & Table 220-11; NEC 2002 reference 220.3 (A) & Table 220.11.

- 107** A single family home has 3499 square feet of living space. If 20 AMP circuit breakers are used for the lighting and general purpose receptacle outlets, what is the minimum number required for only the general use circuits?
- A. 1
 - B. 2
 - C. 3
 - D. 4

CORRECT: D NEC 220.12 Table

Comment: Reference for NEC 1996 to 2002 is Table 220-.3(b/B).
Solution: $3499 \text{ ft.}^2 \times 3 \text{ VA/ft.}^2 = 10,497 \text{ kVA}$, $10,497 \text{ kVA} \div 120 \text{ volts} = 87.475 \text{ amps}$, $87.475 \text{ amps} \div 20 \text{ amps} = 4.37 \text{ amps} \Rightarrow 5 \text{ circuits}$.

- 108** Given: An office 43' x 80', 120V lighting all on 8 hours, non-continuous receptacles. How many 20 Amp circuits are required?
- A. 6
 - B. 7
 - C. 8
 - D. 10

CORRECT: C NEC 220.12 Table

Comment: Reference for NEC 1996 to 2002 is 220-.3 (b/B).
Solution: $43 \text{ ft.} \times 80 \text{ ft.} \times 3.5 \text{ VA/ft.} = 12,040 \text{ VA}$ required for lighting. $12,040$ divided by $120 = 100.33$ amps. 100.33 divided by $20 = 6$ circuits for lights. Footnote b requires $1 \text{ VA} / \text{SF}$ for general circuits. $3440 \text{ VA} \div 120 = 28.66 \text{ amps}$, $28.66 \text{ amps} \div 20 = 1.43 \Rightarrow 2$ circuits thus $2+6=8$ circuits.

NEC Study Guide

- 109** A motel contains 100 guest rooms, each 12' x 20'. What is the minimum lighting load that these would contribute to the service.

- A. 72 KW
- B. 48 KW
- C. 24 KW
- D. 21.2 KW

CORRECT: B NEC 220.12 Table

Solution: $12 \text{ ft.} \times 20 \text{ ft.} \times 2 \text{ VA/ft.}^2 \times 100 \text{ rooms} = 240 \text{ ft.}^2$
 $\times 2 \text{ VA/ft.}^2 \times 100 \text{ rooms} = 480 \text{ VA} \times 100 \text{ rooms} = 48,000$
 $\text{VA} = 48 \text{ kW.}$
Comment: NEC 1996 reference 220-3 (b) Table; NEC 1999 reference 220-3 (a) Table; NEC 2002 reference 220.3 (A) Table.

- 110** The load for the required branch-circuit installed to supply an exterior sign shall be a minimum of ___ W.

- A. 1500
- B. 3000
- C. 1200
- D. neither A, B, nor C

CORRECT: C NEC 220.14 (F)

Comment: Reference for NEC 1996 220-3 (c)(6), NEC 1999 220-3 (b)(6), NEC 2002 220.3 (B)(6)

- 111** According to NEC, in a commercial application, 20 feet of multioutlet assembly where appliances are not likely to be used simultaneously requires ___ 20 amp circuits.

- A. 5
- B. 4
- C. 3
- D. 2

CORRECT: B NEC 220.14 (H)

Note: If the appliances are likely to be use simultaneously then 20 circuits would be required, one for each foot of multioutlet assembly.
Comment: NEC 1996 reference is 220-3 (c) exception 1, NEC 1999 reference is 220-3 (b)(8) and NEC 2002 reference is 220.3 (B)(8).

NEC Study Guide

112 According to the NEC, when calculating feeder loads for a residence, general purpose receptacles of 20 Amps or less rating shall be:

- A. calculated at 1500 watts per circuit
- B. calculated @ 150 watts each
- C. considered part of the general requirement
- D. calculated @ 180 watts each

CORRECT: D NEC 220.14 (I)

Comment: Reference for NEC 1996 220-3 (c)(7), NEC 1999 220-3 (b)(9), NEC 2002 220.3 (B)(9)

113 Bart Gurnsey's new office has 8 general use receptacles in 4 four inch boxes, each having 2-120 volt, 15 amp duplexers. What is the load?

- A. 220 VA
- B. 360 VA
- C. 720 VA
- D. 980 VA

CORRECT: C NEC 220.14 (I)

Comment: References NEC 1996 is 220-3 (c)(7), NEC 1999 is 220-3 (9) and NEC 2002 is 220.0 (9).
Solution: (count each box as 180 VA; 4 boxes x 180 VA/box = 720 VA)

114 Four single receptacle 120v 15 amp outlets on separate straps are mounted on a 4 gang cover on a single surface mounted box. The calculated load for this entire assembly shall not be less than _____ volt amps.

- A. 720
- B. 480
- C. 360
- D. 180

CORRECT: A NEC 220.14 (I)

Comment: Reference NEC 1996 - 220-3 (c)(7); NEC 1999 - 220-3 (b)(9); NEC 2002 220.3 (B)(11).

NEC Study Guide

115 Show windows are computed on ___ VA per linear foot.

- A. 200
- B. 300
- C. 1500
- D. 1200

CORRECT: A NEC 220.43 (A)

Comment: NEC 1996 reference is 220-12, NEC 1999 reference is 220-12 (a) and NEC 2002 reference is 220.12 (A).

116 A 120/208 volt, 3 phase feeder is to supply show window lighting. The Show window is 125 feet long. What will be the feeder demand (load)?

- A. 72.35 amp
- B. 68.5 amp
- C. 70 amp
- D. 69.395 amp

CORRECT: D NEC 220.43 (A)

Comment: NEC 1996 reference is 220-12, NEC 1999 reference is 220-12 (a) and NEC 2002 reference is 220.12 (A).
Solution: $200 \text{ VA} \times 125 \text{ feet} = 25,000 \text{ VA}$; $25,000 \text{ VA} \div 208 \text{ V} \div \sqrt{3} = 25,000 \text{ VA} \div 208 \text{ V} 1.732 = 69.395 \text{ amp}$
(The reason 208 V 3 Φ current is divided by the $\sqrt{3}$ is that the 208 volt line current is less than the 208 volt phase current by a factor the $\sqrt{3}$.)

117 A show window is 240 feet long. How many 120 volt, 20 amp branch circuits will be required for this load?

- A. 20 Branch circuits
- B. 15 Branch circuits
- C. 25 Branch circuits
- D. 18 Branch circuits

CORRECT: A NEC 220.43 (A)

Comment: NEC 1996 reference is 220-12, NEC 1999 reference is 220-12 (a) and NEC 2002 reference is 220.12 (A).
Solution: $200\text{VA} \times 240 \text{ feet}$, divided by $120\text{V} \times 20\text{A} = 2\Phi$ branch circuits. NOTE: This is the minimum number of branch circuits allowed.

NEC Study Guide

- 118** A 6' section of track lighting would increase the branch load ____.
- A. 0W
 - B. 1.5 A per ft
 - C. 450 W
 - D. 6 A

CORRECT: C NEC 220.43 (B)

Comment: Reference NEC 1996 410-102, NEC 1999 220-12 (b), NEC 2002 220.12 (B)
Solution: 150 VA per 2 feet; $150 \times (6 \text{ feet} \div 2) = 150 \times 3 = 450$

- 119** A dwelling unit kitchen must have at least two small appliance branch circuits on the service of the dwelling, and each of the circuits is considered a load of ____ VA.
- A. 750
 - B. 1000
 - C. 1500
 - D. 2000

CORRECT: C NEC 220.52 (A)

Comment: NEC 1996 - 2002 reference is 210-.16 (a/A).

- 120** According to the NEC, ____ must be included in the net computed load for a residential electric clothes dryer, even if the nameplate rating is less.
- A. 4.5 KVA
 - B. 5 KVA
 - C. 5.5 KVA
 - D. 6.5 KVA

CORRECT: B NEC 220.54

Comment: NEC 1996 & 1999 reference is 220-18, NEC 2002 reference is 220.18.

NEC Study Guide

121 According to the NEC, the minimum feeder load for a dryer shall be:

- A. 4.5 Kw
- B. 5 Kw
- C. 5.5 Kw
- D. Nameplate Rating

CORRECT: B NEC 220.54

Comment: NEC 1996 to 2002 reference 220-.18.

122 According to the NEC, what is the feeder demand for 25, 4000 watt, clothes dryers?

- A. 40.625KW
- B. 32.5KW
- C. 487.5KW
- D. 1.7KW

CORRECT: D NEC 220.54 Table

Comment: NEC 1996 to 2002 reference is Table 220-.18.
Solution: The dryer nameplate rating or 5000 watts whichever is greater should be used in the calculation.
 $5000 \times 35\% - [.5 \times (25-23)]$, or $5000 \times 35\% - [.5 \times 2]$, or, $5000 \times 35\%-1\%$. Or, $5000 \times 34\%$, or, 1700 Watts

123 An apartment service has four household electric ranges each rated at 19 kw connected to it. Compute the total demand for the ranges, not using the optional method.

- A. 17 KVA
- B. 19.1 KVA
- C. 21.7 KVA
- D. 23 KVA

CORRECT: D NEC 220.55 Table

Solution: $19 \text{ kW} - 12 \text{ kW} = 7 \text{ kW}$, $5\% \times 7 = 35\%$, from (not over 12 kW rating) $17 \text{ kW} \times 135\% = 22.95$, which is approximately equal to 23 kVA.
Comment: NEC 1996 & 1999 reference 220-19 Table;
NEC 2002 reference 220.19 Table

NEC Study Guide

124 The demand load for nine 10 kW household ranges is ___ kVA.

- A. 25
- B. 31.5
- C. 24
- D. 28.3

CORRECT: C NEC 220.55 Table

Comment: NEC 1996 to 2002 reference is Table 220-/.19.
Solution: According to table the demand load for 9 ranges greater than 8¾ kW but not over 12 kW is 24 kW.

125 What is the maximum demand calculated for 4 ranges rated 8.75 KW, 9 KW, 10 KW, 12 KW?

- A. 12 KW
- B. 17KW
- C. 15 KW
- D. 20 KW

CORRECT: B NEC 220.55 Table

Solution: $(8.75 \times 80\%) + ((9 + 10 + 12) \div 3) = 7 + 10.333 = 17.333 \Rightarrow 17 \text{ kW}$
Comment: NEC 1996 & 1999 reference 220-19 Table;
NEC 2002 reference 220.19 Table.

126 An apartment building has ten 12 kW ranges and eight 14 kW ranges. The demand load is ___ kVA.

- A. 36.3
- B. 18.1
- C. 32.93
- D. 34.65

CORRECT: D NEC 220.55 Table Note 2

Comment: NEC 1996 to 2002 reference is Table 220-/.19 Note 2.
Solution: Determine average kW rating by $(10 \times 12 \text{ kW} + 8 \times 14 \text{ kW}) \div 18 = (120 \text{ kW} + 112 \text{ kW}) \div 18 = 232 \text{ kW} \div 18 = 12.888 \text{ kW}$, from the "Not over 12 kW Rating" column of the table for 18 ranges the demand value is 33 kW, to that needs to be added 5% for each major fraction over 12 kW so 5% of 33 kW is 1.65 kW thus the answer is 34.65 kW.

NEC Study Guide

- 127** The demand load for sixteen 6 kW household ranges is ___ kW.
- A. 26.9
 - B. 48.5
 - C. 96.0
 - D. 96.5

CORRECT: A NEC 220.55 Table Note 3

Comment: NEC 1999 to 2002 reference is Table 220-/.19 Note 3.

Solution: Determine average kW rating by $(16 \times 6) = 96$ kW from the "3½ kW to 8¾ kW rating" column of the table the demand value is 28%, so the demand load is $96 \text{ kW} \times 28\% = 26.88 \text{ kW}$ or 26.9 kW.

- 128** A restaurant is being remodeled and will have a 14 KW stove, a 6 KW oven, a 3 KW washer and a 3 KW booster heater. What is the feeder demand for this group of kitchen equipment?
- A. 20.8 KW
 - B. 26 KW
 - C. 32.5 KW
 - D. 35 KW

CORRECT: A NEC 220.56 Table

Solution: $14,000 \text{ kW} + 6,000 \text{ kW} + 3,000 \text{ kW} + 3,000 \text{ kW} = 26,000 \text{ kW}$, $26,000 \text{ kW} \times 80\% = 20,800 \text{ kW}$.

Comment: NEC 1996 & 1999 reference 220-20 Table; NEC 2002 reference 220.20 Table.

- 129** Using the optional method of calculation for a single dwelling unit, central space heating should be calculated as ___ %.
- A. 50
 - B. 55
 - C. 60
 - D. 65

CORRECT: D NEC 220.82 (C)(5)

Comment: Reference for NEC 1996 is 220-30 (a)(3) and NEC 1999 & 2002 is 220-/.30 (c/C)(4).

NEC Study Guide

- 130** A quadruplex has a 125 amp panel in each unit. When the optional method is used, the demand on a single set of meters from the transformer to the meter bank tap point would be ___ amps.
- A. 125
 - B. 225
 - C. 350
 - D. 500

CORRECT: B NEC 220.84 (A)

Comment: Reference for NEC 1996 to 2002 is 220-.32 (a/A).

Solution: 4 units x 125 amps/unit = 500 amps, from the table the demand factor for 3-5 dwelling units is 45% thus $500 \text{ amps} \times 45\% = 225 \text{ amps}$.

- 131** A 60 unit apartment house has a 4KW dryer in each unit. What is the minimum feeder load after demand attributed to these dryers? Use the optional method.
- A. 180 KW
 - B. 75 KW
 - C. 60 KW
 - D. 57.6 KW

CORRECT: D NEC 220.84 (C)(3)

Comment: Reference NEC 1996 & 1999 is 220-30 (b)(3) and NEC 2002 is 220.32 (C)(3).

Solution: $60 \times 4 \text{ kW} = 240 \text{ kW}$, from the table for 56-61 units the demand factor is 24% thus $240 \text{ kW} \times 24\% = 57.6 \text{ kW}$.

- 132** A new restaurant has a connected load of 400 kVA. Equipment in the restaurant is NOT all electric. Using the optional method for load calculation, the computed load on the feeder conductors for this occupancy is:
- A. 400 kVA
 - B. 392.1 kVA
 - C. 296.75 kVA
 - D. 248.50 kVA

CORRECT: D NEC 220.88

Comment: Reference for NEC 1996 to 2002 is 220-.36. Solution for NEC 2002 and 2005: $400 - 325 = 75 \text{ kVA}$ in excess of 325. $75 \times 45\% = 33.75$. The table value for the first 325 kVA is 262.50. This added to the 33.75 = 296.75.

For NEC 1996 and 1999 the calculation is different and there is no correct answer: $400 \times 65\% = 260 \text{ kW}$.

NEC Study Guide

- 133** Shorts Electrical Inspections, Inc. has the following load on their customer, Blankenship's Kitchens'.
1. 408 Volt, 3-phase, 3-wire equipment
 2. 2-5000 Watt water heaters
 3. 4-3000 Watt deep fryers
 4. 2-6000 Watt ovens

Using the alternate method, Chris, the foreman for 'Shorts', computed the minimum load for each ungrounded feeder conductor to carry ___ amps.

- A. 25 kVA
- B. 27.2 kVA
- C. 29.1 kVA
- D. 32.3 kVA

CORRECT: B NEC 220.88 Table

Comment: For NEC 1996 to 2002 the reference is 220-
/.36.
Solution: The total load is $10,000 + 12,000 + 12,000 =$
 $34,000 \text{ VA}, = 34 \text{ kVA}. 34 \times .8 \text{ (from table)} = 27.2 \text{ kVA}.$

- 134** Given: A new restaurant has a total connected load of 300 kva. It is heated by a forced-air gas furnace. Using the optional method, what is the minimum calculated load which may be used for sizing the feeders?

- A. 159 KVA
- B. 210 KVA
- C. 250 KVA
- D. 300 KVA

CORRECT: C NEC 220.88 Table

Solution: $200 \text{ kVA} + (50\% \times (300 \text{ kVA} - 200 \text{ kVA})) =$
 $200 \text{ kVA} + (50\% \times 100 \text{ kVA}) = 200 \text{ kVA} + 50 \text{ kVA} =$
 $250 \text{ kVA}.$ Note this calculation is only correct for NEC
2002 and 2005; for NEC 1996 & 1999 the calculation is
different and produces a different result: Using the table
find 300 Kva in the first column. Using the Not all
electric column, an 80% load factor is use. $300 \times 80\% =$
 $240 \text{ Kva}.$
Comment: NEC 1996 & 1999 reference 220-36 Table;
NEC 2002 reference 220.36 Table.

NEC Study Guide

- 135** A new, all-electric restaurant has a total connected load of 300 kva. USE THE OPTIONAL METHOD. What is the minimum calculated load which may be used for sizing the feeders?
- A. 170 kva
 - B. 180 kva
 - C. 190 kva
 - D. 200 kva

CORRECT: A NEC 220.88 Table

Solution: Using the table find 300 Kva in the first column. Using the all electric column, the alternate calculation is $160 + 10 = 170$.
Comment: NEC 1996 & 1999 reference 220-36 Table; NEC 2002 reference 220.36 Table.

- 136** A clothing store has the following track lighting:
2- 8'-0" long rated for 120 volt lamps
3- 4'-0" long rated for 120 volt lamps
10 -6'-0" long rated for 120 volt lamps
What is the ampacity for the branch circuit for this installation?
- A. 45
 - B. 55
 - C. 65
 - D. 70

CORRECT: B NEC 220-43 (B)

Comment: NEC 1996 reference is 410-102, NEC 1999 reference is 220-12 (b) and NEC 2002 reference is 220.12 (B).
Solution: Since demand is 150 VA for each 2 lineal foot each length needs to be divided by 2 so, $2 \times (8 \text{ ft.} \div 2) + 3 \times (4 \text{ ft.} \div 2) + 10 \times (6 \text{ ft.} \div 2) = 8 + 6 + 30 = 44$ lineal feet $\div 2$ then $150 \text{ VA} \times 44 = 6600 \text{ VA}$, divide 6600 VA by 12 volts to get 55 amps.

- 137** On services exceeding 600 volts, where will circuit breakers constitute the service disconnecting means, a or an ____ will be installed on the supply side of the disconnecting means.
- A. air breaking isolating switch
 - B. oil switch
 - C. surge arrestor
 - D. oil arrestor

CORRECT: A NEC 225.51

NEC Study Guide

138 Overhead conductors for festoon lighting shall not be smaller than # ___ for spans longer than 40' or longer.

- A. 14
- B. 12
- C. 10
- D. 8

CORRECT: D NEC 225.6 (A)(1)

139 Overhead conductors of 600 volts or less shall not be smaller than ___ copper or ___ aluminum for spans up to 50 feet in length and #8copper or #6 aluminum for longer a longer span, unless supported by a messenger wire.

- A. #12/#10
- B. #10/#8
- C. #8/#6
- D. #6/#4

CORRECT: B NEC 225.6 (A)(1)

140 Overhead conductors of 600 volts or less shall not be smaller than ___ copper for spans up to 50 feet in length and ___ copper for longer spans.

- A. #12 / #10
- B. #10 / #8
- C. #8 / #6
- D. #6 / #4

CORRECT: B NEC 225.6 (A)(1)

NEC Study Guide

141 The ampacity of the neutral conductor of lighting equipment is installed outside on a pole, shall not be less than the ___ load current between the neutral and all ungrounded conductors connected to any one phase.

- A. connected
- B. computed
- C. net computed
- D. maximum net computed

CORRECT: D NEC 225.7 (B)

142 If a multiple occupancy shopping center is built with 10 separate occupants and a service is run to each occupancy, the Code would require:

- A. all disconnects to be outside for this arrangement
- B. special permission from the authority having jurisdiction
- C. the conductors to be 1/0 or larger
- D. the conductors shall be underground

CORRECT: B NEC 230.2 (B)(1)

143 On services exceeding 600 volts. Service entrance conductors shall not be smaller than ___ AWG unless in cable:

- A. 2
- B. 4
- C. 6
- D. 8

CORRECT: C NEC 230.202 (A)

#8 wire is only allowed for multiconductor cable.

NEC Study Guide

144 According to the NEC, the vertical clearance of all service drop conductors shall not be less than ___ feet, disregarding exceptions.

- A. 6
- B. 7
- C. 8
- D. 9

CORRECT: C NEC 230.24 (A)

145 The electric service mast head is located above the roof. Disregarding exception, what is the minimum vertical clearance required between the roof and service conductors?

- A. 6'
- B. 8'
- C. 10'
- D. 12'

CORRECT: B NEC 230.24 (A)

146 According to the NEC, service drop conductors above roofs (porches) shall have a vertical clearance of no less than ___ feet above the roof surface.

- A. 6
- B. 7
- C. 8
- D. 9

CORRECT: C NEC 230.24 (A)

NEC Study Guide

147 A residential electrical drop, passing over the roof of a manufactured home with a slope greater than 4" for every 12", is allowed a reduction in vertical clearance to what minimum distance?

- A. 3'
- B. 4'
- C. 5'
- D. 6'

CORRECT: A NEC 230.24 (A) exception 2

148 What is the minimum vertical clearance distance for a service-drop over an extended porch roof of a dwelling where the voltage does not exceed 300 volts and the pitch is not less than 4" vertically and 12" horizontally?

- A. 3'
- B. 6' in all directions from the edge of the roof.
- C. 8'
- D. 10' except when the voltage is 110

CORRECT: A NEC 230.24 (A) exception 2

149 The minimum height of the service drop attachment to a building shall be no less than ___ feet.

- A. 8
- B. 9
- C. 10
- D. 11

CORRECT: C NEC 230.24 (B)(1)

NEC Study Guide

150 The minimum clearance for service conductors over residential driveways not subject to truck traffic is ____ ft.

- A. 10
- B. 12
- C. 15
- D. 18

CORRECT: B NEC 230.24 (B)(2)

151 The minimum clearance for service drops not exceeding 600 volts over commercial areas subject to traffic is ____ feet.

- A. 16
- B. 17
- C. 18
- D. 19

CORRECT: C NEC 230.24 (B)(4)

152 According to the NEC, The minimum clearance above a non-residential driveway for a 480 volt service drop shall be no less than ____ feet.

- A. 14
- B. 16
- C. 18
- D. 20

CORRECT: C NEC 230.24 (B)(4)

NEC Study Guide

- 153** The minimum clearance for overhead service conductors above a public driveway is ___ feet.
- A. 15
 - B. 18
 - C. 12
 - D. 10
- CORRECT: B** NEC 230.24 (B)(4)
-
- 154** The Code generally prohibits the splicing of service conductors. The one exception where this is permitted is:
- A. where the service conductors are tapped for separate disconnects
 - B. where conductors are smaller than #10 AWG copper
 - C. when conductors are increased in size for voltage drop
 - D. the Code has no exception to this rule
- CORRECT: A** NEC 230.46
-
- 155** Service entrance cable extending along the wall of a single family dwelling where the driveway is adjacent to the same wall, is required by Code to be:
- A. UF cable
 - B. protected from physical damage
 - C. protected from radiation
 - D. supported every 48"
- CORRECT: B** NEC 230.50 (A)

NEC Study Guide

156 Service drop conductors and service entrance conductors shall be required to be all of the following except:

- A. they will not fall down
- B. they will be protected from physical damage
- C. water will not enter the service raceway or equipment
- D. they will be in the cable

CORRECT: D NEC 230.50, 51 & 53

157 The Code requires all fittings on a service raceway, when exposed to weather, to be:

- A. water tight
- B. rain tight
- C. dustproof
- D. weather tight

CORRECT: B NEC 230.53

158 Service conductors are considered outside the building when run in:

I - the crawl space
II - the attic.

- A. I only
- B. II only
- C. both I & II
- D. neither I or II

CORRECT: D NEC 230.6

NEC Study Guide

159 Disregard exceptions. What is the maximum number of circuit breakers that shall be connected in service disconnecting means for any building?

- A. 1
- B. 5
- C. 6
- D. 8

CORRECT: C NEC 230.71 (A)

160 What is the maximum number of service disconnects permitted for a strip shopping center that has one central service entrance; service conductors run to each occupant, given that the shopping center has ten different occupants?

- A. 1
- B. 6
- C. 10
- D. 60

CORRECT: B NEC 230.71 (A)

161 What is the maximum number of disconnects permitted to connect an individual service with one set of service entrance conductors for a single family dwelling?

- A. 1
- B. 3
- C. 6
- D. none

CORRECT: C NEC 230.71 (A)

NEC Study Guide

162 There shall be no more than ___ disconnect(s) per service grouped in any one location.

- A. one
- B. three
- C. four
- D. six

CORRECT: D NEC 230.71 (A)

163 Two to six service disconnects shall be ___.

- A. approved for damp locations
- B. installed indoors
- C. grouped
- D. 3 phase disconnects

CORRECT: C NEC 230.72 (A)

164 A grounding electrode conductor may be connected to the grounded service conductor at what location?

- A. Only on the load side of the service disconnect means.
- B. A sub panel at a remote distribution
- C. At the service disconnecting means
- D. At the service disconnect and any following sub panels

CORRECT: C NEC 230.75

NEC Study Guide

165 In a multisection switchboard, disconnects for the grounded conductor shall be permitted to be in ___ section, provided any such switchboard section is marked.

- A. any
- B. no
- C. connecting raceway
- D. bushing

CORRECT: A NEC 230.75

166 According to the NEC, required grounding conductors and bonding jumpers may not be connected solely by ___ connections.

- A. soldered
- B. pressure
- C. clamped
- D. bolted

CORRECT: A NEC 230.81

167 According to the NEC, taps for a feed servicing a fire pump are permitted to be located:

- A. after the service disconnect
- B. before the service disconnect
- C. after the motor connection
- D. just prior to the motor connection

CORRECT: B NEC 230.82 (5)

Comment: NEC 1996 reference is 230-82 exception 5, NEC 1999 reference is 230-82 (4) and NEC 2002 230.82 (4).

NEC Study Guide

- 168** Service drop conductors less than 300 volts that are located directly above a window are required to be a minimum of ___ feet above the window.
- A. no clearance from the window is required at this location
 - B. 3'
 - C. depends on width of opening
 - D. depends on square footage of opening
- CORRECT: B** NEC 230.9 (A)
-
- 169** What is the maximum distance permitted by the Code between the point that the service conductors comes into a building and the location of the main disconnect when the service disconnect is located inside the building?
- A. 3'
 - B. 5'
 - C. 10'
 - D. the Code does not specify a distance in feet
- CORRECT: D** NEC 230.91
-
- 170** According to the NEC, a ground fault protection of equipment shall be provided for solidly grounded WYE electrical services of more than 150 volts to ground, but not exceeding 600 volts phase-to-phase for each service disconnect rated ___ amperes or more.
- A. 200
 - B. 500
 - C. 1000
 - D. 1500
- CORRECT: C** NEC 230.95

NEC Study Guide

171 Select the minimum overcurrent device permitted to protect a branch circuit that serves a 3 phase 208, 8,646 VA electric hot plate, continuous load. The hot plate is served with #8 THWN conductors and all terminal connections are rated for 60 degrees C. Assume the overcurrent device is not approved for 100% continuous load.

- A. 20
- B. 25
- C. 30
- D. 35

CORRECT: B NEC 240.100

172 A fuse that is located in the neutral conductor for overload protection must be:

- A. located at the supply end of the conductor
- B. located at the load end of the conductor
- C. removed
- D. 125% of the circuits ampacity

CORRECT: A NEC 240.21

Comment: For NEC 1996 reference is 240-21 (a).

173 A feeder tap in a raceway terminating in the single circuit breaker with an ampacity of 1/3 of the feeder conductors may extend not over ____ feet.

- A. 22
- B. 23
- C. 24
- D. 25

CORRECT: D NEC 240.21 (B)(2)(1)

Comment: NEC 1996 reference is 240-21 (c)(2) and NEC 1999 reference is 240-21 (b)(2)(a).

NEC Study Guide

174 Tap conductors that serve as a feeder that are less than 25' in length unless otherwise suitably protected from physical damage, shall be:

- A. 2' or less in length
- B. 3/0 AWG
- C. enclosed in a raceway
- D. use cable

CORRECT: C NEC 240.21 (B)(2)(3)

Comment: NEC 1996 reference is 240-21 (c)(4), NEC 1999 reference is 240-21 (b)(2)(c), NEC 2002 reference is 240.21 (B)(2)(3)

175 A transformer feeder tap is made. What is the minimum ampacity permitted by Code for the tap conductors if the primary plus the secondary tap is 22' in length and the main feeder is 111 AMPS. The feeder overcurrent protector is 125 AMPS. The tap conductors terminate in a 110 AMP breaker.

- A. 20 AMPS
- B. 37 AMPS
- C. 42 AMPS
- D. 110 AMPS

CORRECT: C NEC 240.21 (B)(3)(2)

Comment: NEC 1996 reference is 240-21 (d)(2) and NEC 1999 reference is 240-21 (b)(3)(b).
Solution: Tap conductor is 1/3 rating of overcurrent device of 125 amps. Therefore $125 / 3 = 42$ amps.

176 When service overcurrent devices are not readily accessible, the Code requires the branch circuit overcurrent protection devices to be:

- A. located within 20' of the service overcurrent device
- B. located in an accessible location where a ladder is required for access
- C. a lower ampere rating than the service overcurrent device
- D. less than 6 in number

CORRECT: C NEC 240.24 (A)(3) & 225.40

Comment: NEC 1996 references are 240-24 (a) 3 and 225-9 (b).

NEC Study Guide

177 According to the NEC, the electrical circuit breaker panels for residential buildings may NOT be installed in which of the following locations?

- A. covered patios
- B. clothes closets
- C. hallway
- D. garage

CORRECT: B NEC 240.24 (D)

178 According to the NEC, if a conduit containing a branch circuit of 3 # 10 AWG copper conductors with THW insulation, the maximum size overcurrent protector that may be used on the ungrounded conductors shall be no more than ___ amperes.

- A. 30
- B. 25
- C. 20
- D. 15

CORRECT: A NEC 240.4 (D)

Comment: Section is new as of NEC 1999 thus there is not reference for NEC 1996. NEC 1999 reference is 240-3 (d).

179 The maximum current over protection for a #10 THW copper conductor is ___ amps at 30 degrees C and not more than 3 conductors in a conduit.

- A. 20
- B. 25
- C. 30
- D. 35

CORRECT: C NEC 240.4 (D)

Comment: Section is new in NEC 1999. NEC 1999 reference is 240-3 (d).

NEC Study Guide

180 A branch circuit conductor that serves a multi-outlet cord and plug connected lights has an ampacity of 18 AMPS. What is the maximum ampere rating for the circuit breaker permitted by Code to provide overcurrent protection for the conductors?

- A. 15
- B. 20
- C. 25
- D. 30

CORRECT: A NEC 240.5 (A) & 240.6 (A)

Comment: NEC 1996 reference 240-5 & 240-6 (a).

181 A conductor has an ampacity of 51 AMPS. What is the maximum ampere rating for the breaker, permitted by Code, to provide overcurrent protection for the conductors, given that the conductors serve a multioutlet cord and plug connected load? NOTE: This is NOT a motor circuit.

- A. 50
- B. 55
- C. 60
- D. 65

CORRECT: A NEC 240.5 (B) (1) (4)

182 Extension cord sets having # ___ or larger conductors shall be considered to be protected by 20 A branch-circuit protection.

- A. 16
- B. 18
- C. both A & B
- D. neither A nor B

CORRECT: A NEC 240.5 (B) 1

NEC Study Guide

183 According to the NEC, flexible cord will be considered as protected by a 20 amp branch circuit breaker if it is no less than ___ AWG.

- A. 22
- B. 20
- C. 18
- D. 6' in length

CORRECT: C NEC 240.5 (B)(1)(1)

Comment: NEC 1996 reference is 240-4 and NEC 1999 reference is 240-4 (b)(1).

184 Edison-base plug fuses shall be classified at not more than ___ V, and 30 A and less.

- A. 125
- B. 150
- C. 300
- D. 130

CORRECT: A NEC 240.51 (A)

185 According to the NEC, plug fuses of the Edison-base type shall be only used for replacements in existing installations where there is no evidence of over fusing and tampering.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 240.51(B)

NEC Study Guide

186 Under what conditions does the Code permit fuses that are factory assembled to be installed in parallel?

- A. when fuses are listed as a unit
- B. under no condition
- C. when fuses are SWD listed
- D. when circuits are rated for more than 400 AMPS

CORRECT: A NEC 240.8

Comment: NEC 1996 reference is 240-8 exception.

187 The Code prohibits individual fuses or circuit breakers to be connected:

- A. combined
- B. in series
- C. individually
- D. parallel

CORRECT: D NEC 240.8

188 A circuit breaker does not have its interrupting rating shown. The interrupting rating is ___ AMPS.

- A. 2000
- B. 3500
- C. 5000
- D. 10,000

CORRECT: C NEC 240.83 (C)

NEC Study Guide

189 According to the NEC, circuit breakers used as switches in 120 volt and 277 volt fluorescent lighting circuits, shall be listed and marked " ____ ".

- A. SWD
- B. SSW
- C. HID
- D. either A or C

CORRECT: D NEC 240.83 (D)

190 The maximum length of a bonding jumper outside of a raceway or enclosure is ____ ft.

- A. 3
- B. 6
- C. 25
- D. neither A, B, nor C

CORRECT: B NEC 250.102 (E)

Comment: NEC 1996 reference is 250-79 (f). _____

191 According to NEC, the maximum length of an equipment Bonding Jumper installed on the outside of a flexible metal conduit, shall not exceed _____ feet.

- A. 5'
- B. 6'
- C. 7'
- D. 8'

CORRECT: B NEC 250.102 (E)

Comment: NEC 1996 reference is 250-79 (f). _____

NEC Study Guide

192 An individual apartment in a multi-family dwelling is supplied by 255 amp THW copper feeders. The feeder conductors are protected by 225 amp breakers from the main 800 amp building service. The water piping system in the apartment is metal but is tapped into PVC connection. What size grounding conductor is needed for this installation?

- A. 2
- B. 4
- C. 1/0
- D. 4/0

CORRECT: B NEC 250.104 (A)(2) & Table 250.122

Comment: NEC 1996 reference is 250-80 exception & Table 250-95.

193 Equipment connected by cord and plug in residential occupancies shall be grounded in which of the following appliances?

- A. Refrigerators
- B. Kitchen waste disposer
- C. Portable hand lamp
- D. All of the above

CORRECT: D NEC 250.114 (3)

Comment: NEC 1996 reference is 250-45 (c).

194 According to the NEC, a residential ___ shall be grounded.

- A. toaster
- B. blender
- C. can opener
- D. aquarium

CORRECT: D NEC 250.114 (3)(b)

Comment: Reference for NEC 1996 is 250-45 (c).

NEC Study Guide

195 According to the NEC, listed kitchen waste disposers, compactors and dishwashers protected by double insulation do not require grounding.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 250.114 exception

Comment: NEC 1996 reference is 250-45 (b) exception 3.
Note: Kitchen disposals is not mentioned in NEC 1999 and was probably omitted by mistake.

196 According to the NEC, equipment grounding conductors shall be permitted to be bare, green or ____.

- A. yellow
- B. green with white stripes
- C. green with yellow stripes
- D. white with yellow striping

CORRECT: C NEC 250.119

Comment: NEC 1996 reference is 250-57 (b) and NEC 1999 reference is 250-119.

197 According to the NEC, the equipment grounding conductor of a branch circuit in an electrical wiring system is identified by a green or bare wire.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 250.119

Comment: NEC 1996 reference is 250-57 (b).

NEC Study Guide

198 A grounding conductor of an electrical circuit is properly identified by:

- A. green or bare
- B. white or grey
- C. orange
- D. black

CORRECT: A NEC 250.119

Comment: NEC 1996 reference is 250-57 (b).

199 The grounding conductor of a branch circuit in an electrical wiring system is identified by what color?

- A. white
- B. green or bare copper
- C. orange
- D. black

CORRECT: B NEC 250.119

Comment: NEC 1996 reference is 250-57 (b).

200 For proper identification of the equipment grounding conductor, which of the following colors of insulation would be in accordance with the Code?

- A. orange
- B. white
- C. green
- D. red

CORRECT: C NEC 250.119

Comment: NEC 1996 reference is 250-57 (b).

NEC Study Guide

- 201** From which section of the NEC can one determine the minimum size of an equipment grounding conductor?
- A. 250.94
 - B. 250.122
 - C. 250.51
 - D. 310.16

CORRECT: B NEC 250.122

Comment: NEC 1996 reference is 250-94.

- 202** An over current protective device for non-motorized equipment is rated at 40 AMPS. What is the minimum allowable size for the copper equipment grounding wire in the circuit?
- A. 8 AWG
 - B. 6 AWG
 - C. 10 AWG
 - D. 12 AWG

CORRECT: C NEC 250.122 Table

Comment: NEC 1996 reference is Table 250-95.

- 203** According to the NEC, an overcurrent protective device for non-motorized equipment drawing 70 amps, would require a minimum size ___ AWG copper equipment grounding conductor.
- A. 6
 - B. 7
 - C. 8
 - D. 9

CORRECT: C NEC 250.122 Table

Comment: NEC 1996 reference is Table 250-95.

NEC Study Guide

204 According to the NEC, the minimum size AWG copper equipment grounding conductor required for a 20 amp motor circuit is:

- A. 12
- B. 14
- C. 16
- D. 18

CORRECT: A NEC 250.122 Table

Comment: NEC 1996 reference is 250-95.

205 Under what condition does the Code permit the structural frame of the building to serve as the equipment grounding conductor?

- A. when all connections of the structure are welded
- B. when the distance is limited to 5'
- C. when the metal frame is also the grounding electrode system
- D. under no condition

CORRECT: D NEC 250.136 (A)

Comment: NEC 1996 reference is 250-58 (a).

206 When is it permitted to use the structural metal frame of a building for equipment grounding?

- A. the Code prohibits this practice for AC equipment
- B. when all structural elements are welded
- C. when the conductors are rated a 120 volts and 30 amperes or less
- D. for low voltage systems

CORRECT: A NEC 250.136 (A)

Comment: NEC 1996 reference 250-58 (a).

NEC Study Guide

- 207** What method must be used to ground the frame of a 120v/240 volt clothes dryer in a new one family dwelling?
- A.** By a 3-wire dryer cord and plug set with the grounded conductor bonded to the dryer frame.
 - B.** Connect the grounding conductor of a 4-wire dryer cord to the dryer's motor
 - C.** By a separate flexible conductor from the dryer frame to a grounded metallic raceway or water pipe
 - D.** Install a separate flexible conductor from the dryer frame to the structural metal frame of the building or mobile home.

CORRECT: A NEC 250.138 (A)

Comment: NEC 1996 reference is 250-59 (b).

- 208** Which of the following is NOT an approved method of grounding the frame of a 120/240 volt clothes dryer in a single family dwelling?
- A.** bond the grounding conductor of a 4 wire dryer cord to the frame
 - B.** install a separate flexible conductor from the dryer to the structural metal frame of the building
 - C.** install a separate flexible conductor from the dryer frame to a grounded metallic raceway
 - D.** bond the neutral of a three wire dryer frame

CORRECT: B NEC 250.140

Comment: NEC 1996 reference is 250-60.

- 209** The frame of an electrical range may be grounded by being connected to the grounding conductor of the 120/240 branch circuit if the grounded conductor is no less than a number ____ copper.
- A.** 8
 - B.** 10
 - C.** 12
 - D.** 14

CORRECT: B NEC 250.140 (2)

Comment: NEC 1996 reference is 250-60 (b).

NEC Study Guide

210 Equipment grounding conductors are permitted by Code to be:

I - dependent upon receptacle devices for continuity.

II - spliced in boxes.

- A. I only
- B. II only
- C. either I or II
- D. neither I or II

CORRECT: B NEC 250.148

Comment: NEC 1996 reference is 250-114.

211 According to the National Electrical Code, ___ is the minimum size copper grounding conductor for a direct current system consisting of a three wire balancer set.

- A. 4 AWG
- B. 6 AWG
- C. 8 AWG
- D. 10 AWG

CORRECT: C NEC 250.166 (A)

Comment: NEC 1996 reference is 250-93 (c) - disregard exceptions.

212 According to the NEC, on live-front switchboards having exposed live parts, shall not have their cases grounded, but, shall have mats of insulating rubber or other suitable floor insulation provided for the operator where voltage to ground exceeds 50 volts.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 250.174 (C)

150 volts!
Comment: NEC 1996 reference is 250-123 (c).

NEC Study Guide

213 Where separate services are used to supply a building, all services must use:

- A. individual grounding electrodes
- B. the same grounding electrode system
- C. driven electrodes
- D. concrete encased electrodes

CORRECT: A NEC 250.24 (A)

Comment: NEC 1996 reference is 230-23 (a).

214 According to the NEC, a premise wiring system that is supplied by an AC service that is grounded shall have at each service a grounding electrode conductor connected to one of five acceptable locations. Which of the following locations is acceptable?

- A. at the service disconnecting means
- B. where the transformer supplying the service is inside the building
- C. where the main bonding jumper is a metal conduit
- D. at the service sub-panels

CORRECT: A NEC 250.24 (A)(1)

Comment: NEC 1996 reference is 250-23 (a).

215 According to the NEC, the grounding electrode system be directly bonded to the neutral conductor at the

- I. Meter
- II. Main disconnect

- A. I only
- B. II only
- C. both I and II
- D. either I or II

CORRECT: D NEC 250.24 (A)(1)

Comments: NEC 1999 reference is 250-23 (a) and NEC 1999 reference is 250-24 (a).

NEC Study Guide

216 An A/C system that is operating at less than 1000 Volts that is grounded at any point shall have the grounding conductor running to each:

- A. grounding rod
- B. building
- C. equipment disconnect
- D. service disconnect

CORRECT: D NEC 250.24 (A)(1)

Comment: NEC 1996 reference is 250-23 (a).

217 A 200 amp single phase service panel is supplied with a #2/0 THW conductor. According to the NEC, the minimum size bonding jumper for this service shall be no less than:

- A. #6 aluminum
- B. #6 copper
- C. #4 copper
- D. #4 aluminum

CORRECT: C NEC 250.28 (D) & 250.66 Table

Comment: NEC 1996 reference is 250-79 (d) and Table 250-94.

218 What is the minimum required length for rod type grounding electrodes?

- A. 8'
- B. 6'
- C. 5'
- D. 4'

CORRECT: A NEC 250.52 (A)(5)

Comment: NEC 1996 reference 250-83 (c) and NEC 1999 reference 250-52 (c).

NEC Study Guide

219 According to the NEC, the minimum length for rod used as a grounding electrode is:

- A. 8'
- B. 7'
- C. 6'
- D. 5'

CORRECT: A NEC 250.52 (A)(5)

Comment: NEC 1996 reference 250-83 (c) and NEC 1999 reference 250-52 (c).

220 Plate electrodes shall expose not less than __ square feet of surface to exterior soil.

- A. 1
- B. 1.5
- C. 2
- D. 2.5

CORRECT: C NEC 250.52 (A)(6)

Comment: NEC 1996 reference is 250-83 (d) and NEC 1999 reference is 250-52 (d).

221 All of the following are permitted by the NEC as grounding electrodes except:

- A. 3/4" aluminum rod 9' long
- B. a ground ring encircling a building at a depth of at least 2 1/2'
- C. 5/8" stainless steel rod
- D. 1/4" steel plate 16" x 16"

CORRECT: A NEC 250.52 (B)(2)

Comment: NEC 1996 reference is 250-83 (e) and NEC 1999 reference is 250-52 (e).

NEC Study Guide

222 According to the NEC, the minimum distance between a grounding electrode and a made electrode is:

- A. 6'
- B. 7'
- C. 8'
- D. 9'

CORRECT: A NEC 250.53 (B)

Comment: NEC 1996 reference is 250-83 and NEC 1999 reference is 250-52.

223 According to the NEC, the maximum resistance to ground that a grounding rod for a distribution line may have without requiring an additional grounding rod shall be no less than ___ ohms.

- A. 25
- B. 30
- C. 35
- D. 40

CORRECT: A NEC 250.56

Comment: NEC 1996 reference is 250-84.

224 Shorts Electrical Inspections, Inc. is testing the resistance to ground for the grounding electrode prior to closing up the trenches. They have recorded the following data:

1. Ammeter indicates 1 amp of current
2. The voltmeter indicates 35 volts

Does the ground electrode being tested have acceptable ground resistance?

- A. Yes
- B. No
- C.
- D.

CORRECT: B NEC 250.56

According to NEC resistance shall not be greater than 25 ohms. The calculated resistance in this application is 35 ohms.

Comment: NEC 1996 reference is 250-84.

NEC Study Guide

225 A single pipe is driven into the ground to form a Made Electrode. The resistance to earth measures 50 ohms. According to the NEC "Made Electrode" resistance requirements, this rod:

- A. Meets the resistance requirements for a Made Electrode.
- B. This is a ground rod.
- C. Can not be further than 6' from a water pipe
- D. Must be supplemented by at least one additional electrode.

CORRECT: D NEC 250.56

Comment: NEC 1996 reference is 250-84.

226 A ground rod electrode which has a resistance to ground of 50 ohms, shall:

- A. be replaced
- B. be augmented with one additional electrode
- C. be augmented with two additional electrodes
- D. be considered acceptable

CORRECT: B NEC 250.56

Comment: NEC 1996 reference is 250-84.

227 According to the NEC, which statement(s) is/are true.
System facts:

- A. electrode is driven 10 feet into the earth
- B. electrode has a resistance of 50 ohms

I. It must be replaced with electrode which has a maximum resistance to earth of 24 ohms

II. It needs to be supplemented with one additional electrode

- A. I only
- B. II only
- C. both I and II
- D. either I or II

CORRECT: B NEC 250.56

Comment: NEC 1996 reference is 250-84.

NEC Study Guide

228 The maximum resistance to ground permitted by Code when the grounding electrode system is made up of two or more ground rods that are bonded together is ____ Ohms.

- A. 10
- B. 25
- C. 35
- D. none

CORRECT: B NEC 250.56

Comment: NEC 1996 reference is 250-84.

229 The maximum resistance a ground rod should have to ground is ____ Ohms

- A. 10
- B. 25
- C. 50
- D. 75

CORRECT: B NEC 250.56

Comment: NEC 1996 reference is 250-84.

230 To correct an excessively high resistance to ground:

- A. use a smaller rod
- B. extend the length of the rod
- C. wet the area
- D. shorten the rod

CORRECT: B NEC 250.56

Comment: NEC 1996 reference is 250-84.

NEC Study Guide

- 231** Where separate services are used to supply a building, all services must use:
- A. individual grounding electrodes
 - B. the same grounding electrode system
 - C. driven electrodes
 - D. concrete encased electrodes

CORRECT: B NEC 250.58

Comment: NEC 1996 reference is 250-54 and NEC 1999 reference is 250-58.

- 232** Bare aluminum or copper-clad aluminum grounding conductors shall not be used where in direct contact with masonry or the earth or where subject to corrosive conditions. Where used outside, aluminum or copper-clad aluminum grounding conductors shall not be terminated within ___ inches of the earth.
- A. 12
 - B. 14
 - C. 16
 - D. 18

CORRECT: D NEC 250.64 (A)

Comment: NEC 1996 reference is 250-92 (a).

- 233** When using aluminum as a grounding electrode conductor outside of the building, the conductor must maintain what required clearance from earth?
- A. 6"
 - B. 12"
 - C. 18"
 - D. it must be in direct contact with the earth

CORRECT: C NEC 250.64 (A)

Comment: NEC 1996 reference is 260-92 (a).

NEC Study Guide

234 According to the NEC, a grounding electrode conductor shall be securely fastened to the surface on which it is carried, and, shall be at least a number ____ AWG grounding electrode conductor if it is free from exposure to physical damage.

- A. 2
- B. 4
- C. 6
- D. 8

CORRECT: C NEC 250.64 (B)

Comment: NEC 1996 reference is 250-92 (a).

235 The size of the grounding electrode conductor of a grounded or ungrounded AC system shall not be less than::

- A. the size of the service conductor
- B. the distance to the grounding electrode
- C. the size of the largest ungrounded service conductor
- D. the size of the neutral conductors

CORRECT: C NEC 250.66

Comment: NEC 1996 reference is 250-94.

236 A 120/208 3 Ph service has a one 500 KCMIL copper conductor per phase. The main circuit panel is 300 amps. According to the NEC, the minimum required size copper grounding electrode conductor from the main service panel to a cold water pipe line is:

- A. 10 AWG
- B. 1/0 AWG
- C. 4/0 AWG
- D. 8 AWG

CORRECT: B NEC 250.66 Table

Comment: NEC 1996 reference is Table 250-94.

NEC Study Guide

- 237 Service bonding jumpers must be sized:
- A. according to Table 250.66
 - B. 1/3 as large as the service conductor
 - C. according to Table 250.67
 - D. according to Table 251.66

CORRECT: A NEC 250.66 Table

Correct table for NEC 1996 is 250-94.

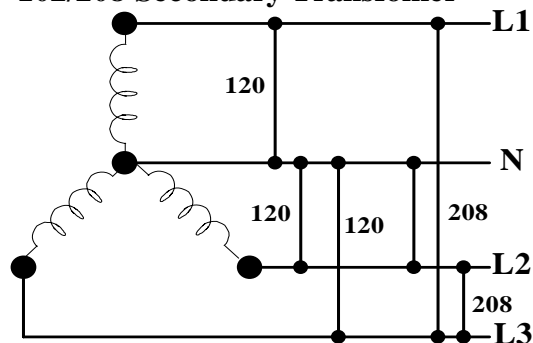
- 238 Using the information shown in the transformer diagram, Determine the minimum size THW aluminum conductor, allowed by the NEC for the grounded service conductor, given: ungrounded service conductors are aluminum 1/0 THW in conduit and no 208 volt loads.

- A. 1/0 AWG
- B. 3 AWG
- C. 5 AWG
- D. 7 AWG

CORRECT: A NEC 250.66 Table

Comment: NEC 1996 reference is Table 250-94.

102/208 Secondary Transformer



- 239 According to the NEC, a 2/0 AWG Aluminum service entrance conductor may have a size ___ AWG copper grounding electrode conductor.

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: C NEC 250.66 Table

Comment: NEC 1996 reference is 250-94.

NEC Study Guide

240 According to NEC, when aluminum conductors are paralleled for a service feeder, the minimum allowable copper grounding conductor is:

- A. 8
- B. 6
- C. 4
- D. 2

CORRECT: A NEC 250.66 Table

Comment: NEC 1996 reference is Table 250-94.

241 What is the minimum size grounding electrode conductor, permitted by Code, if the largest service entrance conductor is made up of three sets of 500 KCMIL copper conductors in parallel and the grounding electrode is effectively grounded to the building steel?

- A. 1 AWG
- B. 1/0 AWG
- C. 3/0 Awg
- D. 250 KCMIL

CORRECT: C NEC 250.66 Table Notes

Comment: NEC 1996 reference is Table 250-94 Notes.

242 Which of the following is NOT an approved method of connecting a grounding conductor to a grounding electrode?

- A. soldering
- B. exothermic welding
- C. listed lugs
- D. listed pressure connectors

CORRECT: A NEC 250.70

Comment: NEC 1996 reference is 250-115.

NEC Study Guide

243 The grounding for a short section of conduit that is used only to protect or support a cable assembly from physical damage is:

- A. specifically exempted by Code
- B. required inside all buildings
- C. required
- D. 1/4

CORRECT: A NEC 250.86 exception 2

Comment: NEC 1996 reference is 250-33 exception 2.

244 A grounding electrode conductor is protected in a metal raceway which is connected on one end to a panel. What is the minimum grounding requirement?

- A. a bonding connector
- B. an effective bond
- C. a bonding jumper to at both ends of the raceway
- D. a bonding jumper only near the grounding electrode

CORRECT: C NEC 250.92 (A)(3)

Comment: NEC 1996 reference is 250-71 (a)(3).

245 To reduce the potential inductive reactance caused by the use of a metal sleeve on a grounding electrode conductor when the sleeve is not electrically continuous from the service equipment to the grounding electrode, the Code requires:

- A. bonding each end of the sleeve to the grounding electrode conductor
- B. limit the sleeve to 6' in length
- C. sleeve to be bonded to the building surface
- D. require the ground clamp to be accessible

CORRECT: A NEC 250.92 (A)(3)

Comment: NEC 1996 reference is 250-71 (a)(3).

NEC Study Guide

246 When a metal sleeve is used to protect a grounding electrode conductor, which end is required to be bonded to the grounding electrode conductor?

- A. both ends
- B. neither end is permitted to be bonded
- C. the end closest to the service
- D. the end closest to the grounding electrode

CORRECT: A NEC 250.92 (A)(3)

Comment: NEC 1996 reference is 250-71 (a)(3).

247 The Code requires an accessible means external to the enclosures for connecting inter-system bonding. This is permitted to be:

- A. service panel cover screws
- B. exposed metallic service raceway
- C. building steel
- D. metal device boxes

CORRECT: B NEC 250.94 (1)

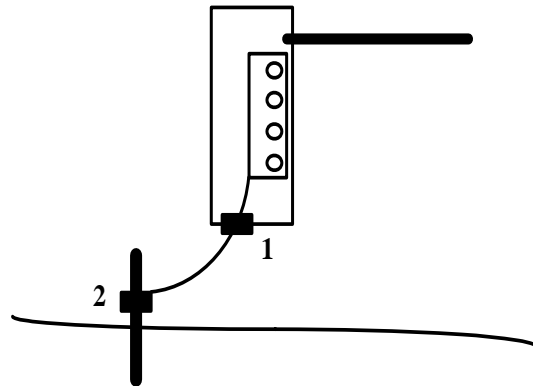
Comment: NEC 1996 reference is 250-71 (b)(1), NEC 1999 reference is 250-92 (b)(1).

248 A raceway protects the grounding electrode conductor. One end of the raceway is connected to the panel with a set screw connector at a concentric knock-out. The raceway ends within an inch of the grounding electrode at the other end. At which points must the grounding electrode conductor be bonded to the metal raceway?

- A. 1 only
- B. 2 only
- C. both 1 and 2
- D. neither 1 nor 2

CORRECT: C NEC 250.96 (A)

Comment: NEC 1996 reference is 250-75.



NEC Study Guide

249 According to the NEC, a ground rod may project above the ground level.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 250-83 (C) (3)

The NEC says that "the upper end of the electrode shall be flush with or below ground level unless the above ground end and the grounding conductor attachment are protected against physical damage as specified 250.10." Comment: NEC 1996 reference is 250-83 (c)(3) and NEC 1999 reference is 250-52 (c)(3).

250 What is the minimum size copper conductor for a surge arrester in a service that is less than 1 KVA?

- A. #10 Awg copper
- B. #12 Awg copper
- C. #14 Awg copper
- D. #16 Awg copper

CORRECT: C NEC 280.22

251 According to the NEC, a single installation of surge arrestors shall be permitted to protect ___ interconnected circuits, provided that no circuit is exposed to surges while disconnected from the surge arrestors.

- A. 1
- B. 2
- C. 3
- D. no numeric requirement

CORRECT: D NEC 280.3

NEC Study Guide

252 The rating of a surge arrester on circuits of less than 1000 volts shall be ___ the maximum continuous phase to ground power frequency voltage at the point of application.

- A. less than
- B. equal to or less than
- C. equal to
- D. equal to or greater than

CORRECT: D NEC 280.4 (A)(1)

253 The rating of a surge arrester on circuits of less than 1000 volts shall be ___ the maximum continuous phase to ground power frequency voltage at the point of application.

- A. less than
- B. equal to or less than
- C. equal to
- D. equal to or greater than

CORRECT: D NEC 280.4 (A)(1)

254 According to the NEC, each hole bored in stud, shall be bored so the edge of the hole is at least 1 1/4" from the nearest edge.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 300.4 (A)(1)

NEC Study Guide

255 According to the NEC, in multiwire branch circuits, the continuity of the ___ shall not depend on the device connection such as lamp holders, receptacles, etc., where the removal of such devices would interrupt the continuity.

- A. grounding conductor
- B. grounded conductor
- C. neutral conductor
- D. over current protection device

CORRECT: C NEC 300.13 (B)

256 Under what condition is it permitted by Code to make a splice within the conduit?

- A. when the diameter is 1" and the fill is less than 10%
- B. when the splice is located within 6" of the end of the conduit
- C. when the only conductor spliced is the grounded conductor
- D. under no condition

CORRECT: D NEC 300.15

257 A branch circuit run in knob and tube wiring switches to use type NM cable. Which of the following methods is acceptable for splicing the NM cable to the knob and tube wiring?

- A. soldered and spliced under strain
- B. soldered and spliced in free air and must be supported by insulators
- C. be secured to a framing member
- D. the knob and tube cable and the NM cable must be spliced with an approved device in a listed enclosure

CORRECT: D NEC 300.16 (A)

NEC Study Guide

258 A ____ shall be permitted in lieu of a box or terminal fitting where the conductors emerge from a raceway or conduit and enter or terminate at equipment, such as open switchboards, unenclosed control equipment, or similar equipment. The ____ shall be of the insulating type for other than lead-sheathed conductors.

- A. bushing
- B. bonded connector
- C. lead-sheathed conductor
- D. lighting panel

CORRECT: A NEC 300.16 (B)

259 Number 8 copper wire conductors in a vertical raceway shall be supported at intervals not exceeding ____ feet.

- A. 80
- B. 85
- C. 95
- D. 100

CORRECT: D NEC 300.19(A) Table

260 According to the NEC, where conductors carrying AC current are installed in metal enclosures or metal raceways, they shall be arranged so as to avoid ____ by installing so that all phase conductors, and, where used, the grounded conductor and all equipment grounding conductors shall be grouped together.

- A. eddy currents
- B. heating the surrounding metal by induction
- C. pulling single wires through the raceway
- D. over current induction

CORRECT: B NEC 300.20 (A)

NEC Study Guide

- 261** What does the Code require to reduce inductive heat where single conductors carrying alternating current enters an aluminum box? (300-20 (b) FPN)
- A. all conductors shall be rated at 220 amperes
 - B. no requirement because aluminum is not a magnetic metal all conductors shall be rated at 220 amperes
 - C. all conductors must have inductive shielding
 - D. all conductors of a circuit must pass through the same opening
- CORRECT: B** NEC 300.20 (B) FPN

- 262** Smith wants a telephone installed in his garage. According to the NEC, what provisions must be made if the line penetrates the wall between his house and garage?
- A. the phone company must install
 - B. any licensed contractor may install
 - C. junction boxes must be installed on both sides of the wall
 - D. opening around the penetration must be fire stopped using approved methods
- CORRECT: D** NEC 300.21

- 263** According to the NEC, openings around electrical penetrations through fire-resistant-rated walls, partitions, floors, or ceilings shall be ___ using approved methods to maintain the fire resistance rating.
- A. caulked
 - B. made using back to back j-boxes
 - C. fire-stopped
 - D. avoided
- CORRECT: C** NEC 300.21

Even for penetrations for low voltage wiring. _____

NEC Study Guide

264 An electrical conductor needs to be run through a fire resistive wall. According to NEC, what provisions, if any, need to be made where the wires pass through this wall?

- A. no penetrations of any kind may be made through a fire resistive rated wall
- B. Metal or fire resistive junction boxes must be installed on both sides of the wall and connected with a conduit nipple.
- C. no special provisions must be made if the hole is less than 1"
- D. the opening around the penetration must be fire stopped using approved methods

CORRECT: D NEC 300.21

265 According to the NEC,
I. Low voltage cables
II. Telecommunications Cables

installed through openings in a fire-resistive wall, partition, floor or ceiling shall be firestopped using approved methods to maintain the fire-resistance rating.

- A. I only
- B. II only
- C. both I and II
- D. neither I nor II

CORRECT: C NEC 300.21

NEC Study Guide

266 A central fire protection panel requires a low voltage cable to be run through a fire resistant wall. According to NEC, what protection efforts must be done, if any, where the cable passes through the hole in the fire wall?

- A. Fire proof junction boxes must be installed on both sides of the wall at the ceiling line and connected with a fire proof conduit nipple.
- B. the openings around the penetrations must be fire stopped using approved methods
- C. No special provisions are required as long as the hole is small.
- D. This wall can not be penetrated for any reason.

CORRECT: B NEC 300.21

See FPN for suggestions.

267 A communications cable is routed through a fire-rated wall. According to the NEC, at the point of penetration, the openings around the penetrations must be fire stopped using approved methods.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 300.21

268 According to the National Electrical Code, a cable tray system may penetrate a fire wall.

- A. yes
- B. no
- C. yes, if firestopped with approved methods
- D. yes, only if installed vertically in the fire wall

CORRECT: C NEC 300.21

NEC Study Guide

269 The mechanical designers of the new King County Courthouse elected to route the supply air and the return air in enclosed ducting throughout the ceiling space. This ceiling space above the suspended ceiling meets the NEC definition of a plenum for cabling purposes.

A. True

B. False

C.

D.

CORRECT: B NEC 300.22 (B)

270 Single family home construction can sometimes utilize floor joist with plywood decks instead of slab on grade. The spaces between the floor joists could be used by the heating or cooling system as a return air duct by enclosing the "box" created by any two adjacent joists and the deck. Communications cable (not rated LS) may be run within this space.

A. True

B. False

C.

D.

CORRECT: B NEC 300.22 (B)

NEC Study Guide

- 271** In a single family residence, the space between floor joists is closed with a galvanized sheet steel and used as a return air plenum. Can a low voltage cable that is not rated for low smoke plenum use be routed along the face of a joist within the enclosed space?
- A.** Yes- no restriction applies for a duct or plenum in a single family residence
 - B.** No- cable in conduit may be used in a duct, plenum or other airhandling space
 - C.** No- cable with out a low smoke rating is not permitted in airhandling spaces
 - D.** Yes- NEC does not apply to low voltage wiring
- CORRECT: B** NEC 300.22 (B)

- 272** According to the NEC, a cable carrying CATV may be run in a return air space between two floor joists enclosed with a galvanized sheet metal.
- A.** True
 - B.** False
 - C.**
 - D.**

CORRECT: B NEC 300.22 (B) & Table 820.154

Comment: NEC 1996 & 1999 reference 300-22 (b) & 820-53, NEC 2002 reference 300.22 (B) & 820.53.

- 273** When a single family home is constructed by utilizing floor joist with plywood decks, the spaces between the floor joists can be used by the heating or cooling system as a return air duct by enclosing the "box or channel" that is created by any two adjacent joists and the plywood deck. Communications cable (not rated LS) may be run within this space.
- A.** True
 - B.** False
 - C.**
 - D.**
- CORRECT: B** NEC 300.22 (C)

NEC Study Guide

- 274** All conductors of the same circuit are required to be located in the same raceway or installed in close proximity except when conductors:
- A. are in parallel and in parallel raceways
 - B. located below ground and are 1/0 AWG or larger
 - C. are protected with overcurrent protection not exceeding 30 AMPS
 - D. are protected with a metal or lead sheathing

CORRECT: A NEC 300.3 (B)(1) Exception

Comment: NEC 1996 reference 300-3 (b) exception 1.

- 275** A 2x4 wood stud is 1½" x 3½". What is the largest hole permitted by the NEC to be bored through the wide face of this stud when routing unprotected non-metallic sheathed cable?
- A. 1"
 - B. 1¼"
 - C. 1½"
 - D. 1¾"

CORRECT: A NEC 300.4 (A)(1)

A hole must be 1¼ inches from nearest edge, $3\frac{1}{2}" - (2 \times 1\frac{1}{4}") = 3\frac{1}{2}" - 2\frac{1}{2}" = 1"$

- 276** Cable that is run parallel with the studs that is not provided with special protection shall be placed a minimum of ___ inches from the edge of the stud.
- A. ¾"
 - B. 1 1/4"
 - C. 1 1/2"
 - D. 2"

CORRECT: B NEC 300.4 (A)(1)

NEC Study Guide

277 The maximum size bored hole in a 2 x 4 stud for a raceway is ___ inches.

- A. 3/4
- B. 7/8
- C. 1
- D. 1 1/4

CORRECT: B NEC 300.4 (A)(1)

$$3.5" - (2 \times 1.25") = 3.5" - 2.5" = 1"$$

278 According to the NEC, cable or raceway type wiring methods installed in a notch, to be covered by wall board, siding, paneling, carpeting, or similar finish, shall be protected by a 1/16" plate.

Which of the following shall not meet this requirement?

- A. flexible metal conduit
- B. intermediate metal conduit
- C. rigid non-metallic conduit
- D. electrical metallic tubing

CORRECT: A NEC 300.4 (A)(2)

279 Where nails or screws are likely to penetrate nonmetallic-sheathed cable, or, electrical nonmetallic tubing, a steel sleeve, steel plate, or steel clip not less than ___ inches in thickness shall be used to protect the cable or tubing.

- A. 1/32
- B. 1/8
- C. 1/16
- D. 1/4

CORRECT: C NEC 300.4 (B)(2)

NEC Study Guide

280 Insulating bushings are required on conduits entering boxes, gutters, etc. if the conduit contains conductors ____ AWG or larger.

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

CORRECT: A NEC 300.4 (F)

281 Where raceways containing # ____ AWG, or larger, enter a cabinet, box enclosure, or raceway, the conductors shall be protected by a substantial fitting providing a smoothly rounded insulating surface.

- A. 3
- B. 4
- C. 5
- D. 6

CORRECT: B NEC 300.4 (F)

282 MI cable may be installed under airport runways.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 300.5 & 332.10

Comment: NEC 1996 & 1999 reference 300-5 & 330-10.

NEC Study Guide

283 Where service entrance direct and buried cable of 480v emerge from the ground, they must be protected by an enclosure which extends from below the grade to a point at least 8 feet above grade.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 300.5 (D)(1)

Comment: NEC 1996 & 1999 reference 300-5 (d).

284 According to Table 300.5 of the NEC, rigid non-metallic raceways listed for direct burial without concrete encasement, which is to be run under a public alley, shall be at minimum depth of bury of at least:

- A. 20"
- B. 22"
- C. 24"
- D. 26"

CORRECT: C NEC 300.5 Table

285 A run of rigid non-metallic conduit approved for direct burial is to be installed underneath a permanent residential driveway. What is the minimum burial depth required?

- A. 18"
- B. 4"
- C. 12"
- D. 24"

CORRECT: A NEC 300.5 Table

NEC Study Guide

286 According to Table 300.5 of the NEC, residential branch circuits rated 120 volts or less with GFCI protection and maximum over current protection of 20 amps, which are run underground in non-metallic raceways to an outdoor lamp, shall be buried at a depth of at least:

- A. 4"
- B. 6"
- C. 18"
- D. 20"

CORRECT: C NEC 300.5 Table

287 According to the NEC, rigid conduit buried in an area subject to heavy vehicular traffic shall have a minimum cover of ____ inches.

- A. 22
- B. 23
- C. 24
- D. 25

CORRECT: C NEC 300.5 Table

288 According the NEC, power conductors in rigid metal conduit should be installed at a minimum depth of ____ under airport runways:

- A. 18"
- B. 24"
- C. 32"
- D. 34"

CORRECT: A NEC 300.5 Table

NEC Study Guide

289 According to Table 300.5 of the NEC, circuits for landscape lighting systems not exceeding 30 volts and of type UF, shall be permitted to be directly buried with a minimum cover of not less than ____ inches.

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: C NEC 300.5 Table

290 According to Table 300-5, of the NEC, the minimum bury depth for a residential branch circuit rated 120 volts or less with GFCI protection and maximum overcurrent protection of 20 amperes, shall be no less than ____ inches.

- A. 4
- B. 6
- C. 8
- D. 10

CORRECT: C NEC 300.5 Table

291 A run of rigid non-metallic conduit that is approved for direct burial is to be installed under a commercial parking lot. What is the minimum burial depth required?

- A. 4
- B. 12
- C. 18
- D. 24

CORRECT: D NEC 300.5 Table

Comment: NEC 1996 & 1999 reference 300-5 Table.

NEC Study Guide

292 What is the maximum depth measured at a point where direct buried cables merge below ground, regardless of the condition, when the raceway used to protect cable must extend below ground?

- A. 6"
- B. 12"
- C. 18"
- D. 24"

CORRECT: D NEC 300.5 Table

293 The minimum burial depth for PVC conduit under a 4" concrete slab is ___ inches.

- A. 24
- B. 18
- C. 4
- D. 0

CORRECT: C NEC 300.5 Table

Comment: NEC 1996 & 1999 reference 300-5 Table.

294 Areas subjected to heavy vehicular traffic such as thoroughfares, shall have a minimum cover of ___ inches for underground installations.

- A. 18
- B. 24
- C. 36
- D. 48

CORRECT: B NEC 300.5 Table

Comment: NEC 1996 & 1999 reference 300-5 Table.

NEC Study Guide

295 A 2" thick concrete pad is placed in the trench over the underground installation of rigid non-metallic conduit. The required burial depth may be reduced by how many inches.

- A. 2"
- B. 6"
- C. 12"
- D. 18"

CORRECT: B NEC 300.5 Table

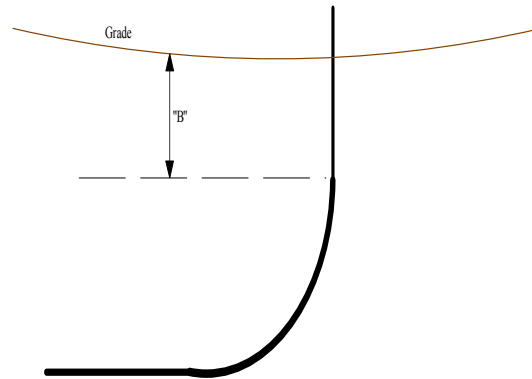
12" minimum cover for RNC in a trench below 2" thick concrete, 18" otherwise thus 18" - 12" = 6"

296 A metallic elbow is inserted in an underground run of sunlight resistant rigid non-metallic conduit. This elbow is not grounded to the electrical system. What is the minimum bury depth allowed at "B" by the NEC?

- A. 6"
- B. 12"
- C. 15"
- D. 18"

CORRECT: D NEC 300.5 Table & 250.80

Comment: NEC 1996 reference Table 200-5 & 250-32.



297 According to the NEC, the minimum earth cover required for a direct burial type UF cable, 120 volt, 40 amp, branch circuit shall be no less than ___ inches.

- A. 20
- B. 22
- C. 18
- D. 24

CORRECT: D NEC 300.5 Table & 340.10 (1)

Comment: NEC 1996 & 1999 reference Table 300-5 & 339-3 (a)(3).

NEC Study Guide

298 According to the NEC, the minimum depth required for a 72,000 volt direct buried cable when no additional protection is provided shall be no less than ___ inches.

- A. 30
- B. 36
- C. 42
- D. 48

CORRECT: C NEC 300.50 Table

Comment: NEC 1996 reference Table 710-4(b).

299 A direct burial cable with a circuit voltage of 4 KV would have a minimum back fill requirement of:

- A. 30"
- B. 24"
- C. 18"
- D. 6"

CORRECT: A NEC 300.50 Table

Comment: NEC 1996 reference Table 710-4(b).

300 A 40 KVA line encased in a rigid metal conduit would require a minimum depth below grade of:

- A. 42"
- B. 36"
- C. 24"
- D. 18"

CORRECT: C NEC 300.50 Table

Comment: NEC 1996 reference Table 710-4(b).

NEC Study Guide

301 For the protection of service raceways, which of the following methods is not permitted by Code as a sole corrosion protection outside the building? (300-6 (a))

- A. enamel only
- B. asphalt
- C. paint
- D. pvc coating

CORRECT: A NEC 300.6 (A)

302 According to the NEC 18-2 AWG copper plastic jacketed cable, marked only for its rated voltage, may be used for doorbell wiring.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 310.11 (A)

303 What type of insulation is acceptable if exposed to oil?

- A. NM
- B. MTW
- C. RHD
- D. TW

CORRECT: B NEC 310.13

NEC Study Guide

304 All of the following are permitted in conduit embedded in a concrete slab EXCEPT:

- A. THHN
- B. THHW
- C. XHHW-2
- D. TW

CORRECT: A NEC 310.13 and 100 Definitions - Location, Wet

A concrete slab is considered a wet location.

305 Type THW insulation is a ____ degree C rating for use in wiring through fixtures.

- A. 65
- B. 70
- C. 75
- D. 80

CORRECT: C NEC 310.13 Table

306 According to the NEC, ____ type conductor is listed as both moisture and heat resistant.

- A. TW
- B. THW
- C. THHN
- D. TFE

CORRECT: B NEC 310.13 Table

NEC Study Guide

307 Two 50 foot raceways includes 9 underground conductors that feed continuous loads. What is the derating factor that must be applied to the ampacity of these conductors?

- A. 80%
- B. 70%
- C. 60%
- D. 50%

CORRECT: B NEC 310.15 (B)(2)(a)

Comment: NEC 1996 reference 310-15 Notes to Ampacity Tables 8.

308 According to the NEC, a 6-conductor cable must have its' conductor ampacity derated by a factor of:

- A. 62%
- B. 60%
- C. 75%
- D. 80%

CORRECT: D NEC 310.15 (B)(2)(a) Table

Comment: NEC 1996 reference Notes to Ampacity Tables (8)(a).

309 A conduit, which contains 15 conductors, according to the NEC, must have their ampacity derated by which factor?

- A. 80%
- B. 70%
- C. 50%
- D. 45%

CORRECT: C NEC 310.15 (B)(2)(a) Table

Comment: NEC 1996 reference Notes to Ampacity Tables (8)(a).

NEC Study Guide

310 According to the NEC, if the number of current carrying conductors in a raceway is 7, the individual ampacity of each conductor shall be reduced by ___ percent.

- A. 65
- B. 70
- C. 75
- D. 80

CORRECT: B NEC 310.15 (B)(2)(a) Table

Comment: NEC 1996 reference Notes to Ampacity Tables (8)(a).

311 According to the NEC, a raceway containing more than 9 current carrying conductors will limit the ampacity of each conductor to ___ percent of its table 310-16 value.

- A. 80
- B. 70
- C. 50
- D. 45

CORRECT: D NEC 310.15 (B)(2)(a) Table

Comment: NEC 1996 reference Notes to Ampacity Tables (8)(a).

312 A raceway encloses 9 ungrounded conductors that feed continuous loads. What is the derating factor that must be applied to the ampacity of these conductors?

- A. 50 %
- B. 60%
- C. 70%
- D. 80%

CORRECT: C NEC 310.15 (B)(2)(a) Table

Comment: NEC 1996 reference 310 Notes to Ampacity Tables of 0 to 2000 volts 8 (a); NEC 1999 reference 310-15 (b)(2)(a) Table.

NEC Study Guide

313 Chauncy's Chop Shop has a new raceway which contains 8 ungrounded conductors feeding various continuous loads. The derating factor that must be applied to the ampacity of these conductors ____ %.

- A. 80
- B. 70
- C. 50
- D. 45

CORRECT: B NEC 310.15 (B)(2)(a) Table

NOTE: The question asks for the derate applied to the ampacity only, NOT the total derate percentage!
Comment: NEC 1996 reference Notes to Ampacity Tables (8)(a).

314 Seven conductors in a raceway, 1 is used as the equipment ground. What percent of each conductors' ampacity must be used?

- A. 20%
- B. 30%
- C. 70%
- D. 80%

CORRECT: D NEC 310.15 (B)(2)(a) Table & 310.15 (B)(5)

Comment: NEC 1996 reference Notes to Ampacity Tables (8)(a) & Note 11.

315 The minimum service entrance conductors size to a restaurant that requires a 200 amp service would be ____ THW copper.

- A. 2/0
- B. 3/0
- C. 4/0
- D. 250 KCMIL

CORRECT: A NEC 310.15 (B)(6)

Restaurant has nothing to do with the question.
Comment: NEC 1996 reference 310-15 Notes to Ampacity Tables.

NEC Study Guide

- 316** Select the minimum size THWN copper feeder conductors permitted to be protected with a 400 ampere overcurrent protection device.
- A. 400 KCMIL
 - B. 500 KCMIL
 - C. 600 KCMIL
 - D. 700 KCMIL

CORRECT: A NEC 310.15 (B)(6) Table

Comment: NEC 1996 reference 310-15 Notes to Ampacity Tables (after note 3).

- 317** A three phase panelboard is fed with two sets of 500 KCMIL copper THWN conductors in parallel raceways. What is the maximum allowable phase current permitted based on the ampacity of the paralleled conductors?
- A. 380 AMPS
 - B. 608 AMPS
 - C. 760 AMPS
 - D. depends on conductor length

CORRECT: A NEC 310.16

- 318** Given: A 120/208 Volt 3 phase transformer secondary supplies a dwelling unit load of 120/208 single phase 150 amps with terminations rated at 75 degrees Celsius. What is the minimum size of type THW aluminum conductors which can be used for the ungrounded service conductors.
- A. 1 AWG
 - B. 1/0
 - C. 2/0
 - D. 3/0

CORRECT: D NEC 310.16 Table

NEC Study Guide

319 The conductor size for a 12 KW 240 volt single phase range located in a residence would be ___ THHN copper.

- A. 10
- B. 8
- C. 6
- D. 4

CORRECT: B NEC 310.16 Table

12000 / 240 = 50 amps. From the table the conductor size is #8 AWG.

320 A 120/208 volt, 3 phase transformer secondary supplies the following dwelling unit load. 120/208 volt, single phase 150 AMP terminations are rated at 75 degrees C. What is the minimum size type THWN aluminum conductor which can be used for the ungrounded service conductors to this dwelling unit?

- A. 1/0 AWG
- B. 3/0 AWG
- C. 2/0 AWG
- D. 1 AWG

CORRECT: B NEC 310.16 Table

From the table 3/0 THWN aluminum is 155 amps.

321 Entrance Electrical Company is installing a service entrance with the following characteristics:

1. feeder conductors supply a continuous load of 240 amps
2. The overcurrent device rated at 300 amps
3. The terminations rated at 75 degrees C

The minimum size phase conductors, type THW aluminum, according to the NEC, shall be no less than ___ kcmil.

- A. 300
- B. 400
- C. 500
- D. 600

CORRECT: C NEC 310.16 Table

NEC Study Guide

322 Entrance Electrical Company has a contract to install a 120/240 volt single phase panel with a 92 KVA balanced incandescent lighting load, supplying a storage room at the local Wal-Mart. The stockroom is only open for two hours at a time. Curtis, the foreman has already determined that the length of time the stockroom is open will have nothing to do with calculating the wire size. He then proceeds to calculate the minimum size required for each ungrounded feeder. The feeders will be aluminum THW conductors. The minimum size, according to Table 310.16, will be no less than ___ kcmil

- A. 600 KCmil
- B. 750 KCmil
- C. 700
- D. 750

CORRECT: B NEC 310.16 Table

Calculate the current as $92 \text{ kVA} \div 240 \text{ volts} = 383.333$ amps. From the ampacity table 750 KCmil aluminum has a maximum ampacity of 385 amps.

323 Bart Gurnsey is discussing the plans for his new professional office building. The Electrical Contractor has advised him that his new office will require a 100 amp service. To save money, Bart decides to purchase the underground entrance cable. He gets a bargain on type TW aluminum. What size should he purchase in order to meet the minimum standards of the NEC?

- A. 2
- B. 1
- C. 1/0
- D. 2/0

CORRECT: C NEC 310.16 Table

NEC Study Guide

324 What is the permitted ampacity for 3 conductors in a raceway, given that the conductors are #10 AWG, THW, aluminum and that the ambient temperature is 100 degrees F and the terminals are rated for 60 degrees C.

- A. 17.75
- B. 24.64
- C. 25
- D. 20.40

CORRECT: D NEC 310.16 Table

325 Determine the conductor ampacity given: conductors are 500 KCMIL, THHN, copper, 125 degrees F. Seven current carrying conductors are in the raceway.

- A. 178.22
- B. 199.50
- C. 228.76
- D. 380.00

CORRECT: C NEC 310.16 Table

The ampacity of 500 KCMIL, THHN copper is 430 amps and the correction factor for 125°F is 0.76. The derating factor for seven conductors in the raceway is 70% thus $430 \text{ amp} \times 0.76 \times 70\% = 228.76 \text{ amps}$.

326 A commercial building with a three wire single phase 120 volt/240 volt service, with terminals rated at 60 degrees C, has a total load of 28,800 watts after all demand factors have been considered. The minimum size THWN aluminum phase conductors required with this underground service will be:

- A. 3 AWG
- B. 1/0 AWG
- C. 2/0 AWG
- D. 3/0 AWG

CORRECT: B NEC 310.16 Table

Calculate the current as $28.8 \text{ kW} \div 240 \text{ volts} = 120 \text{ amps}$. From the ampacity table we find that 1/0 AWG aluminum conductors are required.

NEC Study Guide

327 Which copper conductor AWG size listed below is the minimum permitted for a 100 AMP commercial service with a 100 AMP main overcurrent protection device given that all terminations are rated for 60 degrees C? (Assume 3 conductors in raceway.) (310-16)

- A. #6 THHN
- B. #3 XHHW
- C. #4 THWN
- D. #1 TW

CORRECT: B NEC 310.16 Table

328 A dwelling with a wire, single phase, 120/240 volt service has a total load of 50,000 watts after all demand factors have been considered. All terminal devices are rated for 75 degrees C. What is the minimum size THWN copper conductors required for under ground service line conductor?

- A. #3 AWG
- B. 1/0
- C. 3/0
- D. 4/0

CORRECT: D NEC 310.16 Table

$50,000 \div 240 = 208.333 \text{ amps} \Rightarrow 4/0 \text{ AWG.}$

329 What is the ampacity rating for three #12 AWG TN 60 degree C copper conductors in a single raceway where ambient conditions are 40 degrees C? (310-16)

- A. 7.5
- B. 8.8
- C. 20.5
- D. 25

CORRECT: C NEC 310.16 Table

NEC Study Guide

- 330** Select the minimum size branch circuit copper conductors to serve a motor with a full load current of 44 AMPS. Assume all terminals are rated for 60 degrees C.
- A. 2 AWG
 - B. 3 AWG
 - C. 4 AWG
 - D. 6 AWG

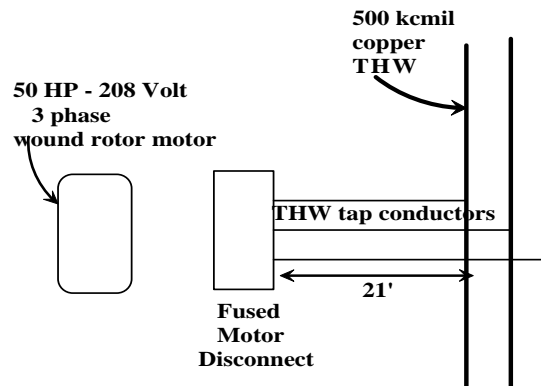
CORRECT: D NEC 310.16 Table

- 331** A 50 HP, 208 volt, three phase wound rotor motor is supplied by tap conductors as shown in the drawing. For calculation purposes, consider all termination to be rated at 75 degrees C. According to the NEC, the minimum size copper THW tap conductors shall be no less than ___ AWG.

- A. 8
- B. 6
- C. 4
- D. 1

CORRECT: B NEC 310.16 Table

Solution: 50×746 (watts per HP) = 37,300 watts.
37,300 divided by 208 Volt = 179.33 amps. 179.33 divided by 3 = 59.78 amps per phase. Look up in table 310-16.



- 332** An 80 gallon, 240 volt, water heater is rated at 6 Kw. If all terminations will be at 75°C, then the conductors in the branch circuit must be at least ___ AWG aluminum THW.

- A. 12
- B. 10
- C. 8
- D. 6

CORRECT: B NEC 310.16 Table

To find the ampacity of this circuit divide the watts by the volts. $6000 / 240 = 25$ amps now look up the ampacity in the Table 310-16.

NEC Study Guide

- 333** Six #10 THWN Cu current-carrying conductors are installed in a raceway. The ambient temperature is 105 degrees F. The ampacity of the conductors is ___A.
- A. 23
 - B. 35
 - C. 28.7
 - D. 28

CORRECT: B NEC 310.16 Table

From table #10 THWN copper conductors have an ampacity of 35 amps; the temperature derating factor is 0.82 and the conductor derating factor for six conductors is 80% thus $35 \text{ amps} \times 0.82 \times 80\% = 22.96$, which is approximately equal to 23 amps.

- 334** There are no temperature ratings marked for the conductor connectors which feed a lighting panel board which is rated 100 AMPS. The conductors have been de-rated according to the NEC. Disregard the exceptions. What is the final maximum temperature rating that must be used to size the conductors that feed this panel?
- A. 145 degrees C
 - B. 65 degrees C
 - C. 75 degrees C
 - D. 90 degrees C

CORRECT: D NEC 310.16 Table & 110.40

- 335** What is the ampacity for 8 #10 AWG, THW conductors under normal ambient temperature conditions when all conductors are copper, current carrying and are located in the same 18" long raceway and all terminals are rated for 75 degrees C.
- A. 24.5
 - B. 30.0
 - C. 35.0
 - D. 40.25

CORRECT: C NEC 310.16 Table & 310.15 (B)(2)(A) exception 3

From the table, #10 AWG copper wire (up to three conductors) will handle 35 amps.
Comment: NEC 1996 reference Table 310-16 & Note 8 (a) exception 3.

NEC Study Guide

336 What is the maximum allowable ampacity of the conductor in a cable of the following type: 6 AWG three conductor, type NM. The ambient temperature is 117°F (47°C).

- A. 33.3 AMPS
- B. 45 AMPS
- C. 55 AMPS
- D. 65 AMPS

CORRECT: C NEC 310.16 Table & 334.80

Comment: NEC 1996 reference Table 310-16 & 336-30 (b), NEC 1999 reference Table 310-16 & 336-26.

337 What is the ampacity of one 250 KCMIL, copper, THWN conductor, to the nearest AMP, that is located in a metallic auxiliary gutter with 10 current carrying conductors? Thirty degrees C and terminals are rated for 75 degrees C.

- A. 127
- B. 178
- C. 204
- D. 255

CORRECT: D NEC 310.16 Table & 366.23 (A)

According to 366.23 (A) [NEC 2002 & 2005] or 374-6 (a) [NEC 1996 & 1999] when the number of current carrying conductors in a sheet metal auxiliary gutter is 30 or less the ampacity limits of 310-16 (b)(2)(a) do not apply, from table 310-16 the ampacity of 250 KCMIL copper THWN conductors is 255 amps and the correction factor is 1.0 thus $255 \text{ amps} \times 1.0 = 255 \text{ amps}$.
Comment: NEC 1996 & 1999 reference Table 310-16 & 374-6 (a).

338 Nine, size 10 AWG, Type THHN, copper conductors are installed in EMT. Ambient is 96 degrees F. The maximum allowed ampacity of each conductor is:

- A. 1.40 AMPS
- B. 2.13 AMPS
- C. 13.6 AMPS
- D. 18.2 AMPS

CORRECT: D NEC 310.16 Table & Table 310.15 (B)(2)(A)

You must derate for temperature and for the number of conductor in the raceway. $40 \text{ amps} \times .91 = 36.4 \text{ amps}$; $36.4 \text{ amps} \times .5 = 18.2 \text{ amps}$.
Comment: NEC 1996 reference Table 310-16 & 310-15

NEC Study Guide

339 Lighting circuits have been run in a raceway containing 8 - #14 AWG type TW, copper, current-carrying conductors. According to the NEC, if the ambient temperature is 120 degrees F, the minimum ampacity of each conductor shall be no more than ___ amps.

- A. 11.78
- B. 10.23
- C. 9.56
- D. 8.12

CORRECT: D NEC 310.16 Table & Table 310.15 (B)(2)(a)

20 amps is allowed by table 310.16. Derate the temperature according to table 310.16 - $20 \times .58 = 11.6$ amps. Derate the ampacity according to 310.15(B)(2)(a) - $11.6 \times .7 = 8.12$ amps.

340 What is the allowable ampacity for #14 AWG copper, THWN conductors given that 10 identical conductors are located in the raceway, each conductor serves as a fire protective signaling circuit. It is not power limited, and each conductor carries a maximum load of 1 AMP. The ambient temperature is 84 degrees F and all terminals are rated for 75 degrees C.

- A. 10
- B. 14
- C. 20
- D. 25

CORRECT: A NEC 310.16 Table & Table 310.15 (B)(2)(a)

NEC Study Guide

341 What is the allowable ampacity of #3 AWG, THHN copper conductors installed in a raceway given that the ambient temperature is 30 degrees C? There are four conductors in the raceway. The terminal devices are rated for 60 degrees C. (310-16 Note 8)

- A. 85
- B. 88
- C. 100
- D. 110

CORRECT: C NEC 310.16 Table & Table 310.15 (B)(2)(a)

From the Allowable Ampacities table (310-/.16) the maximum current for #3 AWG, THHN copper is 110 amps, and the temperature correction factor for 30°C is 1.0. From the Adjustment Factors table (310-/.15) the adjustment factor for 4-6 conductors is 80% thus $110 \text{ amps} \times 1.0 \times 80\% = 88 \text{ amps}$.
Comment: NEC 1996 reference Table 310-16 & 310-15 Notes to Ampacity Table 8.

342 What is the ampacity to the nearest AMP for #4 AWG, THWN copper conductors given that the ambient temperature is 110 degrees F? There are five conductors in the raceway that carry current. The terminal devices are rated for 60 degrees C. (310-16 & Note 8)

- A. 36
- B. 60
- C. 70
- D. 85

CORRECT: B NEC 310.16 Table & Table 310.15 (B)(2)(a)

From the Allowable Ampacities table (310-/.16) the maximum current for #4 AWG, THWN copper is 85 amps, and the temperature correction factor for 110°F is 0.82. From the Adjustment Factors table (310-/.15) the adjustment factor for 4-6 conductors is 80% thus $85 \text{ amps} \times 0.82 \times 80\% = 55.76 \text{ amps}$, which is approximately equal to 56 amps.
Comment: NEC 1996 reference Table 310-16 & 310-15 Notes to Ampacity Table 8.

NEC Study Guide

343 Select the minimum THWN aluminum branch circuit conductor size to serve a 48 AMP single outlet 80 load given that the terminals are rated for 75 degrees C and the ambient temperature is 30 degrees C. Overcurrent protection is minimum ambient rating. The raceway will contain 20 current carrying conductors. (310-16 & Note 8)

- A. #1 AWG
- B. #2 AWG
- C. #4 AWG
- D. 1/0 AWG

CORRECT: B NEC 310.16 Table & Table 310.15 (B)(2)(a)

Comment: NEC 1996 reference Table 310-16 & 310-15 Notes to Ampacity Table 8.

344 A 240 volt, single phase electric furnace has the following 4 heating elements:

1. 10 ohm, 24 amp
2. 20 ohm, 12 amp
4. 30 ohm, 8 amp
4. 40 ohm, 6 amp

Elements are wired in parallel.

According to the NEC, the minimum allowable size type THW AWG copper branch circuit conductors for this installation is:

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: A NEC 310.16 Table & Table 310.15 (B)(2)(A)

The total amperage for the branch circuit is 50 amps. To account for the raceway deration required by Table 310-15(b)(2)(a) you must divide the 50 amps by 70%. This makes the required branch circuit conductor's ampacity equal to approximately 72 amps and this implies #4 AWG.

Comment: NEC 1996 reference Table 310-16 & 310-15 Notes to Ampacity Tables 8.

NEC Study Guide

345 10 size 10 AWG, type THHN current carrying conductors are contained in 12' of EMT raceway at an ambient temperature of 98F. No special temperature ratings. They are rated in accordance with the temperature requirements of the NEC. What is the maximum ampacity of each?

- A. 12.3 amps
- B. 18.2 amps
- C. 36.4 amps
- D. 20.0 amps

CORRECT: B NEC 310.16 Table and 310.15(B)(2)(a)

In this problem you must derate for both temperature and quantity. A 40 amp rating is found in table 310.16 for the #10 AWG. The temperature derate is found in the lower portion of the table as a .91. $40 \times .91 = 36.4$. The quantity derate of .5 is found using table 310.15(B)(2)(a). $36.4 \times .5 = 18.2$.
Comment: NEC 1996 reference Table 310-16 & 310-15 Notes to Ampacity Tables 8.

346 Given: A residential 200 AMP service that is fed with the smallest allowable copper conductors, Type THHW. The raceway on the supply side of the service is bonded with a jumper. According to the NEC, the smallest allowable copper bonding jumper for this raceway shall be _____.

- A. size 2 AWG
- B. size 8 AWG
- C. size 6 AWG
- D. size 4 AWG

CORRECT: D NEC 310.16 Table, 250.28, & Table 250.66

From the ampacity table 200 amp service requires 3/0 AWG, THHW, copper conductors. From the table in article 250 we find that the smallest bonding jumper for 3/0 AWG is #4 AWG.
Comment: NEC 1996 reference Table 310-16, 250-94 & Table 250-94.

NEC Study Guide

- 347** A 120/ 240 volt single phase residential panel board serves 240 volt baseboard heaters:
1. 2-1500 watt:
 2. 2-2000 watt:
 3. 2-2500 watt
 4. 2-1500 watt
 5. 2-2000 watt.

The copper type TW grounded conductor in the feeder supply shall be no less than ___ AWG

- A. 1
- B. 3
- C. 4
- D. 3/0

CORRECT: A NEC 310.16 Table, 424.3 (B) & 210.19 (A)(1)

Add up all the wattages to yield 19,000 watts; calculate the current by $19,000 \text{ watts} \div 240 \text{ volts} = 79.16 \text{ amps}$, since space heaters are considered to be continuous load we need to use 125% of the current so $79.16 \times 125\% = 98.95 \text{ amps}$; from the ampacity table #1 AWG is the correct size.

- 348** Ten baseboards heaters are 240V:
- 2-1500 Watt
 - 2-2000 Watt
 - 2-2500 Watt
 - 2-1500 Watt
 - 2-2000 Watt

According to Table 310-16 in the NEC, what size type TW copper AWG is needed ?

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

CORRECT: A NEC 310.16 Table, 424.3 (B) & 210.19 (A)(1)

Solution: Add all wattages and divide by 240, then multiply that number by 125% to derate for fixed electric heaters then look up in Table. Look up 99 amps
Comment: NEC 1996 & 1999 reference 310-16 Table & 424-3 (b); NEC 2002 reference 310.16 Table & 424.3 (B).

NEC Study Guide

349 A central air conditioning unit has a branch circuit current rating of 55 AMPS. Temperature rating is within allowable limits. What is the minimum size type THHN conductor that may be used to feed this unit?

- A. 6 AWG
- B. 7 AWG
- C. 8 AWG
- D. 10 AWG

CORRECT: C NEC 310.17 Table

350 According to the NEC, the maximum ampacity of single # 8 AWG copper type FEPB conductor operating at 1000 volts in 30 degree C ambient is ___ amps.

- A. 70
- B. 75
- C. 80
- D. 83

CORRECT: C NEC 310.17 Table

351 Conductors, # ___ and larger, shall be stranded when installed in raceways.

- A. 8
- B. 6
- C. 4
- D. 10

CORRECT: A NEC 310.3

NEC Study Guide

352 Which of the following is a requirement for paralleled phase conductors?

- A. larger than 3/0
- B. the same length
- C. terminated on the same lug
- D. in separate raceways

CORRECT: B NEC 310.4

353 When paralleled conductors are run in separate raceways, the raceway shall have: (310-4)

- A. red markings for identification
- B. the same physical characteristics
- C. screw-type fittings only
- D. diameters not less than 3"

CORRECT: B NEC 310.4

354 Aluminum, copper-clad aluminum or copper conductors of size ____ and larger, comprising each phase, neutral, or grounded circuit conductor, shall be permitted to be connected in parallel.

- A. 1/0
- B. 3
- C. 10
- D. 8

CORRECT: A NEC 310.4

NEC Study Guide

355 The reason conductors in parallel are required to be equivalent diameter is:

- A. assured conductors can be pulled without insulation damage
- B. avoid unequal conduit
- C. inductive reactance and unequal current in minimized
- D. reduce corona effect is maximized

CORRECT: C NEC 310.4 FPN (second)

356 According to the National Electrical Code, the ampacity of 1/0 single copper, insulated conductor installed in a triangular configuration, in a uncovered tray, with not less than 2.15 times one conductor diameter between circuits operating over 2000 volts is:

- A. 170
- B. 215
- C. 260
- D. 185

CORRECT: B NEC 310.67 Table & 392.13 (B)(3)

357 Considering a conductors capacity to be based upon a temperature of 90 degrees C and an ambient air temperature of 40 degrees C, then, according to the NEC, the maximum ampacity of a single size 1/0 AWG insulated copper conducted in free air operating at 12,500 volts is no more than:

- A. 240 AMPS
- B. 255 AMPS
- C. 260 AMPS
- D. 265 AMPS

CORRECT: C NEC 310.69 Table

Comment: NEC 1996 & 1999 reference 310-69 Table.

NEC Study Guide

358 An underground cable should have an effectively grounded shield when the voltage to ground is at least ___ kilovolts.

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

CORRECT: B NEC 310.7

359 According to the National Electrical Code, the ampacity of 1/0 triplex, aluminum, rated at 105 degrees C in open cable trays carrying over 2000 volts is:

- A. 195
- B. 260
- C. 150
- D. 170

CORRECT: C NEC 310.70 Table & 392.13 (B)(1)

Get the ampacity from Table 310.70, 200 amps x 75% = 150 amps

360 According to the National Electrical Code, the ampacity of 1/0 triplex, copper, rated at 90 degrees C in open cable trays carrying over 2000 volts is:

- A. 195
- B. 260
- C. 150
- D. 170

CORRECT: A NEC 310.73

NEC Study Guide

361 According to the NEC, all of the following insulator types are permitted for wet locations EXCEPT:

- A. MTW
- B. TW
- C. THHN
- D. THWN

CORRECT: C NEC 310.8 (C)(2)

Comment: NEC 1996 reference 310-8 (a)(2).

362 According to the NEC, which of the conductor insulation types listed is NOT suitable for use in wet locations?

- A. THWN
- B. RHW
- C. THHN
- D. XHHW

CORRECT: C NEC 310.8 (C)(2)

Comment: NEC 1996 reference 310-8 (a)(2).

363 What type of insulation is acceptable for use in wet locations?

- A. THW
- B. THHN
- C. RH
- D. FEB

CORRECT: A NEC 310.8 (C)(2)

Comment: NEC 1996 reference 310-8 (a).

NEC Study Guide

364 Which of the following insulation types is NOT suitable for use in conduit in a concrete slab on grade?

- A. XHHW-2
- B. MTW
- C. RHW
- D. THHN

CORRECT: D NEC 310.8 (C)(2) & 100
Definitions - Location, Wet

Note: Concrete is considered to be a "wet" location.
Comment: NEC 1996 reference 310-8 (a)(2) & 100
Definitions - Location, Wet.

365 According to the NEC, conductors that are intended for use as ungrounded conductors, whether used as single conductors or in multiconductor cables shall be distinguished by colors other than:

- A. white red black
- B. black red gray
- C. white gray green
- D. green gray red

CORRECT: C NEC 310-12 (c)

Starting with NEC 2002 the text was change to read, "Distinguishing markings shall not conflict in any manner with the surface markings required by 310.11 (B)(1). By some reading between the lines using 200.6 and 200.7 it is possible to rule out the use of white, gray and green.

366 4 - #12-2 AWG cables are bundled together for 35'. What is the ampacity for each current carrying conductor?

- A. 19 amps
- B. 20 amps
- C. 21 amps
- D. 22 amps

CORRECT: B NEC 310-16 Table & 310.15
(B)(2)(a) Table

Solution: NEC derate Table 310-15(b)(2)(a) derate 8 current carrying conductors.
Comment: NEC 1996 reference 310-16 Table & Note 8(a); NEC 1999 reference 310-16 Table & #10-15 (b)(2)(a) Table.

NEC Study Guide

367 According to the National Electrical Code, The ampacity for 250 Kcmil and larger triplexed cable when used in open cable trays and in more than one layer:

- A. shall be according to NEC Table 31-69 and Table 310-70
- B. shall not exceed 75% of NEC Table 310-69 and Table 310-70
- C. shall be in accordance with the ampacities of NEC Table 310-69 and Table 310-70
- D. none of the above

CORRECT: D NEC 310-69 Table, and 310-70 Table

368 Refer to the conductor colors in the diagram. They represent circuits wired with non-metallic sheathed cable. Assume all grounding conductors are installed correctly. Conductors have not been re-identified with colored tape. Which figure is correct according to the requirements of the NEC?

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

CORRECT: D NEC 312 C

369 According to the NEC, in damp or wet locations, surface-type enclosures, shall be placed or equipped so as to prevent moisture or water from entering the enclosure, and, shall be mounted so there is at least ___ air space between the enclosure and the wall.

- A. 1/16"
- B. 1/4"
- C. 3/8"
- D. 7/16"

CORRECT: B NEC 312.2 (A)

Comment: NEC 1996 & 1999 reference is 373-2 (a).

NEC Study Guide

370 Surface type cabinets for electrical equipment in damp or wet locations SHALL be mounted so there is at least ____ inch air space between the cabinet and the wall to which it is mounted.

- A. 1/8
- B. 1/4
- C. 3/8
- D. 1/2

CORRECT: B NEC 312.2 (A)

Comment: NEC 1996 & 1999 reference 373-2 (a).

371 A cabinet for electrical equipment in a damp or wet location shall be mounted so that there is at least _____ air space between the cabinet and the wall or other supporting surface.

- A. 1/8"
- B. 1/4"
- C. 3/8"
- D. 1/2"

CORRECT: B NEC 312.2 (A)

Comment: NEC 1996 & 1999 reference 373-2 (a).

372 In areas where conditions meet the NEC definition of "wet", conduit should be mounted with a ____ inch air space between the wall and the conduit.

- A. 3/8
- B. 1/4
- C. 1/2
- D. 1/8

CORRECT: B NEC 312.2(A)

NEC Study Guide

373 According to the National Electrical Code, the wire bending space at the terminal into a cabinet for a #1 AWG conductor shall be ___ if the conductor enters and/or leaves the wall adjacent to the face of the terminal.

- A. 5 times the diameter of the conductor
- B. large enough so that there is no kinking of the conductor
- C. 10 times the diameter of the conductor
- D. 3"

CORRECT: D NEC 312.6 (A) Table

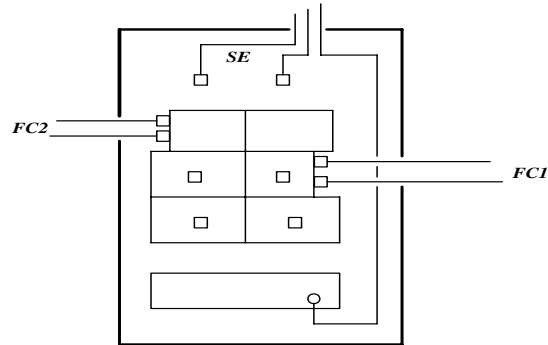
Comment: NEC 1996 & 1999 reference 373-6 (a) Table.

374 Based upon Figure 1A, what is the minimum required bending space in inches for the neutral conductor, from the terminal 2, given that the neutral is 500 KCMIL, aluminum, THWN conductor?

- A. 4.5
- B. 5.5
- C. 8.5
- D. depends on type of fitting at the conductor entrance

CORRECT: C NEC 312.6 (A) Table and 312.6 (B) Table

Comment: NEC 1996 & 1999 refer to article 373.



1-A

375 Wire bending space at terminals in meter sockets is ___.

- A. covered in the NEC
- B. utility controlled
- C. covered by public service commission
- D. a state standard

CORRECT: A NEC 312.6 (B)

Comment: NEC 1996 & 1999 reference 373-6 (b).

NEC Study Guide

376 What is the minimum wire bending space required in a panel board for #6 AWG conductors if the conductors enter the cabinet through the cabinet wall that is opposite the terminal connections and only one wire is connected to each terminal?

- A. 1.5"
- B. 2"
- C. 2.5"
- D. 3"

CORRECT: B NEC 312.6 (B)(2)

Comment: NEC 1996 & 1999 reference 373-6 (b)(2).

377 If an electrical box has a capacity for 10 conductors, has no fittings, and, contains two flush receptacles, how many conductors may be used in this box?

- A. 6
- B. 5
- C. 4
- D. 3

CORRECT: C NEC 314.16

Comment: NEC 1996 & 1999 refer to article 370.

378 What is the maximum number of #10 AWG conductors permitted in a 3 x 2 x 3 1/2 device box?

- A. 6
- B. 7
- C. depends on conductor length
- D. depends on type of conductor insulation

CORRECT: B NEC 314.16 (A)

Comment: NEC 1996 & 1999 refer to article 370.

NEC Study Guide

379 Which of the following device boxes is specified by Code as having a minimum cubic inch capacity of 18" for conductor fill?

- A. 3" x 2" x 3½"
- B. 4" x 2⅛" x 1½"
- C. 4" x 2⅛" x 1⅞"
- D. 4" x 2" x 1½"

CORRECT: A NEC 314.16 (A)

Comment: NEC 1996 & 1999 reference 370-16 (a).

380 In an 18 cu. In. FS box, how many #6 THW Cu conductors are permitted?

- A. 5
- B. 3
- C. 6
- D. 0

CORRECT: B NEC 314.16 (A)

Comment: NEC 1996 & 1999 reference 370-16 (a).

381 Three size 12 AWG two conductors with ground type NM cables are spliced in a ceiling junction box that has internal cable clamps and a flat cover. What is the minimum trade size metal octagonal box that may be used?

- A. 4 x 1 1/4
- B. 4 x 1 1/2
- C. 4 x 2 1/8
- D. 4 x 2 1/4

CORRECT: C NEC 314.16 (A) & (B)

Comment: NEC 1996 & 1999 reference 370-16 (a) & (b).

NEC Study Guide

382 According to the NEC, the cubic inch volume of an outlet box containing the wiring space of a #12 AWG conductor is ___ inches.

- A. 2.5
- B. 2
- C. 2.25
- D. 2.65

CORRECT: C NEC 314.16 (A) Table

Comment: NEC 1996 & 1999 reference Table 370-16 (b).

383 According to the NEC, the minimum size metal octagon box allowed which contains the following conductors, would be:

1. 2 #12 AWG with ground Type NM cables - spliced
2. Internal cable clamps
3. Cover

- A. 4" x 1¼"
- B. 4¼" x 1½"
- C. 4½" x 2⅛"
- D. 4½" x 2¼"

CORRECT: A NEC 314.16 (A) Table & 314.16 (B)(1) & (2)

The volume required for each #12 AWG conductor is 2.25 in.³ and since there are 2 #12 conductors in each type NM cable that count as 4 volume allowances for the conductors; another volume allowance is required for the internal clamp thus there is a total of 5 volume allowances needed so $4 \times 2.25 \text{ in.}^3 = 11.25 \text{ in.}^3$; according to the table for Metal Boxes a 4" x 1¼" will work.

Comment: NEC 1996 & 1999 refer to article 370.

NEC Study Guide

384 A metal junction box contains the following:

1. Six current carrying conductors spliced
2. Two switches
3. A current carrying conductor
4. 2 grounding conductors spliced
5. All conductors are #12 AWG

According to the NEC, the minimum volume required for this box shall be no less than __ cubic inches.

- A.** 21.25
- B.** 22.25
- C.** 23.75
- D.** 24.75

CORRECT: D NEC 314.16 (B)

Comment: NEC 1996 & 1999 reference 370-16 (b).

385 An octagonal junction box contains the following:

1. 3 - #14 AWG two-conductor with ground type NM cables are spliced.
2. Cable clamps
3. Cover

According to the NEC, the minimum trade size box that may be used is:

- A.** 4 x 2 $\frac{1}{8}$
- B.** 4 x 1 $\frac{1}{2}$
- C.** 4 x 1 $\frac{1}{4}$
- D.** 4 x 2 $\frac{1}{4}$

CORRECT: A NEC 314.16 (B)

Count: 2 x 3 = 6, 6 + 1 + 1 = 8 total.

Comment: NEC 1996 & 1999 reference 370-16 (b).

NEC Study Guide

386 Shorts Electrical Inspections, Inc will be installing an electrical box containing the following:

1. 3 # 12 AWG conductors
2. 3 # 10 AWG conductors
3. 1 flush switch connected to 2 # 12 conductors
4. no other devices or fittings

Determine the minimum capacity as allowed by the NEC for this box.

- A. 19.75 cu in
- B. 19.35 cu in
- C. 18.75 cu in
- D. 16.5 cu in

CORRECT: C NEC 314.16 (B) Table & 314.16 (B)

$$3 \times 2.25 \text{ in.}^3 = 6.75 \text{ in.}^3$$

$$3 \times 2.50 \text{ in.}^3 = 7.50 \text{ in.}^3$$

$$2 \times 2.25 \text{ in.}^3 = 4.50 \text{ in.}^3$$

$$\text{Total CI} = 18.75 \text{ in.}^3$$

Comment: NEC 1996 & 1999 refer to article 370.

387 When determining the required box size, what number of conductors must be deducted from the device box capacity for two internal cable clamps and one stud?

- A. 1
- B. 2
- C. 3
- D. depends on number of conductors in the box

CORRECT: B NEC 314.16 (B)(2) & (B)(3)

Comment: NEC 1996 & 1999 reference 370-16 (b)(2) & (b)(3).

NEC Study Guide

388 A metal device box contains one fixture stud two internal cable clamps and two grounding conductors spliced together. To allow for these fittings and conductors a maximum number of conductors allowed in the box by the NEC tables must be reduced by how many?

- A. 3
- B. 2
- C. 5
- D. 4

CORRECT: A NEC 314.16 (B)(2), (B)(3) & (B)(5)

Each Fixture Stud or Hickey counts as one; Two Internal cable clamps count as one; Two grounding conductors count as one; thus a total of 3.
Comment: NEC 1996 & 1999 reference 370-16 (b)(2), (b)(3) & (b)(5).

389 If a device box contains two clamps, one hickey and 3 grounding conductors and two devices on separate straps, the number of conductors must be deducted by Code to determine permitted current carrying conductors is:

- A. 3
- B. 5
- C. 7
- D. 9

CORRECT: B NEC 314.16 (B)(2), (B)(3) & (B)(5)

Comment: NEC 1996 & 1999 reference 370-16 (b)(2), (b)(3) & (b)(5).

390 A metal electrical box has the capacity for 8 conductors and contains one flush duplex receptacle. If there are no devices or fittings, how many conductors may this box contain?

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: C NEC 314.16 (B)(4)

Solution: 8 conductors - 2 (volume factor for duplex receptacle) = 6.
Comment: NEC 1996 & 1999 reference is 370-16 (b)(4).

NEC Study Guide

391 A metal electrical box has the capacity for 8 conductors. If there are no devices or fittings, how many conductors may this box contain if one duplex receptacle is installed in this box?

- A. 5
- B. 6
- C. 7
- D. 8

CORRECT: B NEC 314.16 (B)(4)

A double volume allowance is used by the duplex receptacle thus $8 - 2 = 6$.
Comment: NEC 1996 & 1999 refer to article 370.

392 According to the NEC, ___ conductors are permitted in a 3" x 2" x 1 1/2" deep device box.

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

CORRECT: C NEC 314.16(A) Table

Comment: NEC 1996 & 1999 refer to article 370.

393 A metal junction box is a trade size of 4" x 1 1/2" square. It contains 4 size 12 AWG circuit conductors (2 pair) spliced together, and a flat cover. There are no devices or clamps mounted in the box. Additional size 12 AWG conductors need to be added to the box. What is the maximum number of size 12 AWG conductors that may be added to this box?

- A. 1
- B. 2
- C. 4
- D. 5

CORRECT: D NEC 314.16(A) Table & 314.15 (B)

From the table a 4" x 1 1/2" box can hold 9 #12 conductor, $9 - 4 = 5$ conductors.
Comment: NEC 1996 & 1999 references are 370-16 (a) & 370-16 (a).

NEC Study Guide

394 When conductors requiring the use of lock nuts, enter the side of boxes, the Code prohibits the use of boxes that are:

- A. metal
- B. galvanized
- C. round
- D. connected to metal surfaces of the building

CORRECT: C NEC 314.2

Comment: NEC 1996 & 1999 refer to article 370.

395 Outlet boxes mounted in walls and ceilings constructed of wood or other combustible material must be mounted so that the front edge of the box assembly will ____ the finished surface.

- A. set back not more than 1/4"
- B. set back not more than 1/8"
- C. be flush with
- D. set back not more than 1/2"

CORRECT: C NEC 314.20

Comment: NEC 1996 & 1999 refer to article 370.

396 According to the NEC, in walls and ceilings constructed of combustible material, boxes shall be ____ with the finish surface.

- A. mounted with at least a 1/2" protrusion
- B. mounted with no more than 1/8" setback from the surface
- C. mounted with at least a 1/4" protrusion away from the surface
- D. mounted flush with the surface

CORRECT: D NEC 314.20

Comment: NEC 1996 & 1999 refer to article 370.

NEC Study Guide

397 What is the maximum space or gap permitted between a broken drywall surface and the edge of a flush mounted device box?

- A. 1/8"
- B. 1/16"
- C. 1/4"
- D. Code does not address this detail

CORRECT: A NEC 314.21

Comment: NEC 1996 & 1999 reference 370-21.

398 Fixtures supported by the framing members of a suspended ceiling system shall be securely fastened to the ceiling framing member by mechanical means. This would include all but which of the following?

- A. fixture wire
- B. bolts or screws
- C. rivets
- D. clips identified for this use

CORRECT: A NEC 314.23 (D)(1)

Comment: NEC 1996 reference 370-23 (c), NEC 1999 reference 370-23 (d)(1).

399 A fixture that weights more than ___ lb. shall be supported independently from the box.

- A. 30
- B. 50
- C. 60
- D. 75

CORRECT: B NEC 314.27 (B)

Comment: NEC 1996 & 1999 reference 410-16 (a).

NEC Study Guide

400 According to the NEC, outlet boxes or fittings shall be permitted to support fixtures weighing ___ pounds or less.

- A. 45 lbs
- B. 50 lbs
- C. 55 lbs
- D. 60 lbs

CORRECT: B NEC 314.27(B)

Comment: NEC 1996 & 1999 refer to article 370.

401 Using the following information and the diagram, what is the minimum size of the box at "A"?

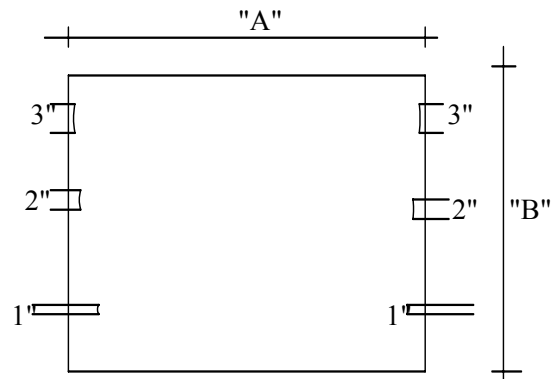
1. Three feeders.
2. Three-350 KCMIL in the 3" conduits.
3. Eight-#10 AWG in the 1" conduits.
4. Four-#2 AWG in 2" conduits.

- A. 18"
- B. 19"
- C. 22"
- D. 24"

CORRECT: D NEC 314.28 (A)(1)

The largest raceway is 3 in. so $3 \text{ in.} \times 8 = 24"$.

Comment: NEC 1996 & 1999 refer to article 370.



402 Size 350 Kcmil conductors are pulled through this box in the image. What is the minimum number of inches allowed between the 2 three inch conduits which is dimension B:

- A. 12
- B. 18
- C. 24
- D. 36

CORRECT: B NEC 314.28 (A)(1)

Comment: NEC 1996 & 1999 reference 370-28 (a)(1).

NEC Study Guide

403 According to NEC, conduit bodies, junction boxes, pull boxes and outlet boxes shall be installed so that they can be rendered _____ without removing any part of the building or, in underground circuits, without excavating sidewalks, paving earth, or other substance that is used to establish finished grade.

- A. visible
- B. accessible
- C. culpable
- D. concealed

CORRECT: B NEC 314.29

Comment: NEC 1996 & 1999 refer to article 370.

404 According to the National Electrical Code, electrical junction boxes shall be installed so that the wiring contained in the boxes can be rendered accessible without removing any part of the building.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 314.29

Comment: NEC 1996 & 1999 refer to article 370.

405 Non-metallic boxes when used with metal conduit require:

- A. internal bonding means
- B. all circuits to be single phase
- C. all conductors to be #8 AWG or smaller
- D. correction because it is not permitted by Code

CORRECT: A NEC 314.3 exception 2

Comment: NEC 1996 & 1999 reference 370-3 exception 2.

NEC Study Guide

406 What is the maximum distance in inches for a type AC cable support location from a metal device box, junction box, cabinet or fitting?

- A. 6
- B. 8
- C. 10
- D. 12

CORRECT: D NEC 320.30 (B)

Comment: NEC 1996 & 1999 reference 333-7; NEC 2002 reference 320.30.

407 What is the maximum rating of the branch circuit of flat cable assemblies?

- A. 20 AMPS
- B. 30 AMPS
- C. 40 AMPS
- D. 50 AMPS

CORRECT: B NEC 322.10 (1)

Comment: NEC 1996 & 1999 reference 363-16.

408 Type FCC cable shall be clearly and durably marked on both sides with all but which of the following?

- A. material of conductors
- B. type of insulation
- C. maximum temperature rating
- D. ampacity

CORRECT: B NEC 322.120 (A)

Comment: NEC 1996 & 1999 reference 328-31.

NEC Study Guide

409 Type FCC cable can be installed under:

- A. vinyl tile only
- B. wall to wall carpet only
- C. desks only
- D. carpet squares

CORRECT: D NEC 324.1

Comment: NEC 1996 & 1999 refer to article 328.

410 According to the National Electrical Code, a flat cable assembly can contain a maximum of ___ current carrying conductors.

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: A NEC 324.100 (A)

Comment: NEC 1996 & 1999 reference 328-30.

411 According to the National Electrical Code, type FCC cable is permitted in:

- A. schools
- B. single family residences
- C. hospitals
- D. none of the above

CORRECT: D NEC 324.12

Comment: NEC 1996 & 1999 reference 328-5.

NEC Study Guide

412 According to the NEC, A protective layer that is installed between the floor and Type FCC flat conductor cable to protect the cable from physical damage must be incorporated as an integral part of the cable.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 324.2 Definitions - Bottom Shield

Comment: NEC 1996 & 1999 refer to article 328.

413 A total of ___ degrees of bends are permitted in a run of EMT.

- A. 360
- B. 180
- C. 320
- D. 240

CORRECT: A NEC 325-12

Comment: NEC 1996 & 1999 reference 325-12.

414 According to the National Electrical Code, in addition to kraft paper tape, additional insulation is provided by:

- A. sulphur hexafluoride gas
- B. sodium hydroxide gas
- C. thermal plastic
- D. asbestos

CORRECT: A NEC 326.112

Comment: NEC 1996 & 1999 reference 325-21.

NEC Study Guide

415 According to the National Electrical Code, the minimum bending radius of 3" IGS cable shall not be less than:

- A. 10 times its diameter
- B. 5 times its diameter
- C. 18"
- D. 35"

CORRECT: D NEC 326.24

Comment: NEC 1996 & 1999 reference 325-11.

416 What is the minimum bending radius for 1" diameter MC cable?

- A. 5"
- B. 7"
- C. 10"
- D. 12"

CORRECT: D NEC 330.24 (A)(2)

Comment: NEC 1996 & 1999 reference 334-11 (a)(2).

417 According to the National Electrical Code, type NM sheathed cable, copper conductors, is approved for use in size AWG #14 through AWG size ____, only.

- A. 2
- B. 4
- C. 6
- D. 8

CORRECT: A NEC 334.104

Comment: NEC 1996 & 1999 reference 336-30 (b).

NEC Study Guide

418 According to NEC, conductors in type NM cable shall be rated at ____ degrees C.

- A. 60
- B. 75
- C. 90
- D. 100

CORRECT: C NEC 334.112

Comment: NEC 1996 & 1999 reference 336-30 (b).

419 Two type NM #12 cables are bundled together for a distance of 25' for ease of installation. What is the ampacity (not maximum fuse size) for each conductor which carries current in this cable bundle?

- A. 20 amps
- B. 24 amps
- C. 12 amps
- D. 25 amps

CORRECT: B NEC 334.112, Table 310.16 & Table 310.15 (B)(2)(a)

Assuming copper conductor, by 336-30 (b) or 334.112 insulation is rated at 90°C; from table 310-/.16 the ampacity is 30 amps; from table 310-15 Notes to Ampacity Tables 8 or table 310-/.15(b/B)(2)(a) the derating factor is 80%.

Comment: NEC 1996 reference 336-30 (b), Table 310-16 & 210-15 Notes to Ampacity Table 8, NEC 1999 reference 336-30 (b), Table 310-16 & Table 310-15 (b)(2)(a).

420 Where NM cable is permitted to be installed exposed, it is required:

- A. the Code does not permit this practice
- B. to follow the surface of the building
- C. to be secured every 2'
- D. to be sleeved

CORRECT: B NEC 334.15 (A)

Comment: NEC 1996 & 1999 reference 336-6 (a)

NEC Study Guide

421 A rigid metal conduit containing NMS cable projects above a concrete floor ending behind an open elevator control cabinet. What is the minimum distance this conduit must extend above the floor?

- A. 6"
- B. 12"
- C. 2"
- D. 18"

CORRECT: A NEC 334.15 (B)

Comment: NEC 1996 & 1999 reference is 336-6 (b).

422 Non-metallic sheathed cable that runs parallel to the joist in an unfinished basement if attached to the bottom edge of the joist is:

- A. prohibited regardless of size
- B. required to be a minimum of #8 AWG and three conductor cable
- C. required to be a minimum of #6 AWG and three conductor cable
- D. is permitted regardless of size

CORRECT: B NEC 334.15 (C)

Comment: NEC 1996 & 1999 reference 336-6 (c).

423 Non-metallic sheathed cable is required to be protected within ___ feet from the edge of an attic scuttle hole access. (Assume the attic access requires a portable ladder.)

- A. 4
- B. 6
- C. 7
- D. 8

CORRECT: B NEC 334.23 & 320.22 (A)

Comment: NEC 1996 & 1999 references are 336-6 (d) and 333-12 (a).

NEC Study Guide

424 According to the NEC, bends in type NM cable shall be made so, and other handling shall be such, that the cable will not be damaged and the radius of the curve of the inner edge of any bend shall not be less than ____ times the diameter of the cable.

- A. 2
- B. 3
- C. 4
- D. 5

CORRECT: D NEC 334.24

Comment: NEC 1996 & 1999 reference 336-16.

425 What is the minimum bend radius of ½" diameter non-metallic sheathed cable?

- A. 1"
- B. 1½"
- C. 2½"
- D. 4"

CORRECT: C NEC 334.24

$5 \times \frac{1}{2}'' = 2\frac{1}{2}''$

Comment: NEC 1996 & 1999 reference 336-16.

426 What is the minimum bend radius in inches allowed by Code in the case of non-metallic sheathed cable given that the cable thickness is ½"?

- A. 1¼"
- B. 1¾"
- C. 2"
- D. 2½"

CORRECT: D NEC 334.24

$5 \times \frac{1}{2}'' = 2\frac{1}{2}''$

Comment: NEC 1996 & 1999 reference 336-16.

NEC Study Guide

427 According to the National Electrical Code, Nm sheathed cable shall be installed so that no bend will have a radius less than ___ times the diameter of the cable.

- A. 2
- B. 3
- C. 4
- D. 5

CORRECT: D NEC 334.24

Comment: NEC 1996 & 1999 reference 336-16.

428 According to the NEC, in an onsite constructed dwelling, non-metallic sheathed cable shall be secured at intervals of no more than ___ feet.

- A. 3
- B. 3½
- C. 4
- D. 4½

CORRECT: D NEC 334.30

Comment: NEC 1996 & 1999 reference 336-18.

429 What is the maximum distance, in inches, that a support for non-metallic sheathed cable is permitted by code to be located from the non-metallic device box 2 1/4" by 4" with a clamp securing the cable to the box? (336-18)

- A. 6"
- B. 8"
- C. 12"
- D. 36"

CORRECT: C NEC 334.30

Comment: NEC 1996 & 1999 reference 336-18.

NEC Study Guide

430 According to the National Electrical Code, the highest rated fuse to protect a #8 AWG copper, non-metallic sheathed cable, insulated with THHN (90 degree C), in general shall not be less than ___ amp.

- A. 35
- B. 40
- C. 45
- D. 50

CORRECT: B NEC 334.80 & Table 310.16

Comment: NEC 1996 reference 336-30 (b) & Table 310-16; NEC 1999 reference 336-26 & Table 310-16.

431 The smallest TC copper cable permitted is # ___.

- A. 14
- B. 12
- C. 3
- D. 18

CORRECT: D NEC 336.104

Comment: NEC 1996 & 1999 reference 340-3.

432 Which of the following is a characteristic of type TC cable?

- A. has either insulated or bare stranded grounding conductor
- B. has two or more insulated conductors
- C. always has solid grounding conductor
- D. has three or more insulated conductors

CORRECT: B NEC 336.2

Comment: NEC 1996 & 1999 reference 340-1.

NEC Study Guide

433 IMC cable shall be permitted to be fastened a distance of ___ feet from a junction box where structural members do not readily permit fastening of the conduit.

- A. 1
- B. 3
- C. 5
- D. 6

CORRECT: C NEC 342.30 (A)

Comment: NEC 1996 & 1999 reference 345-12.

434 What is the maximum distance in feet that intermediate metal conduit shall be securely fastened from a device box when a structural member is readily available to permit fastening?

- A. 1'
- B. 2'
- C. 3'
- D. 4.5'

CORRECT: C NEC 342.30 (A)

Comment: NEC 1996 reference 345-12; NEC 1999 reference 345-12 (a).

435 The maximum trade size permitted for rigid metal conduit is ___ inches.

- A. 4
- B. 6
- C. 5
- D. 8

CORRECT: B NEC 344.20 (B)

Comment: NEC 1996 & 1999 reference 346-6 (b).

NEC Study Guide

436 According to the NEC, runs of 1 1/4 rigid metal conduit must be secured at no more than ____ foot intervals.

- A. 12
- B. 13
- C. 14
- D. 15

CORRECT: C NEC 344.30 (B)(2) Table

Comment: NEC 1996 reference Table 346-12; NEC 1999 reference Table 346-12 (b)(2).

437 According to the NEC, Type AC cable shall be permitted to be unsupported where the cable is fished between access points, where concealed in finished buildings or structures and supporting is impracticable.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 344.30 (D)(1) Table

Comment: NEC 1996 reference 333-7 exception 1; NEC 1999 reference 333-7 (b)(1); NEC 2002 reference 320.30 (B)(1).

438 According to the NEC, the load on an over current protective device located in a panel board, which operates 4 hours continuous, the maximum load permitted is ____ % of the over current device rating.

- A. 75
- B. 80
- C. 85
- D. 90

CORRECT: B NEC 346-16 (D)

Comment: No such requirement in NEC 2002 & 2005.

NEC Study Guide

439 What hazardous location does the Code permit flexible metal conduit for motor connections.

- I - Class I, Division 2.
- II - class II, Division 1.

- A. I only
- B. II only
- C. both I and II
- D. neither I or II

CORRECT: D NEC 348.12 (4) & 501.10 (B)(2)

Comment: NEC 1996 & 1999 reference 350-5 (4) & 501-4 (b); NEC 2002 reference 348.12 (4) & 501.4 (b)(2).

440 According to the NEC, _____ is a raceway of circular cross-section made of helically wound, formed, interlocked metal strip.

- A. flexible metal conduit
- B. metal clad cable (MC)
- C. flexible nonmetallic conduit
- D. flexible metal tubing

CORRECT: A NEC 348.2

Comment: NEC 1996 & 1999 refer to article 350.

441 A 3/8" flexible metal conduit fixture whip with external connections contains a pair of size 14 AWG grounding connector. How many size 14 AWG type THHN conductors may be added.

- A. 1
- B. 4
- C. 2
- D. 0

CORRECT: C NEC 348.22 Table

Comment: NEC 1996 & 1999 reference is Table 350-12.

NEC Study Guide

442 According to table 348.22 of the NEC, the maximum number of 14 THHN conductors allowed in 3/8" flexible metal conduit, "fittings inside the conduit", is:

- A. 3
- B. 4
- C. 5
- D. 6

CORRECT: A NEC 348.22 Table

Do not include grounding conductors.
Comment: NEC 1996 & 1999 reference Table 350-12.

443 According to Table 350-12 of the NEC, a 3/8" flexible metal conduit with external connections which contains two 16 AWG grounding conductors may have 5 additional 16 AWG type THHN conductors.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 348.22 Table

The two grounding conductors are considered by code to be "ONE" conductor. Therefore $6 - 1 = 5$.
Comment: NEC 1996 & 1999 reference Table 350-12

444 What is the maximum number of _____ #12 AWG THHN conductors permitted in a 3/8" flexible metal conduit with fittings outside the conduit?

- A. 3
- B. 4
- C. 5
- D. 6

CORRECT: A NEC 348.22 Table

Comment: NEC 1996 & 1999 reference 350-12 Table.

NEC Study Guide

445 According to the NEC, liquid tight flexible metal conduit shall be securely fastened in place by an approved means within ___ inches of each box, cabinet conduit body, or other conduit terminations.

- A. 10
- B. 11
- C. 12
- D. 13

CORRECT: C NEC 350.30 (A)

Comment: NEC 1996 & 1999 reference 351-8.

446 In an underground rigid non-metallic conduit system that consists of a 10 foot length between pulling points, what is the maximum number of bends that this run may have?

- A. a total of 1500 degrees
- B. forty 90 degree
- C. four 90 degree
- D. a total of 3600 degrees

CORRECT: C NEC 352.26

Comment: NEC 1996 & 1999 reference 347-14.

447 What is the maximum spacing permitted between supports to support 3/4" rigid non-metallic conduit? (347-8)

- A. 3.0'
- B. 10.0'
- C. 12.0'
- D. 21.5'

CORRECT: A NEC 352.30 (B) Table

Comment: NEC 1996 & 1999 reference Table 347-8.

NEC Study Guide

448 Given: A 200' run of PVC conduit is subject to a temperature drop of 50 degrees F. This length of conduit will shrink ____ inches.

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

CORRECT: D NEC 352.44 (A) Table

Comment: NEC 1996 reference 347-9 & Table 10 pg. 70-890; NEC 1999 reference Table 347-9 (a).

449 The NEC covers the use and installation requirements for liquid tight flexible non-metallic conduit to what maximum length?

- A. 5'
- B. 6'
- C. 8'
- D. 10'

CORRECT: B NEC 356.12 (3)

Comment: NEC 1996 & 1999 reference 351-23 (b)(3).

450 Electrical metallic tubing is required by Code to be:
I - with concrete-type couplings if conduit is embedded masonry,
II - supported every 10'.

- A. I only
- B. II only
- C. both I & II
- D. neither I or II

CORRECT: C NEC 358.10 (C) & 358.30 (A)

Comment: NEC 1996 reference 348-1 & 348-12, NEC 1999 reference 348-4 (b) & 348-13.

NEC Study Guide

451 Dissimilar metals should be avoided wherever possible to avoid galvanic action. The Code does not, however, permit: I - brass fittings with steel conduit, II - steel fittings with brass conduit.

- A. I only
- B. II only
- C. both I & II
- D. neither I or II

CORRECT: D NEC 358.12 (6) [EMT], 342.14 [IMC], 344.14 [RMC]

Comment: NEC 1996 & 1999 reference 348-1 [EMT], 345-3 (a) [IMC], 346-3 (b) [NEC 96 - RMC] or 346-3 (a) [NEC 99 - RMC].

452 According to the NEC,

- I. The Minimum EMT is 1/2"
- II. The maximum size EMT is 4"

- A. I only
- B. II only
- C. both I and II
- D. neither I nor II

CORRECT: C NEC 358.20

Comment: NEC 1996 reference 348-5, NEC 1999 reference 348-7.

453 According to the National Electric Code, the largest size EMT permitted is ____ inches.

- A. 4
- B. 6
- C. 5
- D. 8

CORRECT: A NEC 358.20 (B)

Comment: NEC 1996 reference 348-5 (b), NEC 1999 reference 348-7 (b).

NEC Study Guide

454 A run of EMT conduit may have a maximum of ___ 90 degree bends between pull points.

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

CORRECT: D NEC 358.26

Comment: NEC 1996 reference 348-10, NEC 1999 reference 348-12

455 Shorts Electrical Inspections, Inc. has installed ½" EMT without couplings between two junction boxes, containing 2 - 90° bends, 1 - 3 point saddle consisting of one 45° bend and two 22½° bends, and at one end of the run, an offset consisting of 2 - 30° bends. Statement ___ is correct.

- A. this is permitted by the NEC because the total bends do not exceed the equivalent of 4 - 90° bends
- B. this is permitted by the NEC because saddle bends do not count toward total degrees of bend
- C. this is permitted by the NEC because offsets are not counted in total number of bends
- D. this is permitted by the NEC because the total bends exceed the equivalent of 4 - 90° bends

CORRECT: A NEC 358.26

Comment: NEC 1996 reference 348-10, NEC 1999 reference 248-12.

456 What is the minimum number threads permitted by Code for threading electrical metallic tubing in the field for a coupling? (348-7)

- A. threads are prohibited
- B. depends on the diameter
- C. 3
- D. 5

CORRECT: A NEC 358.28 (B)

Comment: NEC 1996 reference 348-7, NEC 1999 referenc 348-9.

NEC Study Guide

457 According to the NEC, EMT shall be fastened at least every 10' ,and, each tube shall be fastened within ___ feet of each outlet box, junction box, device box, cabinet, conduit body or other tubing terminations.

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

CORRECT: C NEC 358.30 (A)

Comment: NEC 1996 reference 348-12, NEC 1999 reference 348-13.

458 Where practical, dissimilar metals in contact anywhere in the system shall be avoided to eliminate the possibility of ___.

- A. hysteresis
- B. galvanic action
- C. inductive action
- D. coefficient effect

CORRECT: B NEC 358-12 (6)

Comment: NEC 1996 reference 348-1, NEC 1999 reference 348-5 (5).

459 ENT is not permitted to be used for ___.

- A. direct burial
- B. in cinder fill
- C. wet locations
- D. in ceilings

CORRECT: A NEC 362.12 (5)

Comment: NEC 1996 & 1999 reference 331-4 (5).

NEC Study Guide

- 460** Which of the following wiring methods are approved for direct burial? I - electrical non-metallic tubing, II - rigid non-metallic conduit.
- A. I only
 - B. II only
 - C. both I & II
 - D. neither I or II

CORRECT: B NEC 362.12 (5) & 352.10 (G)

Comment: NEC 1996 & 1999 reference 331-4 (5) & 347-2 (g).

- 461** An auxiliary gutter contains the following 25 THW insulated conductors:
- 1. 8 # 1 AWG
 - 2. 7 # 2 AWG
 - 3. 4 #3 AWG
 - 4. 6 #6 AWG

According to the NEC, the minimum size gutter to properly house these conductors shall be no less than

_____.

- A. 5" x 5"
- B. 6" x 6"
- C. 7" x 7"
- D. 8" x 8"

CORRECT: B NEC 366.22 & Table 5 pg. 70-631

Calculate the area of the 25 conductors from table 5 Page 564. This should equal 3.34 square inches. This is the amount of fill for the auxiliary gutter. Divide this by 20% to find the minimum area allowed, which is 16.7 square inches.

Comment: NEC 1996 reference 374-5 (a) & Table 5 pg. 70-884, NEC 1999 reference 374-5 (a)(1) & Table 5 pg. 70-564, NEC 2002 reference 366.6 (a) & Table 5 pg. 70-622.

NEC Study Guide

462 The cross sectional area in square inches permitted to be filled with splices and taps in an auxiliary gutter that has a total cross sectional area of 16 square inches is:
(374-5 (a))

- A. 3.2
- B. 6.4
- C. 8.
- D. 12

CORRECT: A NEC 366.22 (A)

Comment: NEC 1996 reference 374-5 (a), NEC 1999 reference 374-5 (a)(3), NEC 2002 reference 366.6 (A).

463 Wireways shall not contain more than ___ current-carrying conductors at any cross section.

- A. 20
- B. 30
- C. 40
- D. 35

CORRECT: B NEC 366.22 (A)

Comment: NEC 1996 reference 374-5 (a), NEC 1999 reference 374-5 (a)(1), NEC 2002 reference 366.6 (A).

464 According to the National Electrical Code, metal gutters shall be supported through their entire length at intervals not exceeding ___ feet.

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: B NEC 366.30 (A)

Comment: NEC 1996 & 1999 reference 374-3 (a), NEC 2002 reference 366.4 (A).

NEC Study Guide

465 Derating the ampacity based on the number of conductors in an auxiliary gutter is required when the conductors are more than:

- A. 208 volt
- B. #12 AWG
- C. 40% fill area
- D. 30 total conductors

CORRECT: D NEC 366.6

Comment: NEC 1996 reference 374-5 (a), NEC 1999 reference 374-5 (a)(1), NEC 2002 reference 366.6 (A).

466 The minimum size conductor permitted to be installed in cablebus is ____.

- A. #3
- B. #1/0
- C. 250 kcmil
- D. #4/0

CORRECT: B NEC 370.4 (C)

Comment: NEC 1996 & 1999 reference 365-3 (c).

467 When the cells of cellular concrete floors are used as raceways, connections to cabinets and other enclosures shall be made by means of ____ raceways and approved fittings.

- A. metal
- B. rigid non-metallic conduit
- C. non-metallic conduit tubing
- D. schedule 80 PVC

CORRECT: A NEC 372.6

Comment: NEC 1996 & 1999 reference 358-6.

NEC Study Guide

468 The largest conductor permitted to be installed in a hollow space of a cellular metal floor is # ____.

- A. 1/0
- B. 6
- C. 8
- D. 10

CORRECT: A NEC 374.4

Comment: NEC 1996 & 1999 reference 356-4.

469 According to the National Electrical Code, wireways shall be permitted only for:

- A. exposed locations
- B. industrial and commercial work
- C. meter can extensions
- D. indoor locations

CORRECT: A NEC 376.10 (1)

Comment: NEC 1996 reference 362-2, NEC 1999 reference 362-2 (1).

470 Not counting exceptions, according to the NEC, the maximum number of current carrying conductors permitted at any cross section of a metal wire way shall be no more than:

- A. 15
- B. 30
- C. 45
- D. 60

CORRECT: B NEC 376.22

Comment: NEC 1996 & 1999 reference 362-5.

NEC Study Guide

471 According to the NEC and disregarding exception, the sum of the cross sectional areas of all contained conductors at any cross-section of a metallic or nonmetallic wireway shall not exceed ___ % of the interior cross-section of the wireway.

- A. 20
- B. 30
- C. 40
- D. 60

CORRECT: A NEC 376.22 and 378.22

Comment: NEC 1996 & 1999 reference 362-5 & 362-19.

472 Conductors, splices, and taps shall not fill a wireway to more than ___ % of its area at that point.

- A. 25
- B. 80
- C. 125
- D. 75

CORRECT: D NEC 376.56 (A) & 378.56

Comment: NEC 1996 & 1999 reference 362-7 & 362-21, NEC 2002 reference 376.56 & 378.56.

473 Electrical non-metallic tubing must be supported horizontally every:

- A. 12"
- B. 24"
- C. 36"
- D. 60"

CORRECT: C NEC 378.30 (A)

Comment: NEC 1996 & 1999 reference 362-22 (a).

NEC Study Guide

474 According to the National Electrical Code, multioutlet assemblies must comply with article ____.

- A. 210
- B. 300
- C. 310
- D. 425

CORRECT: B NEC 380

Comment: NEC 1996 & 1999 reference 353.

475 Splices and taps in surface metal raceways without removable covers, shall be made only in:

- A. raceways
- B. junction boxes
- C. exposed areas
- D. concealed areas

CORRECT: C NEC 386.56

Comment: NEC 1996 & 1999 reference 352-7.

476 According to the NEC, splices within metal surface raceways which do not have removable covers are allowed in junction boxes.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 386.56

Comment: NEC 1996 & 1999 reference is 352-7.

NEC Study Guide

477 According to NEC, flat top raceways over 4" wide but not over 8" wide with a minimum of 1" spacing between raceways shall have a concrete cover of not less than:

- A. 1½"
- B. 1¼"
- C. 1"
- D. ¾"

CORRECT: C NEC 390.3 (B)

Comment: NEC 1996 & 1999 reference 354-3 (b).

478 According to the NEC, splices and taps are permitted in trench-type flush raceways when the raceway has removable covers.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 390.6 exception

Comment: NEC 1996 & 1999 reference is 354-6 exception.

479 What is the minimum ventilated cable inside tray width required for the following combination of conductors.
20 - 1000 KCMIL-XHHW-compact aluminum, 30 - 250 KCMIL-XHHW-compact aluminum.

- A. 18"
- B. 24"
- C. 30"
- D. 36"

CORRECT: C NEC 392.10 (A)(2) & Table 5A pg. 70-634

Area of 1000 KCMIL is 1.1882 in.², area of 250 KCMIL is 0.3421 in.², 20 x 1.1882 in.² + 20 x 0.3421 in.² = 23.764 in.² + 10.263 in.² = 34.027 in.² thus a 36" tray is required.

Comment: NEC 1996 & 1999 reference 318-10 (a)(2) & Table 5A pg. 70-887 [NEC 96] or pg. 70-566 [NEC 99], NEC 2002 reference 392.10 (A)(2) & Table 5A pg. 70-624.

NEC Study Guide

480 According to the NEC, the smallest current-carrying conductor size in a cable tray is:

- A. 1/0 AWG
- B. 2/0 AWG
- C. 3/0 AWG
- D. 4/0 AWG

CORRECT: B NEC 392.3 (B)(1)(a)

Insulation type does not matter.
Comment: NEC 1996 reference 318-3 (b)(1), NEC 1999 reference 318-3 (b)(1)(a).

481 What is the maximum rung space permitted in ladder-type cable tray when the conductors are single conductor cable 3/0 AWG in size? (318-3 (b) 1)

- A. 6"
- B. 9"
- C. 12"
- D. 15"

CORRECT: B NEC 392.3 (B)(1)(a)

Comment: NEC 1996 & 1999 refer to article 370; for NEC 1996, 318-3 (b)(1); for NEC 1999, 318-3 (b)(1)(a).

482 According to the National Electrical Code, Cable trays shall not be used:

- A. in hazardous locations
- B. hoistways
- C. to support feeders
- D. in wet locations

CORRECT: B NEC 392.4

Comment: NEC 1996 & 1999 reference is 318-4.

NEC Study Guide

483 What wiring method is permitted to be exposed on the fifth floor of an office building for branch circuits?

- A. non-metallic sheathed cable
- B. electrical non-metallic tubing
- C. cable tray
- D. rigid non-metallic conduit

CORRECT: C NEC 392.6 (H)

Comment: NEC 1996 & 1999 reference 318-6 (h).

484 A steel cable tray shall not be used as equipment grounding for circuits protected at over ___ amps.

- A. 60
- B. 200
- C. 600
- D. 1200

CORRECT: C NEC 392.7 (B) Table

Comment: NEC 1996 & 1999 reference 318-7 (b)(2) Table.

485 Single conductors are to be run in parallel in cable trays. They shall be securely bound in the circuit groups to prevent:

- A. excessive electrical currents due to faulty current magnetic forces
- B. excessive movement due to faulty current magnetic forces
- C. physical damage due to faulty current magnetic forces
- D. voltage drop due to faulty current magnetic forces

CORRECT: B NEC 392.8 (D)

Comment: NEC 1996 & 1999 reference is 318-8 (d).

NEC Study Guide

486 A cable tray contains the following conductors: 3-755 MCM & 11-500 MCM copper THW conductors. What size of ladder cable tray is required?

- A. 8"
- B. 16"
- C. 24"
- D. 36"

CORRECT: C NEC 392.9 (A)(1) & Table 5
(NEC 2005 pg. 70-622; NEC 2002
pg. 70-631)

Comment: NEC 1996 & 1999 refer to article 318; 318-9 (a)(1) & Table 5 (NEC 1996 pg. 70-884; NEC 1999 pg. 70-564).

487 Consealed knob and tube wiring shall be used only for:

- A. houses and out buildings
- B. well houses
- C. extensions of existing installations
- D. accessible locations

CORRECT: C NEC 394.10 (1)

Comment: NEC 1996 & 1999 reference is 324-3 (1).

488 Where it is impracticable to provide supports, conductors shall be permitted to be fished through hollow spaces in dry locations, provided each conductor is individually enclosed in flexible nonmetallic tubing that is in ___ lengths between supports, between boxes, or between a support and a box.

- A. 1'
- B. 12'
- C. 20'
- D. continuous

CORRECT: D NEC 394.30 (A)

Comment: NEC 1996 reference 324-6 exception, NEC 1999 reference 324-6.

NEC Study Guide

489 A support wire to remove strain on aerial runs using rings and saddles is known as:

- A. a support wire
- B. a messenger wire
- C. a guy wire
- D. a slave wire

CORRECT: B NEC 396.2

Comment: NEC 1996 & 1999 reference 321-1.

490 Open wiring on insulators is allowed in which of the following applications?

- A. residential
- B. office computer room
- C. auto mobile service center
- D. industrial/agricultural

CORRECT: D NEC 398.10

Comment: NEC 1996 & 1999 reference 320-3.

491 According to the NEC, which of the following types of electrical cords, if marked water-resistant, may be submerged in water?

- A. SOOW
- B. SFT
- C. SPT-3
- D. SVT

CORRECT: A NEC 400.4 Table & Note 13

Comment: Type SOOW is not referred to prior to NEC 2002.

NEC Study Guide

492 Portable cables over 600 volts shall not be:

- A. stranded
- B. solid
- C. flexible
- D. over #8 AWG

CORRECT: B NEC 400.31 (A)

Comment: NEC 1996 & 1999 reference 400-31 (a).

493 Type TPT is attached directly to the portable appliance rated at 50 watts or less. Extreme flexibility of the cord is essential. What is the maximum length?

- A. 8'
- B. 10'
- C. 100'
- D. 120'

CORRECT: A NEC 400.4 Note 2

Comment: NEC 1996 & 1999 reference 400-4 Note 2.

494 Type TPT is attached directly to the portable appliance rated at 50 watts or less. Extreme flexibility of the cord is essential. What is the maximum length?

- A. 8'
- B. 10'
- C. 100'
- D. 120'

CORRECT: A NEC 400.4 Table Note 2

NEC Study Guide

495 A #12-4 type SO cord is used to supply a portable 120/240 volt, single-phase, incandescent lighting load. One conductor is the grounded conductor. One conductor carries only the unbalanced circuit current. What is the ampacity of the ungrounded conductor?

- A. 25 amps
- B. 18 amps
- C. 20 amps
- D. 15 amps

CORRECT: A NEC 400.5 (A) Table

Comment: NEC 1996 & 1999 reference Table 400-5 (A).

496 What is the maximum ampacity for an SJO flexible cord with two current carrying #12 AWG copper conductors? Assume standard conditions

- A. 15
- B. 20
- C. 25
- D. 30

CORRECT: C NEC 400.5 (A) Table

Comment: NEC 1996 & 1999 reference Table 400-5 (A).

497 If an appliance is identified for a flexible cord connection, each flexible cord shall be:

- A. hard wired
- B. equipped with an attachment plug
- C. on its own branch circuit
- D. overload protected

CORRECT: B NEC 400.7 (A)(8) & (B)

Comment: NEC 1996 & 1999 reference 400-7 (a)(8) & (b).

NEC Study Guide

498 According to the NEC, flexible cords may not be used:

- A. as a substitute for the fixed wiring of a structure
- B. when running thru holes and walls
- C. where attached to building surfaces
- D. all of these

CORRECT: D NEC 400.8

Comment: NEC 1996 & 1999 reference 400-8.

499 According to the NEC, all switches and circuit breakers used as switches shall be located so that they may be operated from a readily accessible place. They shall be installed so that the center of the grip handle of the switch or circuit breaker, when in its highest position, will not be more than ___ feet above the floor.

- A. 6' - 7"
- B. 6' - 6"
- C. 6' - 5"
- D. 6' - 4"

CORRECT: A NEC 400.8 (A)

Comment: NEC 1996 & 1999 reference 380-8 (a).

500 Three way switches require that all switching be done:

- A. in the grounded conductors
- B. in the ungrounded conductors
- C. both in the grounded and ungrounded conductors
- D. either in the grounded or ungrounded conductors

CORRECT: B NEC 402.2 (A)

Comment: NEC 1996 & 1999 reference Table 380-2 (a).

NEC Study Guide

501 An AC/DC general use snap-switch may control an inductive load such as a garbage grinder as long as the maximum percent of the switch amp rating does not exceed ___ percent.

- A. 50
- B. 40
- C. 30
- D. 20

CORRECT: A NEC 404.14 (B)(2)

Comment: NEC 1996 & 1999 reference 380-14 (b)(2).

502 Snap switches rated 20 amperes or less directly connected to aluminum connectors shall be listed and marked:

- A. CO/ALU
- B. CU/ALR
- C. CO/ALR
- D. CU/ALU

CORRECT: C NEC 404.14 (C)

Comment: NEC 1996 & 1999 reference 404-14 (c).

503 According to the NEC, the following type of switch is to be marked with amps and volts:

- A. Isolation switches only
- B. snap switches and Isolation switches
- C. knife switches, snap switches, Isolation switches
- D. none of the above

CORRECT: C NEC 404.15 (A)

Comment: NEC 1996 & 1999 reference 380-15.

NEC Study Guide

504 According to NEC, the highest point of the operating handle of a switch gear or circuit breaker shall be no higher than:

- A. 6'-6"
- B. 6'-7"
- C. 6'-8"
- D. 6'-9"

CORRECT: B NEC 404.8 (A)

Comment: NEC 1996 & 1999 reference is 380-8 (a).

505 Receptacles installed for the attachment of portable cords shall be ____.

- A. rated at not less than 15 amps, 125 volts
- B. rated at not less than 20 amps, 250 volts
- C. rated at not less than 30 amps, 150 volts
- D. a type suitable for use as a lamp holder

CORRECT: A NEC 406.2 (B)

Comment: NEC 1996 & 1999 reference 410-56 (a).

506 An ungrounded receptacle outlet is to be placed by a ground fault circuit interrupter receptacle. There is no provision for grounding within the receptacle box. Which of the following is not an option when this receptacle is being placed?

- A. not installing an equipment grounding conductor
- B. connecting a grounding conductor to the nearest cold water pipe 25' from the pipe's entrance to the building
- C. running a grounding conductor to within 5' of the cold water pipe where it enters the building
- D. bringing a grounding conductor from a nearby grounded receptacle outlet

CORRECT: D NEC 406.3 (D)

Comment: NEC 1996 & 1999 reference is 210-7 (d).

NEC Study Guide

507 According to the NEC, replacement of receptacles where a grounding means does not exist, shall comply with:

- A.** a non-grounding type receptacle shall be permitted to be replaced with another non-grounding type receptacle
- B.** a non-grounding type receptacle shall be permitted to be replaced with a ground-fault circuit interrupter type of receptacle
- C.** a non-grounded type receptacle shall be permitted to be replaced with a grounding type receptacle where supplied through a ground-fault circuit interrupter.
- D.** All of the above

CORRECT: D NEC 406.3 (D)(3)

Comment: NEC 1996 & 1999 reference is 210-7 (d)(3).

508 Receptacles installed in wet locations shall be ____.

- A.** have an enclosure that is weatherproof
- B.** protected with a GFCI
- C.** labeled as water resistant
- D.** listed for a wet location

CORRECT: A NEC 406.8 (B)

Comment: NEC 1996 & 1999 reference is 410-57.

509 A space of ____ ft or more shall be provided between the top of any switch board and any combustible ceiling.

- A.** 3
- B.** 6
- C.** 4
- D.** 2

CORRECT: A NEC 408.18 (A)

Comment: NEC 1996 & 1999 reference 384-8 (a), NEC 2002 reference 408.8 (A).

NEC Study Guide

510 A lighting and appliance panel board contains 6 three-pole circuit breakers and eight two-pole breakers. The maximum allowable number of single pole breakers permitted to be added to this panel is ____.

- A. 6
- B. 7
- C. 8
- D. 9

CORRECT: C NEC 408.35

Not more than 42 overcurrent devices are allowed on one panelboard, thus $42 - [(6 \times 3) + (8 \times 2)] = 42 - [18 + 16] = 42 - 34 = 8$.

Comment: NEC 1996 & 1999 reference 384-15, NEC 2002 reference 408.15.

511 What is the minimum number of lighting panel boards required to install 100 individual 2-pole circuit breakers for lighting and appliances?

- A. 3
- B. 6
- C. 7
- D. 8

CORRECT: A NEC 408.35

A maximum of 42 overcurrent devices are permitted in a single panelboard, thus $100 \div 42 = 2.38 \Rightarrow 3$ panelboards.

Comment: NEC 1996 & 1999 reference 384-15, NEC 2002 reference 408.15.

512 Which of the following statements is true, regarding the secondary circuit supply lighting systems operating at 30 volts or less?

- A. the circuit must not be grounded
- B. the circuit must be grounded
- C. the circuit may be supplied by an auto transformer
- D. just a bare circuit conductor may be grounded

CORRECT: A NEC 41.5 (A)

Comment: NEC 1996 & 1999 reference 411-5 (a).

NEC Study Guide

513 Fixtures shall be wired with conductors having insulation suitable for:

- A. the ampacity to which the conductors will be subjected
- B. the resistance to which the conductors will be subjected
- C. the current to which the conductors will be subjected
- D. the raceway to which the conductors will be subjected

CORRECT: A NEC 410.24

Comment: NEC 1996 reference 410-24 (a), NEC 1999 reference 410-24.

514 Fluorescent lighting fixtures may be used as raceways if _____.

- A. they are connected by a conduit wiring method
- B. fixture is designed for end-to-end assembly
- C. they are wired so that conductors are not closer than 3" from the ballast
- D. none of these

CORRECT: D NEC 410.31

Comment: NEC 1996 & 1999 reference 410-31.

515 According to the NEC, branch circuit conductors within 3" of a ballast within the ballast compartment shall have an insulation rating of not lower than 90°C and shall be of type RHH, THW, THHW, FEP, FEPB, SA, XHHW or:

- A. THHN
- B. RHP
- C. THNN
- D. DWI

CORRECT: A NEC 410.33

Comment: NEC 1996 & 1999 reference 410-31.

NEC Study Guide

516 Branch circuit conductors within 3" of a ballast within the ballast compartment of a fixture must be rated for use at temperatures not lower than:

- A. 70° Centigrade
- B. 90° Centigrade
- C. 85° Centigrade
- D. 65° Centigrade

CORRECT: B NEC 410.33

Comment: NEC 1996 & 1999 reference 410-31.

517 Branch circuit wires are 2" from the ballast within the ballast compartment of a fluorescent lighting fixture. Which type of conductors may be used?

- A. THW or THHN
- B. RH or RHW
- C. CHF or THWN
- D. T or TW

CORRECT: A NEC 410.33 & Table 310-13

Comment: NEC 1996 & 1999 reference 410-31.

518 Auxiliary equipment for electric discharge lamps shall:

- A. be at least 3" away from any combustible material
- B. be over 1500 watts
- C. be treated as sources of heat
- D. be mounted with a 2" air gap from all other materials

CORRECT: C NEC 410.54 (A)

Comment: NEC 1996 & 1999 reference 410-54 (a).

NEC Study Guide

519 Auxiliary equipment for electric discharge lamps shall:

- A. be at least 3" away from any combustible material
- B. be over 1500 watts
- C. be treated as sources of heat
- D. be mounted with a 2" air gap from all other materials

CORRECT: C NEC 410.54 (A)

520 Fixtures shall be so constructed or installed that adjacent combustible material is not subjected to temperatures in excess of ___ degrees C.

- A. 75
- B. 90
- C. 185
- D. 140

CORRECT: B NEC 410.65 (A)

Comment: NEC 1996 & 1999 reference 410-65 (a).

521 What type of protection is provided to protect from the overheating of recessed incandescent fixtures?

- A. GFI circuit protection
- B. screw shell will only accept one wattage lamp size
- C. fixtures are required to be fire protected
- D. thermal protection

CORRECT: D NEC 410.65 (C)

Comment: NEC 1996 & 1999 reference 410-65 (c).

NEC Study Guide

522 Disregarding any exceptions, what thermal protection is required where recessed high intensity discharge fixtures are installed indoors and operated by remote ballasts?

- A. the ballast requires thermal protection
- B. only the fixture requires thermal protection
- C. both fixture and ballast require thermal protection
- D. thermal protection is not required

CORRECT: C NEC 410.73 (E)(1)

Comment: NEC 1996 reference 410-73 (e), 1999 reference 410-73 (e)(1).

523 What is the minimum horizontal clearance required in inches for a surface mounted incandescent lighting fixture with a completely enclosed lamp that is installed on the ceiling of clothes closet?

- A. 6
- B. 12
- C. horizontal clearance depends on the vertical clearance
- D. no clearance is required

CORRECT: B NEC 410.8 (D)(1)

Comment: NEC 1996 & 1999 reference 410-8 (d)(1).

524 The maximum current allowed for the secondary circuit supplying a lighting system operating at 30 volts is ___ amps.

- A. 23
- B. 24
- C. 25
- D. 26

CORRECT: C NEC 411.2

Comment: NEC 1996 & 1999 reference 411-2.

NEC Study Guide

525 According to the NEC, secondary circuits of lighting systems operating at 30 volts or less shall be grounded at the panel box.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 411.5 (A)

Comment: NEC 1996 & 1999 reference 411-5 (a).

526 According to the NEC, ___ may be added to an individual 120 volt central heating branch circuit.

- A. furnace pumps
- B. humidifier
- C. electrostatic air cleaner
- D. all of the above

CORRECT: D NEC 422.12 exception

Comment: NEC 1996 reference 422-7 exception, 1999 reference 422-12 exception.

527 All fixed storage type water heaters having a capacity of 120 gallons or less shall have a ___ of not less than 125% of the name plate rating.

- A. branch circuit rating
- B. feeder demand of
- C. service demand of
- D. motor rating

CORRECT: A NEC 422.13

Comment: NEC 1996 reference 422-14 (b), NEC 1999 reference 422-13.

NEC Study Guide

528 Each section panel or strip carrying a number of infrared lamp holders, shall be considered:

- A. an individual outlet
- B. an appliance
- C. a separate connector
- D. a light fixture

CORRECT: B NEC 422.14

Comment: NEC 1996 reference 422-15 (c), NEC 1999 reference 422-14.

529 According to the NEC, the maximum length of a cord on a cord and plug connected to a waste disposal in a dwelling is ____ inches.

- A. 36
- B. 37
- C. 38
- D. 39

CORRECT: A NEC 422.16 (B)(1)(2)

Comment: NEC 1996 reference 422-8 (d)(1)(a), NEC 1999 reference 410-31 (b)(1)(b).

530 According to the NEC, for permanently connected appliances rated at not more than 300 volt-amperes or ____ horse power, the branch circuit overcurrent device shall be permitted to serve as the disconnecting means.

- A. 1/2
- B. 1/8
- C. 1/16
- D. 1/32

CORRECT: B NEC 422.31 (A)

Comment: NEC 1996 & 1999 reference 422-31 (a).

NEC Study Guide

- 531** The overcurrent protection device that is neither lockable nor within sight of an appliance may serve as the disconnect for a non-motor appliance provided the appliance:
- A. volt-amp load is limited
 - B. appliance is grounded
 - C. appliance is GFCI protected
 - D. overcurrent device is within one story of the appliance

CORRECT: A NEC 422.31 (A)

Comment: NEC 1996 & 1999 reference 422-31 (a).

- 532** According to the National Electrical Code, the branch circuit over current protection device for a motor driven permanently connected appliance, may serve as the disconnecting means if the motor is rated at not more than ___ HP

- A. 1/8
- B. 1/6
- C. 1/4
- D. 1/3

CORRECT: A NEC 422.32

Comment: NEC 1996 reference 422-21 (a), NEC 1999 reference 422-31 (a).

- 533** A unit switch with a marked "off" position that is part of an appliance and disconnect all ungrounded conductors shall be permitted as the disconnecting means where other means for disconnection are provided. In a two-family dwelling, the other disconnecting means shall be permitted both inside or outside the dwelling unit where the appliance is installed.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 422.34 (B)

Comment: NEC 1996 reference 422-25 (b), NEC 1999 reference 422-33 (b).

NEC Study Guide

534 Screw-shell lamp holders shall not be used with heating lamps having a rating over ___ watts unless identified as suitable for such wattage.

- A. 200
- B. 300
- C. 400
- D. 500

CORRECT: B NEC 422.48 (B)

Comment: NEC 1996 reference 422-15 (b), NEC 1999 reference 422-48 (b).

535 According to the Standard Specifications for Highway and Bridge Construction, permanent pavement marking machines shall be equipped with three colors of paint.

- A. 18
- B. 36
- C. 48
- D. 72

CORRECT: B NEC 422-8

536 What is the minimum branch circuit rating permitted for a branch circuit that serves an 8 AMP fastened-in-place space heating load and receptacles and serves a 200 square foot living room?

- A. 15 AMP
- B. 20 AMP
- C. 25 AMP
- D. depends on if the heating load is continuous or noncontinuous

CORRECT: A NEC 424.3 (B) & 210.19 (A)(1)

$8 \times 125\% = 10 \Rightarrow 15$ amps.

Comment: NEC 1996 & 1999 reference 424-3 (b), NEC 2002 reference 424.3 (B).

NEC Study Guide

537 According to the NEC, the combined load of two 240 volt, fixed space heaters on a 20 AMP branch circuit shall not exceed ___ VA.

- A. 2400 VA
- B. 3840 VA
- C. 4840 VA
- D. 9600 VA

CORRECT: B NEC 424.3 (B) & 210.19 (A)(1)

Solution: The VA of the circuit is $240 \times 20 = 4800$ VA. The rule is that the branch circuit load shall not be less than 125% of the load of the heater. 4800 divided by $125\% = 3840$ - maximum combined load.
Comment: NEC 1996 & 1999 reference 424-3 (b), NEC 2002 reference 424.3 (B).

538 Branch-circuit conductors for fixed-resistance space heaters shall be rated at ___ %.

- A. 250
- B. 80
- C. 300
- D. 125

CORRECT: D NEC 424.3 (B) & 210.19 (A)(1)

Comment: NEC 1996 & 1999 reference 424-3 (b), NEC 2002 reference 424.3 (B).

539 A boiler employing resistance type heating elements and rated more than 48 AMPS that is not contained in an ASME rated and stamped vessel, shall have heating elements sub divided into loads not exceeding ___ AMPS and protected at not more than ___ AMPS.

- A. 24/48
- B. 48/60
- C. 24/60
- D. 48/80

CORRECT: B NEC 424.3 (B) & 210.19 (A)(1)

Comment: NEC 1996 & 1999 reference 424-3 (b), NEC 2002 reference 424.3 (B).

NEC Study Guide

540 The minimum size overcurrent protection device for the feeder conductors for two 8', 120 volt, 16-amp wall heaters to be installed?

- A. 16-amp
- B. 24-amp
- C. 36-amp
- D. 40-amp

CORRECT: D NEC 424.3 (B) & 210.19 (A)(1)

Solution: minimum fuse for feeder: 32 amps x 125% = 40.
Comment: NEC 1996 & 1999 reference 424-3 (b), NEC 2002 reference 424.3 (B).

541 Heating cables shall be furnished with a non-heating leads at least ____ feet long.

- A. 6
- B. 7
- C. 8
- D. 9

CORRECT: B NEC 424.34

Comment: NEC 1996 & NEC 1999 reference 424-34.

542 Heating cables shall be furnished complete with factory assembled, nonheating leads at least ____ feet in length.

- A. 3
- B. 6
- C. 7
- D. 9

CORRECT: C NEC 424.34

Comment: NEC 1996 & 1999 reference 424-34.

NEC Study Guide

543 Non heating leads to a heat mat which extends under a slab must:

- A. be sleeved in EMT
- B. factory installed with a braided ground
- C. factory assembled nonheating lead
- D. factory assembled nonheating leads at least 7 1/2' long

CORRECT: C NEC 424.34

Comment: NEC 1996 & 1999 reference 424-34.

544 According to the NEC, all heating cables shall have legible and permanent markings indication their rating in:

- I. Volts and amps
- II. Volts and watts

- A. I only
- B. II only
- C. Either I or II
- D. Neither I nor II

CORRECT: C NEC 424.35

Comment: NEC 1996 & 1999 reference 424-35.

545 According to the NEC, all heating cables shall have legible and permanent markings on each non-heating lead with ____ of the terminal end.

- A. 2"
- B. 3"
- C. 4"
- D. 5"

CORRECT: B NEC 424.35

Comment: NEC 1996 & 1999 reference 424-35.

NEC Study Guide

546 According to NEC, a heating device with yellow leads has a ____ volt rating.

- A. 120
- B. 208
- C. 240
- D. 277

CORRECT: A NEC 424.35 (1)

Comment: NEC 1996 & 1999 reference 424-35.

547 According to the NEC, all heating cables shall have legible and permanent colored markings on each nonheating lead. What would the marking color for a 208 volts, nominal be:

- A. blue
- B. yellow
- C. green
- D. orange

CORRECT: A NEC 424.35 (2)

Comment: NEC 1996 & 1999 reference 424-35.

548 According to the NEC, the marking of heating cables shall be so as to identify the voltage of the cable by the color of the lead wire. The non-heating lead wire shall be located within 3" of the terminal end. The lead wire for 240 volts shall be of the color red.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 424.35 (3)

120 volt-yellow. 208 volt-blue. 277 volt-brown. 480 volt-orange.

Comment: NEC 1996 & 1999 reference 424-35.

NEC Study Guide

549 If the lead wire of electric ceiling heating cable is coded brown, what is the nominal voltage for this heating cable?

- A. 220 volts
- B. 248 volts
- C. 277 volts
- D. 408 volts

CORRECT: C NEC 424.35 (4)

550 3 size 10 THW copper conductors in a conduit are installed above ceiling without insulation between the ceiling and roof shall be rated at ____ amps.

- A. 35.0
- B. 28.2
- C. 26.25
- D. 23.45

CORRECT: C NEC 424.36 and Table 310.16

Solution: The temperature correction factor for 50°C is 0.75 since there is no insulation between the ceiling and roof, #10 THW is rated for 35 amps, thus $35 \text{ amps} \times 0.75 = 26.25 \text{ amps}$.

Comment: NEC 1996 & 1999 reference 424-36 & Table 310-16.

551 Three size 8 THHW copper conductors are installed in conduit 2" above a heated ceiling which has 2" of insulation between the ceiling and the roof. The conductors rated ampacity is ____ amps.

- A. 50
- B. 55
- C. 41.25
- D. 39.75

CORRECT: B NEC 424.36 and Table 310.16

Solution: No temperature correction factor is needed since there is 2" of insulation between the ceiling and roof, #8 THHW is rated for 55 amps.

Comment: NEC 1996 & 1999 reference 424-36 & Table 310-16.

NEC Study Guide

552 According to NEC, what type of protection must fixed, outdoor, electric de-icing equipment have, if any?

- A. ground fault circuit interruption protection for personnel
- B. none required
- C. ground fault protection just for equipment
- D. physical protection alone

CORRECT: D NEC 426.12

Comment: NEC 1996 & 1999 reference 426-12.

553 According to the NEC, the approximate locked-rotor current of a motor can be found by multiplying the full load current of the appropriate tables by a constant multiplier of:

- A. 5
- B. 6
- C. 7
- D. 8

CORRECT: B NEC 430.110 (C)(3)

554 Where wires pass through an opening in an enclosure, conduit box or barrier, ___ shall be used.

- A. an insert
- B. nipple
- C. bushing
- D. non metallic fibre duct

CORRECT: C NEC 430.13

Comment: NEC 1996 & 1999 reference Table 430-13.

NEC Study Guide

555 Branch-circuit conductors for a continuous duty pump motor shall have an ampacity of not less than ___ of the motor's full load current. Current rating is determined by NEC sec. 430-/.6(a/A)(1)

- A. same percentage
- B. 125%
- C. 119%
- D. 135%

CORRECT: B NEC 430.22

Comment: NEC 1996 & 1999 reference 430-22.

556 The branch circuit conductors' ampacity for a motor having 24 AMPS full load current shall not be less than ___ AMPS.

- A. 15
- B. 25
- C. 29
- D. 30

CORRECT: D NEC 430.22 (A)

Solution: 24 amps x 125% = 30 amps.

Comment: NEC 1996 & 1999 reference 430-22 (a).

557 According to the NEC, single motor branch circuit conductors that supply a single motor used in a continuous duty application shall have an ampacity of not less than ___ percent of the motor's full load current rating as determined by article 430-6(a)(1).

- A. 100
- B. 118
- C. 122
- D. 125

CORRECT: D NEC 430.22 (A)

Comment: NEC 1996 & 1999 reference 430-22 (a).

NEC Study Guide

558 What is the minimum size 60 degree C copper feeder circuit conductors permitted to serve two motors drawing 30 AMPS and 40 AMPS per phase each?

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

CORRECT: C NEC 430.24 & Table 310.16

Solution: $30 \text{ amps} + 40 \text{ amps} + (40 \text{ amps} \times 25\%) = 70 \text{ amps} + 10 \text{ amps} = 80 \text{ amps} \Rightarrow \#3 \text{ AWG}$.
Comment: NEC 1996 & 1999 reference 430-22 & Table 310-16.

559 A 40 HP 460 volt, 3-phase motor, and a 25 HP 460 volt 3-phase motor are to be fed from the same THW copper conductor. According to the National Electrical Code, what size feeder is required?

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

CORRECT: C NEC 430.24, Table 430.250 & Table 310.16

Solution: $34 \text{ amps} + 52 \text{ amps} + (52 \text{ amps} \times 25\%) = 86 \text{ amps} + 13 \text{ amps} = 99 \text{ amps} \Rightarrow \#3 \text{ AWG}$.
Comment: NEC 1996 & 1999 reference 430-24, Table 430-150, & Table 310-16; NEC 2002 reference 430.24, Table 430.150, & Table 310.16.

560 According to NEC, a 115 volt, 1/2 horsepower motor with normal torque characteristics will draw ___ amperes.

- A. 8.4 amps
- B. 8.9 amps
- C. 9.2 amps
- D. 9.8 amps

CORRECT: D NEC 430.248 Table

Comment: NEC 1996 & 1999 reference Table 430-148, NEC 2002 reference Table 430.148.

NEC Study Guide

561 The full load current of a single phase
1 1/2 hp 115 volt AC motor is:

- A. 16 amps
- B. 10 amps
- C. 20 amps
- D. 24 amps

CORRECT: C NEC 430.248 Table

Comment: NEC 1996 & 1999 reference Table 430-148,
NEC 2002 reference Table 430.148.

562 According to the National Electrical Code, what is the
full load current for a 5 HP, 240 volt, single phase
motor?

- A. 32 amp
- B. 28 amp
- C. 15.2 amp
- D. 7.6 amp

CORRECT: B NEC 430.248 Table

Comment: NEC 1996 & 1999 reference Table 430-148;
NEC 2002 reference Table 430.148.

563 What is the maximum rating for the motor branch
circuit, short circuit non-time delay fuse that protects a
wound rotor no-code letter, 2 horse power, single
phase, 115 volt motor?

- A. 15
- B. 30
- C. 60
- D. 80

CORRECT: B NEC 430.248 Table & Table
430.52

Note: Assume the lower standard rating when tried, will
not hold the starting current.

Solution:

Comment: NEC 1996 & 1999 reference Table 430-148 &
Table 430-152; NEC 2002 reference Table 430.148 &
Table 430.52.

NEC Study Guide

564 According to the NEC, a 208 volt 50 hp three phase squirrel cage motor has a full load current of ____ amps.

- A. 150
- B. 143
- C. 130
- D. 65

CORRECT: B NEC 430.250 Table

Comment: NEC 1996 & 1999 reference Table 430-150; NEC 2002 reference Table 430.150.

565 What is the maximum permitted operational setting of an adjustable inverse time breaker protecting a 10 HP, 208 volt, three phase squirrel cage motor, design E branch circuit? Assume no exceptions are applicable.

- A. 30.8
- B. 35.7
- C. 77
- D. depends on if the load is continuous or non-continuous

CORRECT: B NEC 430.250 Table & Table 430.52

Solution: Motor full-load current is 30.8 amps, 30.8 amps x 250% = 77 amps.
Comment: NEC 1996 & 1999 reference Table 430-150 & Table 430-152; NEC 2002 reference Table 430.150 & Table 430.52.

566 According to the National Electrical Code, the maximum setting on a magnetic only circuit breaker for a 15 HP, 230 volt, 3 phase full starting motor is:

- A. 277
- B. 298
- C. 323
- D. 336

CORRECT: D NEC 430.250 Table & Table 430-52

Solution:
Comment: NEC 1996 & 1999 reference Table 430-150 & Table 430-152; NEC 2002 reference Table 430.150 & Table 430.52.

NEC Study Guide

567 A 50 hp, 460 volt, 3 phase passenger elevator, equipped with a continuous duty, squirrel cage motor, must be fed with AWG # ____ THHN/THWN or larger, copper conductors.

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

CORRECT: A NEC 430.250 Table, 430.22 (A) & Table 310.16

From 430.150 the horsepower rating in amps is determined to be 65 amps. Then derated by 125% according to 430.22. The full load amps are now 81.25. Look up the wire size in table 310.16.
Comment: NEC 1996 & 1999 reference Table 430-150, 430-22 (a) & Table 310-16; NEC 2002 reference Table 430.150, 430.22 (A) & Table 310.16.

568 According to the National Electrical Code, circuit conductors for a 75-HP, 480 volt, 3-phase, continuous duty rated motor used for an elevator, shall be no less than ____ AWG THW copper.

- A. 1
- B. 1/0
- C. 2/0
- D. 3/0

CORRECT: B NEC 430.250 Table, Table 430.22 (E) & Table 310-16

Solution: Motor full-load current is 96 amps, for continuous duty in an elevator use 140%, $96 \text{ amps} \times 140\% = 134.4 \text{ amp}$, which is approximately equal to 150 amps \Rightarrow 1/0 AWG.
Comment: NEC 1996 reference Table 430-150, Table 430-22 (a) & Table 310-16; NEC 1999 reference Table 430-150, Table 430-22 (b) & Table 310-16; NEC 2002 reference Table 430.150, Table 430.22 (E) & Table 310.16.

NEC Study Guide

569 According to the National Electrical Code, circuit conductors for a 75-HP, 480 volt, 3-phase, varying duty rated motor, shall be no less than ___ AWG.

- A. 1/0
- B. 2/0
- C. 3/0
- D. 4/0

CORRECT: C NEC 430.250 Table, Table 430.22 (E) & Table 310-16

Solution: Motor full-load current is 96 amps, for varying duty in an elevator use 200%, $96 \text{ amps} \times 200\% = 192 \text{ amp} \approx 200 \text{ amps} \Rightarrow 3/0 \text{ AWG}$.

Comment: NEC 1996 reference Table 430-150, Table 430-22 (a) & Table 310-16; NEC 1999 reference Table 430-150, Table 430-22 (b) & Table 310-16; NEC 2002 reference Table 430.150, Table 430.22 (E) & Table 310.16.

570 Chauncy's Chop Shop has a squirrel cage motor on his band Saw. It is a 3-phase, 440 volts, 30 HP motor and the name plate rating is NEC. The duty cycle is continuous and it has a design letter of B. A non-time delay fuse protects the branch circuit supplying the motor. According to the NEC, the standard rating of the fuse used to protect this circuit would be no less than ___ amps.

- A. 125
- B. 120
- C. 115
- D. 100

CORRECT: A NEC 430.250 Table, Table 430.52 & 240.6 (A)

According to 430.52 the fuse rating is 300% of the full load amps of the motor. From 430.150 the FLA is 40 amps. $40 \times 300\% = 120 \text{ amps}$. The next size above 120 is 125 Amp fuse.

Comment: NEC 1996 & 1999 reference Table 430-150, Table 430-152 & 240-6 (a); NEC 2002 reference Table 430.150, Table 430.52 & 240.6 (A).

NEC Study Guide

571 According to the National Electrical Code, the maximum rating for a BCSCGF time delay device allowed for a 20 HP, 460 volt, 3 phase, Code letter A motor is:

- A. 30 amp
- B. 40 amp
- C. 50 amp
- D. 60 amp

CORRECT: C NEC 430.250 Table, Table 430.52 & 430.52 (C)(1)

Solution: Motor full-load current is 27 amps, $27 \text{ amps} \times 175\% = 47.25 \Rightarrow 50 \text{ amps}$.

Comment: NEC 1996 & NEC 1999 reference Table 430-150, Table 430-152 & 430-52 (c)(1); NEC 2002 reference Table 430.150, Table 430.52 & 430.52 (C)(1).

572 According to the National Electrical Code, the absolute maximum rating of non-time-delay fuses for a 50 HP, 3 phase, 460 volt induction motor is:

- A. 200 amp
- B. 225 amp
- C. 250 amp
- D. 275 amp

CORRECT: C NEC 430.250 Table, Table 430.52 & 430.52 (C)(1) exception 2 (a)

Solution: Motor full-load current is 65 amps,
Comment: NEC 1996 reference Table 430-150, Table 430-152 & 430-52 (c)(1) exception 2a; NEC 1999 reference Table 430-150, Table 430-152 & 430-52 (c)(1) exception 2 (a) ; NEC 2002 reference Table 430.150, Table 430.52 & 430.52 (C)(1) exception 2 (a).

573 According to the National Electrical Code, the maximum rated BCSCGF dual element time delay fuse allowed for a 30 HP, 230 volt, 3 phase, auto-transformer, code letter B motor is:

- A. 200
- B. 125
- C. 150
- D. 175

CORRECT: C NEC 430.250 Table, Table 430.52 & 430-52 (C)(1) exception 1

Solution: Motor full-load current is 80 amps, $80 \text{ amps} \times 175\% = 140 \text{ amps} \Rightarrow 150 \text{ amp fuse}$.

Comment: NEC 1996 & NEC 1999 reference Table 430-150, Table 430-152 & 430-52 (c)(1) exception 1 ; NEC 2002 reference Table 430.150, Table 430.52 & 430.52 (C)(1) exception 1

NEC Study Guide

574 According to the National Electrical Code, the maximum rated BCSCGF dual element device allowed for a 20 HP, 460 volt, 3 phase, code letter A motor is:

- A. 50 amp
- B. 60 amp
- C. 70 amp
- D. 80 amp

CORRECT: B NEC 430.250 Table, Table 430.52 & 430-52 (C)(1) exception 2 (b)

Solution: Motor full-load current is 27 amps,
Comment: NEC 1996 reference Table 430-150, Table 430-152 & 430-52 (c)(1) exception 2b; NEC 1999 reference Table 430-150, Table 430-152 & 430-52 (c)(1) exception 2 (b) ; NEC 2002 reference Table 430.150, Table 430.52 & 430.52 (C)(1) exception 2 (b).

575 According to the National Electrical Code, regarding exceptions, the maximum setting on an inverse time circuit breaker for a 25 HP, 230 volt, 3 phase motor is:

- A. 177
- B. 250
- C. 272
- D. 305

CORRECT: C NEC 430.250 Table, Table 430.52 Table & 430-52 (C)(1) Exception 2 (c)

Solution: Motor full-load current is 68 amps, $68 \text{ amps} \times 400\% = 272 \text{ amps}$.
Comment: NEC 1996 reference Table 430-150, Table 430-152 & 430-52 (c)(1) exception 2c; NEC 1999 reference Table 430-150, Table 430-152 & 430-52 (c)(1) exception 2 (c) ; NEC 2002 reference Table 430.150, Table 430.52 & 430.52 (C)(1) exception 2 (C).

NEC Study Guide

576 According to the National Electrical Code, the maximum rating of branch circuit non-time-delay fuses for a 5 HP, 3 phase, 230 volt, squirrel cage motor is:

- A. 40 amp
- B. 45 amp
- C. 50 amp
- D. 55 amp

CORRECT: C NEC 430.250 Table, Table 430.52, 430.52 (C)(1) exception 1 & 240.6 (A)

Solution: Motor full-load current is 15.2 amps, 15.2 amps x 300% = 45.6 amps, closest fuse size is 50 amps.
Comment: NEC 1996 & NEC 1999 reference Table 430-150, Table 430-152, 430-52 (c)(1) exception 1 & 240-6 (a); NEC 2002 reference Table 430.150, Table 430.52 & 430.52 (C)(1) exception 1 & 240.6 (A).

577 According to the National Electrical Code, the maximum setting on an inverse time circuit breaker for a 25 HP, 230 volt, 3 phase motor is:

- A. 155
- B. 160
- C. 165
- D. 170

CORRECT: C NEC 430.250 Table, Table 430.52, 430.52 (C)(1) exception 1 & 240.6 (A)

Solution:
Comment: NEC 1996 & NEC 1999 reference Table 430-150, Table 430-152, 430-52 (c)(1) exception 1 & 240-6 (a); NEC 2002 reference Table 430.150, Table 430.52, 430.52 (C)(1) exception 1 & 240.6 (A).

NEC Study Guide

578 According to the National Electrical Code, what is the minimum wire size for a motor using 10 conductors with the following characteristics:

1. 25 HP squirrel cage
2. 240 volt
3. 3-phase
4. THW insulation
5. Copper
6. 140 degrees F rating

- A. 4/0
- B. 250 Kcmil
- C. 300 Kcmil
- D. 350 Kcmil

CORRECT: D NEC 430.250 Table; 310.15 (B)(2)(a)

Solution:
Comment: NEC 1996 reference Table 430-150 & 310-16 note 8; NEC 1999 reference Table 430-150 & 310-15 (b)(2)(a); NEC 2002 reference Table 430.150 & 310.15 (B)(2)(a).

579 According to the National Electrical Code, what is the minimum wire size for a motor using 7 conductors with the following characteristics:

1. 25 HP squirrel cage
2. 230 volt
3. 3-phase
4. THW insulation
5. Copper

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

CORRECT: A NEC 430.250 Table; 310-15 (B)(2)(a)

Solution: Motor full load current is 68 amps, seven conductor derating is 70%, $68 \text{ amps} \times 125\% = 85 \text{ amps}$, derate as $85 \text{ amps} \div 70\% = 121 \text{ amps} \Rightarrow \#1 \text{ AWG}$.
Comment: NEC 1996 reference Table 430-150 & 310-16 note 8; NEC 1999 reference Table 430-150 & 310-15 (b)(2)(a); NEC 2002 reference Table 430.150 & 310.15 (B)(2)(a).

NEC Study Guide

580 According to the National Electrical Code, regarding exceptions, the maximum setting on a magnetic only circuit breaker for a 15 HP, 230 volt, 3 phase full starting motor is:

- A. 523
- B. 546
- C. 1336
- D. 3360

CORRECT: B NEC 430.250 Table; 430.52 (C)(3) exception 1

Solution: Motor full-load current is 42 amps, 42 amps x 1300% = 546 amps.
Comment: NEC 1996 & NEC 1999 reference Table 430-150 & 430-52 (c)(3) exception 1; NEC 2002 reference Table 430.150 & 430.52 (C)(3) exception 1.

581 According to the National Electrical Code, the maximum rated inverse time circuit breaker for a 25 HP, 230 volt, 3 phase motor is:

- A. 175
- B. 200
- C. 225
- D. 250

CORRECT: A NEC 430.250 Table; Table 430.52; 430-52 (C)(1) exception 1

Solution: Motor full-load current is 68 amps, 68 amps x 250% = 170 amps => 175 amp circuit breaker.
Comment: NEC 1996 & NEC 1999 reference Table 430-150, Table 430-152 & 430-52 (c)(1) exception 1 ; NEC 2002 reference Table 430.150, Table 430.52 & 430.52 (C)(1) exception 1.

582 What is the maximum length in feet permitted for motor feeder tap conductors given that no exceptions apply? (420-28)

- A. 8
- B. 9
- C. 10
- D. 25

CORRECT: C NEC 430.28 (1)

Comment: NEC 1996 & 1999 reference 430-28 (1).

NEC Study Guide

583 What is the maximum percent above the full load AMP rating for setting of a 20 horsepower motor overload protective device, that is responsive to motor current, if the motor is marked for a 15 degree C temperature rise, given that modification is permitted to allow the overload device to hold the starting current?

- A. 110
- B. 115
- C. 120
- D. 125

CORRECT: D NEC 430.32 (A)(1)

Comment: NEC 1996 & 1999 reference 430-32 (a)(1).

584 A terminal protector is intended to protect a motor against _____.

- A. dangerous overheating
- B. short circuit
- C. ground fault
- D. over burden

CORRECT: A NEC 430.32 (A)(2) & 430.32 (B)(2)

Comment: NEC 1996 & 1999 reference 430-32 (a)(2) & 430-32 (c)(2). See also 100 Definitions - Thermal Protection, (as applied to motors).

585 A ___ motor does not need a starting switch.

- A. permanent split capacitor
- B. split phase induction run
- C. capacitor start/cap run
- D. capacitor start induction run

CORRECT: B NEC 430.32 (B)(4) FPN

Comment: NEC 1996 & 1999 reference 430-32 (c)(4) FPN.

NEC Study Guide

- 586** Chauncy's Chop shop has a chop saw with a squirrel cage motor as follows:
1. 208 volt, 3-phase, 30 horse power
 2. Nameplate amps NEC
 3. Duty cycle is continuous
 4. Autotransformer
 5. Design is A
 6. No service factor
 7. Separate overload relay - protects against overload

According to the NEC, if the calculated size of the relay would NOT be sufficient to start the motor or carry the load, then, the separate overload relay to protect the motor would be permitted to be increased to a calculated trip current of:

- A.** 110 amps
- B.** 114 amps
- C.** 117 amps
- D.** 121 amps

CORRECT: B NEC 430.32 (C) & Table 430.250

Solution:
Comment: NEC 1996 & 1999 reference 430-34 & Table 430-150; NEC 2002 reference 430.32 (C) & Table 430.150.

- 587** What is the maximum inverse time circuit breaker permitted by Code to protect a single phase, squirrel cage, design E motor with a 10 AMP full load circuit? Assume the exceptions for starting current do not apply.

- A.** 10 AMP
- B.** 25 AMP
- C.** 30 AMP
- D.** 40 AMP

CORRECT: B NEC 430.52

Solution: $10 \text{ amps} \times 250\% = 25 \text{ amps}$.
Comment: NEC 1996 & 1999 reference 430-152.

NEC Study Guide

588 According to the NEC, in a general motor application, the motor branch circuit protective device (fuse) must have its rating not to exceed:

- A. motor nameplate current
- B. NEMA Standards
- C. the values in Table 430-152
- D. factory manual

CORRECT: C NEC 430.52 (C)(1)

Comment: NEC 1996 & 1999 reference 430-52 (c)(1).

589 What is the maximum rating allowed for a dual element, time delay fuse in a branch circuit feeding a 50 hp, 480 volt, 3 phase, continuous rated motor, pulling a conveyor belt?

- A. 113.75 amp
- B. 115 amp
- C. 125 amp
- D. 150 amp

CORRECT: C NEC 430.52 (C)(1) exception 2 (b), Table 430.250, Table 430.52, 240.6 (A)

Solution: Find amperage of 65 amps from table 430.150. The exception (b) in 430.52 (C) (1). $65 \times 225\% = 146$ amps. Can't use 150 amps. Must use 125 Amps.
Comment: NEC 1996 reference 430-52 (c)(1) exception 2 (b), Table 430-150, Table 430-152, 240-6 (a); NEC 1999 reference 430-52 (c)(1) exception 2 (b), Table 430-150, Table 430-152, 240-6 (a); NEC 2002 reference 430.52 (C)(1) exception 2 (b), Table 430.250, Table 430.52, 240.6 (A).

590 Squirrel-cage motors which can draw up to 600% of full-load current when starting shall be protected by which of the following?

- A. non-fused disconnect
- B. fused disconnect or circuit breaker
- C. instantaneous trip breaker
- D. overload relay

CORRECT: B NEC 430.52 Table

Note: We believe that there is not a correct answer for this question. According to Table 430.52 (430-152) it is clear that the required short circuit protection is an instantaneous trip breaker.
Comment: NEC 1996 & 1999 reference 430-152.

NEC Study Guide

591 According to the NEC, several motors, each not exceeding 1 hp in rating, shall be permitted on a nominal 120-volt branch circuit protected at not over 20 amps within the condition that the full-load rating of each motor does not exceed 6 amps.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 430.53 (A)(1)

592 A 120/240V, 3-phase power panel board supplies the following:

- 1-15HP, 240V, 3-phase, wound rotor motor
- 4-5HP, 240V, 3-phase, wound rotor motors
- 6-5HP, 240V, 1-phase motors
- 3-1KW, 240V, 1-phase baseboard heaters.

Each ungrounded conductor in the sub-feeder to this power panel has a total net computed load of _____.

- A. 121.1 amps
- B. 190.6 amps
- C. 217.5 amps
- D. 277.0 amps

CORRECT: D NEC 430.6 (A)(1), Table 430.248, Table 430-250, 430.24 & 424.3 (B)

# Motors	# Connected to AL	Motor/Equipment being served	Amps From Tables	25% of Largest	Total Amps Per Line
1	1	15 Hp, 240 Volt 3-Phase	42	10.5	52.5
4	4	5 Hp, 240 Volt 3-Phase	15.2	X	60.8
6	2	5 Hp, 240 Volt, Single Phase	28	X	56
3	1	1000 Watt, 240 Volt, Single Phase	4.2	X	4.2
14	8				173.5

Find the ampacity of the three phase motors from Table 430-/.150/250. Find the ampacity of the single phase motors from Table 430-/.148/248.

Comment: NEC 1996 reference 430-6 (a), Table 430-148, Table 430-150, 430-24 & 424-3 (b), NEC 1999 reference 430-6 (a)(1), Table 430-148, Table 430-150 430-24 & 424-3 (b), NEC 2002 reference 430.6 (A)(1), Table 430.148, Table 430.150, 430.24 & 424.3 (B).

NEC Study Guide

593 According to the National Electrical Code, what is the minimum wire size for a motor on the end of a short conduit containing 3 conductors with the following characteristics:

1. 25 HP squirrel cage
2. 240 volt
3. 3-phase
4. THHN insulation
5. Copper
6. 120°F rating

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

CORRECT: C NEC 430.6 (A)(1), Table 430.250 & Table 310.16

Solution: From 3-phase AC motor table full-load current is 68 amps, from ampacity table temperature correction factor is 0.82, thus $68 \text{ amps} \div 0.82 = 82.93 \text{ amps} \Rightarrow \#4 \text{ AWG}$.

Comment: NEC 1996 reference 430-6 (a), Table 430-150 & Table 310-16, NEC 1999 reference 430-6 (a)(1), Table 430-150 & Table 310-16, NEC 2002 reference 430.6 (A)(1), Table 430.150 & Table 310.16.

594 The rated current for the selection of branch circuit conductors to a torque motor is the:

- A. motors running current
- B. motors starting current
- C. motors stopping current
- D. locked rotor current

CORRECT: D NEC 430.6 (B)

Comment: NEC 1996 & 1999 reference 430.6 (b).

NEC Study Guide

595 What is the maximum permitted setting for the branch circuit short circuit protective device for a torque motor that has a name plate current of 25 amps given that the branch circuit conductors are #12 TW?

- A. 20
- B. 25
- C. 37 1/2
- D. 50

CORRECT: B NEC 430.6 (B) & Table 310.16

Comment: NEC 1996 & 1999 reference 430-6 (b) & Table 310-16.

596 What is the maximum overcurrent protection per hp for locked rotor with code letter "R".

- A. 14.90
- B. 15.99
- C. 12.99
- D. 18.77

CORRECT: B NEC 430.7 (B) Table

Comment: NEC 1996 & 1999 reference 430-7 (b) Table.

597 What is the maximum overcurrent protection permitted for a #14 copper THWN motor control circuit that is tapped from the load side of the motor short circuit protective device?

- A. 20
- B. 25
- C. 30
- D. 100

CORRECT: D NEC 430.72 (B)(2) and Table 430.72 (b) column B

Note: The conductors require only short circuit protection and do not extend beyond the motor control equipment enclosure.

Comment: NEC 1996 reference 430-72 (b) exception 1 & Table 430-72 (b) column B; NEC 1999 reference 430-72 (b)(2) & Table 430-72 (b) column B.

NEC Study Guide

598 What is the largest stationary motor (HP) that is permitted to use a snap switch for a motor controller?

- A. 1/8
- B. 3/4
- C. 1
- D. 2

CORRECT: A NEC 430.81 (A)

Comment: NEC 1996 & 1999 reference 430-81 (b); NEC 2002 reference 430.81 (B).

599 A magnetic motor controller is operated from two separate start/stop stations. Both stop push buttons must be wired in series.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 430.82 (A)

Comment: NEC 1996 & 1999 reference 430-82 (a).

600 Motor controllers shall be capable of interrupting the:

- A. line to line short circuit current
- B. ground fault current
- C. locked rotor current
- D. mechanical room lighting

CORRECT: C NEC 430.82 (A)

Comment: NEC 1996 & 1999 reference 430-82 (a).

NEC Study Guide

601 An inverse time circuit breaker protecting a branch circuit that serves as a motor controller is:

- A. permitted by Code
- B. permitted only if horsepower rated
- C. required to be in a separate enclosure
- D. is prohibited

CORRECT: A NEC 430.83 (A)(2)

Comment: NEC 1996 reference 430-83 (a) exception 3;
NEC 1999 reference 430-83 (a)(2).

602 According to the NEC, for stationary motors rated at 2 hp or less and 300 volts or less, a general-use switch with an ampere rating not less than twice the full load current rating of the motor, may serve as the motor controller.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 430.83 (C)(1)

Comment: NEC 1996 reference 430-83 exception 2;
NEC 1999 reference 430-83 (c)(1).

603 A snap switch which is used for a 2 hp motor must have a rating of _____ percent of the motors' full load amperage.

- A. 87%
- B. 100%
- C. 125%
- D. 127%

CORRECT: C NEC 430.83 (C)(1)

Comment: NEC 1996 reference 430-83 (a) exception 2;
NEC 1999 reference 430-83 (c)(1).

NEC Study Guide

604 A 15 AMP A/C general use snap switch serves as the controller for a motor. What is the maximum motor full load amperage permitted by Code to allow the use of this switch?

- A. 10
- B. 12
- C. 15
- D. depends on whether the load is continuous or noncontinuous

CORRECT: B NEC 430.83 (C)(2)

Solution: $15 \times 80\% = 12$.
Comment: NEC 1996 reference 430-83 exception 2;
NEC 1999 reference 430-83 (c)(2).

605 What is the minimum inch pounds of torque required for the screw type pressure terminals used to conduct #14 AWG or smaller copper conductors within motor control circuit devices?

- A. 7
- B. 9
- C. 12
- D. 16

CORRECT: A NEC 430.9 (C)

Comment: NEC 1996 & reference 430-9 (c).

606 According to the NEC, a type ___ enclosure is intended for specific locations other than hazardous locations (specifically indoor use).

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

CORRECT: A NEC 430.91 Table

Note: Dry Conditions.
Comment: NEC 1996 & 1999 reference Table 430-91.

NEC Study Guide

607 A motor controller is installed with the expectation that it will be submerged occasionally for short periods of time. According to NEC, the controller shall be installed in an enclosure type number _____.

- A. 4X
- B. 3S
- C. 6
- D. 3

CORRECT: C NEC 430.91 Table

Comment: NEC 1996 & 1999 reference 430-91 Table.

608 According to the NEC, a ___ type motor controller enclosure is intended for outdoor general purpose, under normal atmospheric (dry) conditions.

- A. 1
- B. 3R
- C. 5
- D. 12

CORRECT: B NEC 430.91 Table

Comment: NEC 1996 & 1999 reference Table 430-91.

609 What is the maximum overcurrent device permitted to protect both a 9,600 VA, 240 volt, single phase range and branch circuit conductors, given that the conductors are #8 copper, THHN conductors, and all conductor terminal connections are rated for 60 degrees C?

- A. 90
- B. 55
- C. 60
- D. depends on if the load is continuous or noncontinuous

CORRECT: B NEC 430-152

NEC Study Guide

610 According to the National Electrical Code, what is the minimum wire size for a motor with the following characteristics:

1. 40 HP continuous rated
2. 460 volt
3. 3-phase
4. THHN insulation
5. Copper
6. 50 degrees C

- A. #1 AWG
- B. #6 AWG
- C. #8 AWG
- D. #10 AWG

CORRECT: C NEC 430-22; 430-150 Table; 310-16

From 430-22 must shall have an ampacity of not less than 125% of FLA. Therefore the FLA = 52 X 125% which is = 65 FLA ; Then the ampacity must be derated by .82 (temperature correction factor). The ampacity is then 53.3. Now look up the wire size in 310-16 in the THHN column. Since 53.3 lies between 40 and 55, you must use the higher value of 55 which requires a #8 copper wire.

Solution: Motor full-load current is 52 amps, for continuous duty application use 125%, 52 amps x 125% = 65 amps, the tempearture factor is 0.82, 65 amps ÷ 0.82 = 79.27 amps, which is approximately equal to 80 amps => #4 AWG.

Comment: NEC 1996 & 1999 reference Table 430-150, 430-22 (a) & Table 310-16; NEC 2002 reference Table 430.150, 430.22 (A) & Table 310.16.

611 According to the National Electrical Code, what is the minimum wire size for a motor with the following characteristics:

1. 40 HP synchronous
2. 230 volt
3. 3- phase
4. Code letter M
5. THHN insulation
6. Copper
7. Power Factor = 100%

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

CORRECT: C NEC 430-250 Table & Table 310-16

Solution:

Comment: NEC 1996 & 1999 reference Table 430-150 & Table 310-16; NEC 2002 reference Table 430-150 &

NEC Study Guide

612 According to the National Electrical Code, article 430-52 C (1) Exception 1, the maximum rated inverse time circuit breaker for a 25 HP, 230 volt, 3 phase motor is:

- A. 175
- B. 200
- C. 225
- D. 250

CORRECT: D NEC 430-250 Table, Table 430-52 & 240.6 (A)

Solution: $68 \text{ amps} \times 250\% = 170 \text{ amps}$, the closest circuit breaker is 175 amps.
Comment: NEC 1996 & 1999 reference Table 430-150, Table 430-152 & 240-6 (a); NEC 2002 reference Table 430-150, Table 430-52 & 240.6 (A).

613 According to Code, the disconnecting means for a refrigeration motor hermetic compressor shall be at least ___ rating in amps given that the rated load current is 40 amps and the branch circuit selection current is 50 amps.

- A. 46
- B. 50
- C. 57.5
- D. 62.5

CORRECT: C NEC 440.12 (A)(1)

Comment: NEC 1996 & 1999 reference 440-12 (a)(1).

614 When a fuse responsive to motor current serves to protect a motor compressor against overload and failure to start, the Code requires the fuse not to be rated more than ___% of the motor compressor and motor load current.

- A. 115
- B. 125
- C. 175
- D. 225

CORRECT: D NEC 440.22 (A)

Comment: NEC 1996 & 1999 reference 440-22 (a).

NEC Study Guide

- 615** When can an attachment plug and receptacle serve as the disconnecting means for a single phase room air conditioner rated 250 volts or less?
- A. when it is rated at 40 amps or less
 - B. when the cord is 6' or less in length
 - C. when the manual controls are located within 6' of the floor
 - D. when it is protected by an inverse time circuit breaker

CORRECT: C NEC 440.63

Comment: NEC 1996 & 1999 reference 440-63.

- 616** When supplying a nominal 120 volt rated room air conditioner, a length of flexible supply cord shall not exceed ____ feet.
- A. 9
 - B. 10
 - C. 11
 - D. 12

CORRECT: B NEC 440.64

Comment: NEC 1996 & 1999 reference 440-64.

- 617** Where a flexible cord is used to supply a room air conditioner, the length of the cord shall not exceed 10 feet for a nominal, 120 volt rating or ____ feet for a nominal 208 or 240 volt rating.
- A. 5
 - B. 6
 - C. 7
 - D. 8

CORRECT: B NEC 440.64

Comment: NEC 1996 & 1999 reference 440-64.

NEC Study Guide

618 What is the minimum ampacity required for the phase conductors from the generator terminals to the first overcurrent device given that the generator name plate current rating is 100 amps and given no exception are applicable?

- A. 80 amps
- B. 100 amps
- C. 115 amps
- D. 125 amps

CORRECT: C NEC 445.13

Solution: $100 \text{ amps} \times 115\% = 115 \text{ amps}$.
Comment: NEC 1996 & 1999 reference 445-5.

619 What is the maximum voltage to ground that terminals on a generator are permitted to be exposed to accidental contact where accessible to unqualified persons?

- A. 12
- B. 30
- C. 36
- D. 50

CORRECT: D NEC 445.14

Comment: NEC 1996 & 1999 reference 445-6.

620 According to the NEC, the impedance shall be marked on the name plate of all transformers which are _____ Kilovolt-amps or larger.

- A. 15
- B. 25
- C. 40
- D. 55

CORRECT: B NEC 450.11

Comment: NEC 1996 & 1999 reference 450-11.

NEC Study Guide

621 When installing a dry type 480 volt/240 volt transformer that is 75 KVA, the Code requires the transformer when not in the open to be:

- A. readily accessible
- B. 12" from combustible material
- C. located in a separate room
- D. located in a room with a minimum of 2 air changes per hour

CORRECT: B NEC 450.21 (A)

Comment: NEC 1996 & 1999 reference 450-21 (a).

622 Dry-type transformers located indoors and rated 112.5kVA or less shall be at least _____ inches from combustible material.

- A. 12
- B. 18
- C. 24
- D. 15

CORRECT: A NEC 450.21 (A)

Comment: NEC 1996 & 1999 reference 450-21 (a).

623 Dry-type transformers installed indoors and rated 112 1/2 kVA or less shall have a separation of at least ____ inches from combustible material.

- A. 6
- B. 24
- C. 12
- D. 10

CORRECT: C NEC 450.21 (A)

Comment: NEC 1996 & 1999 reference 450-21 (a).

NEC Study Guide

624 A dry type transformer is to be installed indoors. The transformer must be installed in a fire resistive transformer room if it is rated more than ____ Kva.

- A. 35
- B. 112.5
- C. 100.5
- D. 25

CORRECT: B NEC 450.21 (B)

Comment: NEC 1996 & 1999 reference 450-21 (b).

625 The fire resistive rating of a door on a vault which contains a transformer rated over 112 1/2 KVA shall be ____ hour.

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

CORRECT: C NEC 450.21 (B)

Comment: NEC 1996 no reference; NEC 1999 reference 450-21 (b).

626 A circuit breaker is located only on the primary side of a 960 volt transformer in a supervised installation. According to article 450 of NEC, this breaker shall be set at no more than ____ percent of the rated primary current of the transformer.

- A. 200
- B. 250
- C. 300
- D. 350

CORRECT: C NEC 450.3 (A)

Comment: NEC 1996 reference 450-3 (a)(2); NEC 1999 reference 450-3 (a).

NEC Study Guide

627 According to the NEC, and using the following transformer data, determine the maximum percent setting of primary side breaker.

1. circuit breaker is located only on the primary side
2. 2400 volt transformer
3. A "supervised" installation
4. No impedance rating marked on the transformer

- A. 115
- B. 125
- C. 250
- D. 300

CORRECT: D NEC 450.3 (A) Table

Comment: NEC 1996 no reference - table not setup for no impedance value; NEC 1999 reference 450-3 (a).

628 According to Table 450-3 (b) of the NEC, transformers with primary voltages of 600 volts or less, and the primary transformer only has over current protection, the primary over current device shall be a maximum of ___ percent of the rated primary current of the transformer when the currents in the primary are less than 9 amperes.

- A. 125
- B. 167
- C. 250
- D. 300

CORRECT: B NEC 450.3 (B) & 450.3(B) Table

Comment: NEC 1996 reference is 450-3 (b)(1) exception 1.

629 A step up transformer from 240 volts to 480 volts will have: I - greater primary current than the secondary current, II - will require overcurrent protection.

- A. I only
- B. II only
- C. both I & II
- D. neither I or II

CORRECT: B NEC 450.3 (B) Table

Comment: NEC 1996 reference 450-3 (b)(1); NEC 1999 reference Table 450-3 (b).

NEC Study Guide

630 An auto transformer has four windings on the primary and four windings on the secondary.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 450.4

Comment: NEC 1996 & 1999 reference 450-4.

631 According to the NEC, any pipe or duct system foreign to the electrical installation shall not enter or pass through a transformer vault. Piping or other facilities provided for vault or ___ protection, or for transformer cooling shall not be considered foreign to electrical installations.

- A. drain piping
- B. building
- C. an exhaust air duct passing through the vault
- D. fire

CORRECT: D NEC 450.47

Comment: NEC 1996 & 1999 reference 450-47.

632 According to the NEC, single phase converters, when the loads are variable, shall have overcurrent protection set at not more than 125% of the name plate input full-load amperes. In the case of a nameplate rating of 34 amps, therefore, the standard overcurrent protection device should not be rated more than ___ amperes.

- A. 40 amp
- B. 41 amp
- C. 43 amp
- D. 45 amp

CORRECT: D NEC 455.7 & 240.6 (A)

Solution: $34 \text{ amps} \times 125\% = 42.5 \text{ amps}$, closest overcurrent protection device is 45 amps.
Comment: NEC 1996 reference 455-7 exception 2 & 240-6 (a); NEC 1999 reference 454-7 & 240-6 (a).

NEC Study Guide

- 633** Group operated switches shall be used for capacitor switching on circuits over 600 volts and shall be capable of all but which of the following?
- A. carrying continuously a minimum of 135% of the rated current of the capacitor installation
 - B. interrupting the maximum continuous load current of each capacitor that will be switched as a unit
 - C. withstanding the maximum in rush current
 - D. carrying current due to faults on the capacitor side of the switch

CORRECT: C NEC 460.24 (A)

Solution: A switch is able to do all of these.

Comment: NEC 1996 & 1999 reference 460-24 (a).

- 634** Group operated switches shall be used for capacitor switching on circuits over 600 volts and shall be capable of all but which of the following?
- A. carrying continuously a minimum of 135% of the rated current of the capacitor installation
 - B. interrupting the maximum continuous load current of each capacitor that will be switched as a unit
 - C. withstanding the maximum inrush voltage
 - D. carrying current due to faults on the capacitor side of the switch

CORRECT: B NEC 460.24 (A)

Must be able to withstand the maximum inrush current not inrush voltage.

- 635** According to the NEC, after a capacitor is disconnected from the source of supply, there must be a means to reduce the residual voltage to 50 volts or less, in no more than ___ minutes.
- A. 1
 - B. 2
 - C. 3
 - D. 4

CORRECT: A NEC 460.6 (A)

Comment: NEC 1996 & 1999 reference 460-6 (a).

NEC Study Guide

- 636** A discharge circuit of a capacitor may be any of the following except:
- A.** it may be permanently connected to the terminals of the capacitor
 - B.** it may be provided with automatic means of connecting it to terminals of the capacitor bank after disconnection of the capacitor from one source of supply
 - C.** the windings of motors directly connected to capacitors
 - D.** a high resistance bank connected between the capacitors and ground

CORRECT: C NEC 460.6 (B)

Comment: NEC 1996 & 1999 reference 460-6 (b).

- 637** A circuit has 20 kilovolt-amperes (kVa) of inductive reactive kilovolt-amperes. What size capacitor will be needed to cancel out the reactive inductance?
- A.** 16kVa
 - B.** 19kVa
 - C.** 23kVa
 - D.** 27kVa

CORRECT: B NEC 460.8 (C) (3)

This one is the closest figure to the 20 kVa needed to cancel out the reactance.

- 638** How are hazardous locations classified?
- A.** Class A, Class B, Class C
 - B.** Class 1, Class 2, Class 3
 - C.** Class H1, Class H2, Class H3
 - D.** Class I, Class II, Class III

CORRECT: D NEC 500

NEC Study Guide

639 Class 1 hazardous areas deal with:

- A. dusts
- B. oil
- C. gasses
- D. paint

CORRECT: C NEC 500.5 (B)

Comment: NEC 1996 reference 500-5; NEC 1999 reference 500-7.

640 According to the NEC, a fuel dispensing station with electrical equipment nearby is classified as a ___ hazardous location.

- A. class I group B division 1
- B. division 2
- C. class II group T division 2
- D. class I, division 1

CORRECT: D NEC 500.5 (B)(1)

Comment: NEC 1996 reference 500-5 (a); NEC 1999 reference 500-7 (a).

641 What is the classification of a space where flammable gasses are frequently present because of repair or maintenance?

- A. Class I, Division I
- B. Class I, Division II
- C. Class II, Division I
- D. Class II, Division II

CORRECT: A NEC 500.5 (B)(1)(2)

Comment: NEC 1996 reference 500-5 (a)(2) 1999 reference 500-7 (a)(2).

NEC Study Guide

642 What division of Class I is the proper classification in an area when flammable liquids are used but are confined in closed containers which they can escape in case of accidental rupture?

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

CORRECT: B NEC 500.5 (B)(2)(1)

Comment: NEC 1996 reference 500-5 (b)(1); NEC 1999 reference 500-7 (B)(1).

643 Class II hazardous locations have combustible:

- A. gas
- B. fibers
- C. dust
- D. vapor

CORRECT: C NEC 500.5 (C)

Comment: NEC 1996 reference 500-6; NEC 1999 reference 500-8.

644 What classification is defined by Code as an area that is hazardous due to combustible dusts?

- A. Class I
- B. Class II
- C. Class III
- D. Class IV

CORRECT: B NEC 500.5 (C)

Comment: NEC 1996 reference 500-6; NEC 1999 reference 500-8.

NEC Study Guide

645 According to the NEC, Class II locations are hazardous because of the presence of:

- A. vapors
- B. fibers
- C. combustible dusts
- D. gasses

CORRECT: C NEC 500.5 (C)

Comment: NEC 1996 reference 500-6; NEC 1999 reference 500-8.

646 According to the National Electrical Code, a location does not normally have combustible dust that may be suspended in the air as a result of infrequent malfunctioning of handling or processing equipment, is a ____ hazardous classification.

- A. Class 2, division 1
- B. Class 2 , division 2
- C. Class 3 , division 1
- D. Class 3, division 2

CORRECT: B NEC 500.5 (C)(2)(2)

Comment: NEC 1996 reference 500-6 (b); NEC 1999 reference 500-8 (b)(1); NEC 2002 reference 500.5 (C)(2)(1).

647 According to the NEC, Class III locations are those that are hazardous because of the presence of:

- A. flammable vapors
- B. organic dust
- C. combustible dust
- D. ignitable flyings

CORRECT: D NEC 500.5 (D)

Comment: NEC 1996 reference 500-7; NEC 1999 reference 500-9.

NEC Study Guide

648 Which of the following is an example of a carbonaceous dust?

- A. coal and coke dust
- B. talcum
- C. fibrous
- D. sawdust

CORRECT: C NEC 500.6 (B)(2)

Comment: NEC 1996 reference 500-3 (b)(2); NEC 1999 reference 500-5 (b)(2).

649 According to the NEC, explosion proof alarm systems switch contacts are designed to :

- I. withstand explosions in class I division 1 locations
- II. prevent ignition of gas or vapors

- A. I only
- B. II only
- C. both I and II
- D. neither I nor II

CORRECT: A NEC 500.7 (A)

Comment: NEC 1996 reference 500-2 (a)(1); NEC 1999 reference 500-4 (a).

650 What is the minimum number of threads required for threaded joints in Class I, Division 1 areas?

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: B NEC 500.8 (D)

Comment: NEC 1996 reference 501-4 (a); NEC 1999 reference 501-4 (a)(1); NEC 2002 501.4 (A)(1)(a).

NEC Study Guide

651 According to the NEC, in class I, division 1 locations, disregarding exception, ___ is an approved wiring method.

- A. NM cable
- B. threaded rigid metal conduit
- C. Type IM cable
- D. flexible non-metal tubing

CORRECT: B NEC 501.10 (A)(1)(a)

Comment: NEC 1996 reference 501-4 (a); NEC 1999 reference 501-4 (a)(1); NEC 2002 reference 501.4 (A)(1)(a).

652 A fire alarm signal circuit is operated by a push button switch in a class I, division 1 hazardous location. The circuit must be run from the hazardous location to a location outside of the hazardous location in:

- I. threaded ridged metal conduit
- II. With approved explosion proof boxes, fittings and joints.

- A. I only
- B. II only
- C. both I and II
- D. neither I nor II

CORRECT: C NEC 501.10 (A)(1)(a) & (A)(3)

Comment: NEC 1996 reference 501-4 (a); NEC 1999 reference 501-4 (a)(1); NEC 2002 reference 501.4 (A)(1)(a) & (A)(3).

653 Concealed wiring in Class I, Division 2 and Class II, Division 2 locations may be wired with what type of cable or cord?

- A. MI
- B. NM
- C. SO
- D. SE

CORRECT: A NEC 501.10 (B)(6) & 330.10 (A)(4) / 502.10 (B)(6) & 330.10 (A)(4)

The first pair of references are for Class I, Division 2 and the second pair of references are for Class II, Division 2.
Comment: NEC 1996 & 1999 references are 501-4 (b) & 330-3 (5) / 502-4 (b) & 330-3 (5).

NEC Study Guide

654 According to the NEC, in class I, division 1 hazardous locations, in each conduit entry into an explosion proof enclosure where either the enclosure contains apparatus, such as switches, circuit breakers, fuses, relays, or resistors, that may produce arcs, sparks, or high temperatures that are considered to be an ignition source in normal operations, conduit seals shall be installed within ___ inches from the enclosure.

- A. 16
- B. 18
- C. 19
- D. 20

CORRECT: B NEC 501.15 (A)(1)

Comment: NEC 1996 & 1999 reference 501-5 (a)(1);
NEC 2002 reference 501.5 (A)(1).

655 What is the minimum sealing compound thickness required in a hazardous area for a sealed off fitting used in conjunction with 1/2" diameter conduit?

- A. 1/2"
- B. 5/8"
- C. 1"
- D. the Code does not specify a minimum thickness

CORRECT: B NEC 501.15 (C)(3)

Comment: NEC 1996 & 1999 reference 501-5 (c)(3);
NEC 2002 reference 501.5 (C)(3).

NEC Study Guide

656 Alarm systems circuits are to be installed in building which manufactures and warehouses' ammonia products. There are several storage buildings. Power circuits and alarm circuits are not associated with the same equipment. Alarm circuits are in hazardous locations. The alarm circuits can be installed with the existing power circuits under what circumstance? Disregard exceptions.

- A. they use the same raceway, but with the use of fire retardant lubricant
- B. they are over 2" apart and pulling eyes are used on manhole runs
- C. they use separate, threaded steel IMC and explosion proof boxes
- D. they are 6" to 12" between alarm wiring and power service drops

CORRECT: C NEC 501.150 (A) & 501.10 (A)(1)

Comment: Prior to NEC 2005 reference is 501-.14 (a/A) & 501-.4 (a/A)(1).

657 In Class I, Division 1 locations, conduit entry into an explosion proof enclosure requires seals to be within how many inches from the enclosure?

- A. 6"
- B. 12"
- C. 18"
- D. 24"

CORRECT: C NEC 501.5 (A)(1)

Comment: NEC 1996 & 1999 reference 501-5 (a)(1); NEC 2002 reference 501.5 (A)(1).

658 Transformers rated in excess of 25 KVA which contain askarel must:

- A. be red tagged
- B. be installed in an accessible location
- C. must be equipped with emergency shut off switches
- D. must be equipped with a pressure relief device

CORRECT: D NEC 502.100 (B)(2)(1)

Comment: NEC 1996 & 1999 reference 502-2 (b)(2)(1); NEC 2002 reference 502.2 (B)(2)(1).

NEC Study Guide

659 A conduit is routed from an enclosure which is located in a class II hazardous location, through a barrier into a non-hazardous location. According to NEC, a seal is:

- A. not required
- B. required in the middle of the conduit
- C. required anywhere along the length of the conduit
- D. required at the exit point of the class II hazardous area

CORRECT: A NEC 502.15

Comment: NEC 1996 & 1999 reference 502-5; NEC 2002 reference 502.5.

660 According to the NEC, an area which handles coal dust is present, the origin of the equipment grounding conductor for a grounded Delta system shall be:

- A. the primary side of the overcurrent device
- B. the grounding resistor
- C. an isolated grounding electrode conductor
- D. the transformers grounded secondary connection

CORRECT: D NEC 502.30 & 250-26 (3)

This is a Class II Location.
Comment: NEC 1996 grounding reference is and 250-25 (3).

661 In a Class III location, the bonding of the disconnecting means shall be:

- A. prohibited
- B. the double locknut type
- C. neither the lock nut bushing nor double locknut types
- D. the locknut bushing type

CORRECT: C NEC 503.30 (A)

Comment: NEC 1996 & 1999 reference 503-16 (a); NEC 2002 reference 503.16 (A).

NEC Study Guide

662 What 15 and 20 AMP receptacles in commercial repair garages are required to be protected with ground fault circuit interrupters?

I - receptacles serving electrical hand tools.

II - receptacles serving diagnostic equipment.

- A. I only
- B. II only
- C. both I & II
- D. neither I or II

CORRECT: C NEC 511.12

Comment: NEC 1996 & 1999 reference 511-10.

663 Ground fault circuit interrupters are required by Code for receptacles in garages that serve hand tools when the garage is for a:

I. dwelling

II. Commercial repair garage

- A. I only
- B. II only
- C. both I & II
- D. Neither I nor II

CORRECT: B NEC 511.12

Comment: NEC 1996 & 1999 reference 511-10.

664 What is the classification of a floor in an unvented commercial garage used for servicing automobiles?

- A. Class I Division 1
- B. Class I Division 2
- C. Class II Division 1
- D. Class II Division 2

CORRECT: B NEC 511.3 (A)(5)

Comment: NEC 1996 & 1999 reference 511-3 (a); NEC 2002 reference 511.3 (B)(1).

NEC Study Guide

665 According to the National Electrical Code, communications wiring installed within 18" of the ceiling of a shop area where CNG vehicles are repaired, having no fans for ventilation, is a ___ hazardous area.

- A. class 1, division 1
- B. class 1, division 2
- C. class 1, division 3
- D. class 1, division 4

CORRECT: B NEC 511.3 (B)(4)

Note: No fans means no mechanical ventilation.
Comment: NEC 1996 & 1999 no reference; NEC 2002 reference 511.3 (B)(2).

666 Raceways embedded in a masonry wall are considered to be in a hazardous area when:

- A. extensions pass within 6" of such areas
- B. any connections lead into such areas
- C. they are located above a hazardous area
- D. not addressed in 2005 NEC

CORRECT: A NEC 511.4 (A)

From the Analysis of Change of the 2005 NEC: "A review of NEC 500.5(B) indicates that a Class I location is where flammable gases or vapors are present in the air in quantities sufficient to produce an explosive or ignitable mixture. The lack of oxygen in the earth makes it impossible to achieve an ignitable concentration without some void for oxygen to be collected."

667 Raceways embedded in a masonry wall are considered to be in a hazardous area when:

- A. extensions pass within 6" of such areas
- B. any connections lead into such areas
- C. they are located above a hazardous area
- D. they are buried 24" below a hazardous area

CORRECT: B NEC 511.4 (A)(1)

Comment: NEC 1996 & 1999 reference 511-4; NEC 2005 no reference - deleted, see 2005 Analysis of Change.

NEC Study Guide

668 A 120 volt AC portable lamp is used in a commercial garage and is frequently placed on the floor under an automobile. This lamp must be a type approved for use in hazardous locations defined as:

- A. Class I, Division 1
- B. Class I, Division 2
- C. Class II, Division 1
- D. Class II, Division 2

CORRECT: A NEC 511.4 (B)(2)

Comment: NEC 1996 & 1999 reference 511-3 (f).

669 An open fixture in a commercial garage shall be placed over vehicular lanes at a height of at least _____ feet.

- A. 16
- B. 10
- C. 14
- D. 12

CORRECT: D NEC 511.7 (B)(1)

Comment: NEC 1996 & 1999 reference 511-7.

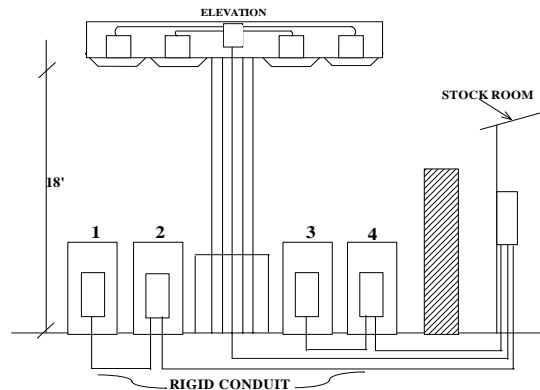
670 Using the information on the diagram, what is the correct number of seal fittings for this installation?

- A. 7
- B. 8
- C. 9
- D. 10

CORRECT: D NEC 511.9 & 501.15 (B)(2)

Note: Be sure to count all penetrations through the surface of the earth.

Comment: NEC 1996 & 1999 reference 511-5 & 501-5 (b)(2); NEC 2002 reference 511.9 & 501.5 (B)(2).



NEC Study Guide

- 671** What special consideration is required for the disconnect that serves the two disconnect circuits that lead to or through gasoline dispensing pumps?
- A. disconnects are prohibited for these circuits
 - B. disconnects must be horsepower rated
 - C. disconnect must be located within 12' of the dispensing equipment
 - D. all circuit conductors including the neutral shall be disconnected

CORRECT: D NEC 514.11 (A)

Comment: NEC 1996 & 1999 reference 514-5 (a).

- 672** According to NEC, any non classified lubrication or service pit, must have an exhaust rate of not less than ____ cfm per ft.² where the facility is not a dispensing facility.
- A. 1
 - B. 2
 - C. 3
 - D. 4

CORRECT: A NEC 514.3 (B)(1) Table

Comment: NEC 1996 & 1999 reference 514-2 Table.

- 673** The NEC considers the area around the dispensing pumps in a service station to be a hazardous location. This area extends to a height of 18" above grade, and up to a distance of ____ feet from the enclosure of the dispensing pump.
- A. 16
 - B. 18
 - C. 20
 - D. 21

CORRECT: C NEC 514.3 Figure

Comment: NEC 1996 & 1999 reference 514-2 Figure.

NEC Study Guide

674 In a gasoline dispensing service station, rigid non-metallic conduit may be installed provided the conduit is:

- A. terminates in a sealed vault fitting prior to emerging from below ground
- B. filled with an approved potting compound
- C. less than 3/4" in diameter
- D. buried no less than 24" deep

CORRECT: D NEC 514.8 exception 2

Comment: NEC 1996 & 1999 reference 514-8 exception 2.

675 A 120 volt portable lamp is used in a commercial garage and regularly laid on the floor under an automobile. This lamp must be of a type approved for its use in hazardous locations as defined by ____.

- A. Class I Division 1
- B. Class I Division 2
- C. Class II Division 1
- D. Class II Division 2

CORRECT: B NEC 516.4(D) exception 2

676 The NEC does not cover:

- A. x-ray equipment
- B. medical & dental x-ray equipment
- C. radiation safety and performance requirements
- D. mobile x-ray equipment

CORRECT: C NEC 517 Part V or 660.1 FPN No. 1

Comment: NEC 1996 & 1999 references are 517 Part E or 660-1 FPN No. 1.

NEC Study Guide

677 What is required for the equipment grounding conductor in a health care facility that serves equipment that operates at 100 volts or more in areas used for patient care that are subject to personal contact?

- A. the conductor must be copper and insulated
- B. the conductor is permitted to be either aluminum or copper if insulated
- C. the conductor must be stranded and insulated
- D. the conductor must be limited to 6' in length

CORRECT: A NEC 517.13 (B)

Comment: NEC 1996 & 1999 reference 517-13 (a).

678 In an area used for patient care, the grounding terminals of all receptacles and non-current-carrying conductive surfaces of fixed electric equipment likely to become energized that are subject to personal contact operating at or above ____ volts, shall be grounded by an insulated copper conductor.

- A. 125
- B. 115
- C. 100
- D. 95

CORRECT: C NEC 517.13 (B)

Comment: NEC 1996 & 1999 reference 517-13 (a).

679 Patient bed locations shall have ____ branch circuits.

- A. 2
- B. 3
- C. 4
- D. 5

CORRECT: A NEC 517.18 (A)

Comment: NEC 1996 & 1999 reference 517-18 (a).

NEC Study Guide

680 Patient bed locations shall have ____ single or duplex receptacles.

- A. 2
- B. 3
- C. 4
- D. 5

CORRECT: C NEC 517.18 (B)

Comment: NEC 1996 & 1999 reference 517-18 (b).

681 According to the NEC, what are the two branches of the hospital emergency system?

- A. the emergency branch and the standby branch
- B. the life safety branch and the critical branch
- C. the normal branch and the alternative branch
- D. the essential branch and the non-essential branch

CORRECT: B NEC 517.31

Comment: NEC 1996 & 1999 reference 517-31.

682 According to the NEC, the two branches of the hospital emergency system ARE:

- A. the emergency branch and the standby branch
- B. the life safety branch and the critical branch
- C. the normal branch and the alternate branch
- D. the essential branch and the non-essential branch

CORRECT: B NEC 517.31

Comment: NEC 1996 & 1999 reference 517-31.

NEC Study Guide

- 683** Which wiring method listed below is not permitted in a single story place of assembly that is non-fire rated construction?
- A. EMT
 - B. TC
 - C. ENT
 - D. NM cable

CORRECT: D NEC 518.4 (B)

Comment: NEC 1996 reference 518-4 exception 1; NEC 1999 reference 518-4 (b).

- 684** Each wall switch controlling a receptacle in a theater dressing room shall be ____.
- A. pilot lighted to indicate the receptacle is energized
 - B. connected only to the top 1/2 of the receptacle
 - C. pilot lighted to locate the switch
 - D. connected only to the common ground of the receptacle

CORRECT: A NEC 520.73

- 685** Temporary wiring for general illumination lampholder shall be ____.
- A. at least 10' above finished floor
 - B. weatherproof
 - C. grounded
 - D. guarded

CORRECT: D NEC 525.21 (B)

Comment: NEC 1996 no reference; NEC 1999 reference 525-13 (g).

NEC Study Guide

686 Overhead conductors (600 volts) passing by a Ferris wheel shall not be located over or within ___ feet.

- A. 10
- B. 12
- C. 15
- D. 18

CORRECT: C NEC 525.5 (B)

Comment: NEC 1996 & 1999 reference 525-12 (b).

687 The service entrance conductors for a manufactured building shall be installed after erection at the building site unless:

- A. the local code requires otherwise
- B. the point of attachment is known prior to manufacture
- C. there is no local code
- D. the owner wants it included in the price

CORRECT: B NEC 545.6 exception

Comment: NEC 1996 & 1999 reference 545-6 exception.

688 According to the NEC, the power supply cord of a mobile home

- I. Shall not be less than 21 feet in length
- II. Shall not be more than 36.5' in length

- A. I only
- B. II only
- C. both I and II
- D. neither I nor II

CORRECT: C NEC 550.10(D)

Comment: NEC 1996 & 1999 reference 550-5 (d).

NEC Study Guide

689 According to the NEC, the neutral conductors of a manufactured home's electric service must be connected to the system grounding conductor at what point?

- A. water main
- B. supply side of the main disconnect
- C. inside distribution panel
- D. ground rod

CORRECT: C NEC 550.16

Comment: NEC 1996 and 1999 reference is 550-11.

690 When an electrician connects a 120 volt/ 240 volt electric range with a cord and plug in a mobile home, the plug cap must have connections for:

- A. 2 line conductors, 1 neutral 1 grounding conductor
- B. 1 line conductor and 1 neutral conductor
- C. 2 line conductors and 1 neutral conductor
- D. 2 line conductors and 1 grounding conductor

CORRECT: A NEC 550.16 (A)(2)

Comment: NEC 1996 & 1999 reference 550-11 (a)(2).

691 According to the NEC, the green-colored insulated grounding wire in the supply cord or permanent feeder wiring, of a manufactured home, shall be used as a "grounding ____" to the grounding buss in the distribution panel board or disconnecting means.

- A. connector
- B. terminator
- C. rod
- D. electrode

CORRECT: A NEC 550.16 (B)(1)

Comment: NEC 1996 & 1999 reference 550-11 (b)(1).

NEC Study Guide

692 According to the NEC, the minimum allowable VA (Volt-Amps) for floor lighting in a manufactured home is ___ VA per square foot.

- A. 3
- B. 6
- C. 9
- D. 12

CORRECT: A NEC 550.18 (A)(1)

Comment: NEC 1996 & 1999 reference 550-13 (a)

693 A park has 45 mobile home sites. The largest typical mobile home has a load of 15,000 VA. The park is supplied by a 120/240 volt single phase service. The service conductors to this park must be sized to carry a minimum net computed load of:

- A. 301.5 amps
- B. 466.7 amps
- C. 643.5 amps
- D. 790.2 amps

CORRECT: D NEC 550.31

Solution: $15,000 \times 23\% = 3450$ VA. $3450 / 240 = 14.3$ amps per location. $14.3 \times 45 = 643.5$.

Comment: NEC 1996 & 1999 reference 550-22.

694 According to NEC Table of Demand Factors for Service and Feeders, if a mobile home park is planned for 35 sites, then, the ungrounded wires in the service to supply this park must be calculated to carry no less than ___ amperes.

- A. 476
- B. 543
- C. 555
- D. 560

CORRECT: D NEC 550.31

Solution: $16,000 \text{ VA} \div 240 \text{ volts} = 66.67$ amps; 66.67 amps $\times 24\% \times 35 = 560$ amps.

Comment: NEC 1996 & 1999 reference 550-22.

NEC Study Guide

695 A park has 45 mobile home sites. The largest typical mobile home has a load of 15,000 VA. The park is supplied by a 120/240 volt single phase service. Conductors servicing the supply to this park must be sized to carry a minimum net computed load of:

- A. 62.5 amps
- B. 647 amps
- C. 2720 amps
- D. 2790 amps

CORRECT: B NEC 550.31

From Demand Factors for Service and Feeders table select the 23% demand factor. Find the amperage of the mobile homes. $15,000 \text{ VA} \div 240 \text{ volts} = 62.5 \text{ amps}$. Derate 62.5 amps. $23\% \times 62.5 \text{ amps} = 14.375 \text{ amps}$. $45 \times 14.375 \text{ amps} = 646.875 \text{ total amps}$.
Comment: NEC 1996 & 1999 reference 550-22.

696 A non-metallic sheathed cable is to be supported near a non-metallic outlet box that has no clamp. The support must be a maximum of ___ inches from the box.

- A. 6
- B. 8
- C. 10
- D. 18

CORRECT: B NEC 551.47 (J)

Comment: NEC 1996 & 1999 reference 551-47 (j)

697 How many recreational vehicle sites in an RV park are required to have 30 AMP 125 volt receptacles given that the park has 200 sites?

- A. none
- B. 70
- C. 100
- D. 140

CORRECT: D NEC 551.71

Solution: $200 \times 70\% = 140 \text{ units}$.
Comment: NEC 1996 & 1999 reference 551-71.

NEC Study Guide

698 All recreational vehicle sites that are supplied with power are required by Code to have: (551-71)

- A. one 20 AMP/125 volt receptacle
- B. one 20 AMP/125 volt and one 20 AMP/240 volt receptacle
- C. one 30 AMP/240 volt receptacle
- D. one 20 AMP and one 50 AMP/240 volt receptacle

CORRECT: A NEC 551.71

Comment: NEC 1996 & 1999 reference 551-71.

699 A 40 space RV park has the standard 50 amp, 30 amp, and 20 amp receptacles as required. What is the total KVA demand for this park?

- A. 80.445
- B. 85.447
- C. 76.752
- D. 65

CORRECT: C NEC 551.73 Table & 551.71

Solution: 20% of sites need to be rated for 50 amps (9600 VA) and 70% of sites need to be rated for 30 amps (3600 VA) and the rest for 20 amps (2400 VA) so we end up with 8 sites at 9600 VA, 28 sites at 3600 VA and 4 sites at 2400 VA, $(8 \times 9600 \text{ VA}) + (28 \times 3600 \text{ VA}) + (4 \times 2400 \text{ VA}) = 76.8 \text{ kVA} + 100.8 \text{ kVA} + 9.6 \text{ kVA} = 187.2 \text{ kVA}$, $187.2 \text{ kVA} \times 41\% = 76.752 \text{ kVA}$.

Comment: NEC 1996 & 1999 reference 551-73 Table & 551-71.

700 The grounded conductors of Type MI cable shall be identified by:

- A. an outer identification of green
- B. an outer identification of orange
- C. distinct markings at the terminals
- D. an outer identification of red

CORRECT: C NEC 555.15 (B)

Comment: NEC 1996 reference 555-7 (b) exception; 1999 reference 555-8 (b) exception.

NEC Study Guide

701 You are installing a 20 AMP receptacle to supply power from the shore to a yacht. The NEC requires this receptacle to be:

- A. on a GFCI
- B. of the locking and grounding type
- C. connected by a rigid metallic conduit
- D. kept independent of a multi-bridge circuit wire multi-wire bridge circuits

CORRECT: B NEC 555.19 (A)(4)(a)

Comment: NEC 1996 & 1999 reference 555-3.

702 Temporary power for Christmas lights is permitted for a period not to exceed ___ days.

- A. 90
- B. 60
- C. 120
- D. 30

CORRECT: A NEC 590.3 (B)

Comment: NEC 1996 & 1999 reference 305-3 (b); NEC 2002 reference 527.3 (B).

703 For temporary wiring on a construction site, 120 volt receptacle outlets are being installed. The receptacle outlets may not be on the same branch as the:

- A. temporary lighting outlet
- B. bathroom receptacle outlet
- C. sign outlet
- D. water pump outlet

CORRECT: A NEC 590.4(D)

Comment: NEC 1996 & 1999 reference 305-4 (d); NEC 2002 reference 527.4 (D).

NEC Study Guide

704 Portable or mobile signs shall be provided with factory-installed ground-fault circuit-interrupter protection for personnel. The ground-fault circuit interrupter shall be an integral part of the attachment plug or shall be located in the power-supply cord within ___ inches of the attachment plug.

- A. 12
- B. 13
- C. 14
- D. 15

CORRECT: A NEC 600.10 (C)(2)

Comment: NEC 1996 & 1999 reference 600-10 (c)(2).

705 Where should a ballast or a transformer for an electric sign or outline lighting be installed for accessibility and to keep a secondary conductor as short as possible?

- A. As near to the clamps or neon tubing as possible
- B. Attached to securely suspended ceiling grids
- C. In attics if a 2' x 2' access door exists
- D. Adjacent to the electrical panel board

CORRECT: A NEC 600.21 (B)

Comment: NEC 1996 & 1999 reference 600-21 (b).

706 Transformers not installed in a sign must have a working space that is at least ___ when measured for height, width and depth.

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

CORRECT: B NEC 600.21 (D)

Comment: NEC 1996 & 1999 reference 600-1 (d).

NEC Study Guide

707 Transformers for signs that operate at more than 1,000 volts located in attics require:

- A. a minimum sized access passageway
- B. relocation
- C. GFCI protection
- D. insulated housings

CORRECT: A NEC 600.21 (E)

Comment: NEC 1996 & 1999 reference 600-21 (e).

708 Transformers for outline lighting shall have a secondary current rating not to exceed ___ milliamperes.

- A. 15
- B. 3
- C. 150
- D. 300

CORRECT: D NEC 600.23 (D)

Comment: NEC 1996 & 1999 reference 600-23 (d).

709 Transformers and electronic power supplies for electric signs and outline lighting shall have a secondary circuit rating of no more than.

- A. 30 mA
- B. 60 mA
- C. 120 mA
- D. 300mA

CORRECT: D NEC 600.23 (D)

NEC Study Guide

- 710** Transformers for outline lighting shall have secondary current ratings of:
- A. 20 amps
 - B. 30 amps
 - C. 40 amps
 - D. 50 amps

CORRECT: B NEC 600.23 (D)

NOTE: Please note that the NEC states that the secondary current rating of an outline light shall not be more than 300 mA. There is no correct answer here. We suggest that you protest his question.
Comment: NEC 1996 & 1999 reference 600-23 (d).

- 711** Neon Secondary-Circuit Conductors, 1000 Volts or Less, Nominal shall have conductors of a size no smaller than ___ AWG.
- A. 14
 - B. 16
 - C. 18
 - D. 20

CORRECT: C NEC 600.31 (B)

Comment: NEC 1996 & 1999 reference 600-31 (b).

- 712** The length of secondary circuit conductors from a high-voltage terminal or lead of a transformer or electronic power supply to the first neon tube electrode shall not exceed the following:
- I. 20 ft where installed in metal conduit or tubing
 - II. 50 ft where installed in nonmetallic conduit
- A. I only
 - B. II only
 - C. Both I and II
 - D. Neither I nor II

CORRECT: C NEC 600.32 (J)(1)

Comment: NEC 1996 & 1999 reference 600-32 (j).

NEC Study Guide

713 A field installed skeleton tubing has a single conductor in a metal raceway from the 8,000 volt secondary terminal of a transformer. What maximum length is allowed for this high-voltage conductor?

- A. 6 ft
- B. 10 ft
- C. 15 ft
- D. 20 ft

CORRECT: D NEC 600.32 (J)(1)

Comment: NEC 1996 & 1999 reference 600-32 (j).

714 Electric discharge lamp signs may not be marked with:

- A. input amperage
- B. voltage
- C. manufacturer's name
- D. the number of lamp holders

CORRECT: D NEC 600.4 (A)

Comment: NEC 1996 reference 600-4 (a)(2); NEC 1999 reference 600-4 (a).

715 The length and design of neon tubing shall not cause a continuous ___ beyond the design loading of the transformer or electronic power supply.

- A. overcurrent
- B. undercurrent
- C. overvoltage
- D. undervoltage

CORRECT: A NEC 600.41 (A)

Comment: NEC 1996 & 1999 reference 600-41 (a).

NEC Study Guide

716 Each commercial building and each commercial occupancy with ground floor footage accessible to pedestrians shall be provided with at least one outlet for sign lighting. The outlet shall be equipped by a branch circuit rated at ___ AMPS.

- A. 5
- B. 20
- C. 30
- D. 40

CORRECT: B NEC 600.5 (A)

Comment: NEC 1996 & 1999 reference 600-5 (a).

717 According to the National Electrical Code, each commercial building accessible to pedestrians shall be provided with at least one outlet by a branch circuit rated at least ___ amperes.

- A. 15 amps
- B. 20 amps
- C. 30 amps
- D. 40 amps

CORRECT: B NEC 600.5 (A)

Comment: NEC 1996 & 1999 reference 600-5 (a).

718 What load, other than a sign, is permitted on the required 20 AMP branch circuit that serves the required sign outlet located at the entrance for a commercial building?

- A. any load less than 5 AMPS
- B. no other load is permitted
- C. one outdoor receptacle provided it is GFCI protected
- D. an automatic door opener

CORRECT: B NEC 600.5 (A)

Comment: NEC 1996 & 1999 reference 600-5 (a).

NEC Study Guide

- 719** According to the National Electrical code, branch circuits that supply signs shall be rated:
- I. Incandescent & fluorescent - 30 amps
 - II. Neon - 20 amps

- A. I only
- B. II only
- C. Both I and II
- D. Neither I nor II

CORRECT: D NEC 600.5 (B)

Comment: NEC 1996 & 1999 reference 600-5 (b).

- 720** A single disconnect may control ___ fixed sign installations:

- A. 6
- B. 2
- C. 3
- D. 1

CORRECT: D NEC 600.6

Comment: NEC 1996 & 1999 reference 600-6.

- 721** According to the NEC, a flasher unit on a neon sign must be rated at ___ percent of the transformer serving that unit.

- A. 100%
- B. 125%
- C. 150%
- D. 200%

CORRECT: D NEC 600.6 (B)

Comment: NEC 1996 & 1999 reference 600-6 (b).

NEC Study Guide

- 722** All decorative metal used on an electric sign must be grounded:
- A.** except when isolated from the energized parts
 - B.** except when insulated from all conductive material
 - C.** except when accessible only to qualified persons
 - D.** under all conditions

CORRECT: D NEC 600.7

Comment: NEC 1996 & 1999 reference 600-7.

- 723** An outdoor sign is accessible to vehicles but it is not protected from physical damage. The bottom of this sign must be above the road at least ____ feet.
- A.** 8
 - B.** 12
 - C.** 14
 - D.** 20

CORRECT: C NEC 600.9 (A)

Comment: NEC 1996 & 1999 reference 600-9 (a).

- 724** Sign or outline lighting system equipment shall be at least ____ feet above areas accessible to vehicles unless protected from physical damage.
- A.** 12
 - B.** 14
 - C.** 16
 - D.** 18

CORRECT: B NEC 600.9 (A)

Comment: NEC 1996 & 1999 reference 600-9 (a).

NEC Study Guide

725 Wood which is used for external decoration on signs must be placed ___ inches from the nearest lamp holder.

- A. 1/2
- B. 1
- C. 2
- D. 2 1/2

CORRECT: A NEC 600.9 (C)

Comment: NEC 1996 & 1999 reference 600-9 (c).

726 Enclosures for outdoor signs must have drain holes that have a maximum size of:

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

CORRECT: A NEC 600.9 (D)(1)

Comment: NEC 1996 & 1999 reference 600-9 (d)(1).

727 What is the maximum number of 15 amp 125 volt receptacles allowed in a free standing partition cord and plug configuration?

- A. 10
- B. 12
- C. 13
- D. 15

CORRECT: C NEC 605.8 (C)

Comment: NEC 1996 & 1999 reference 600-8 (c).

NEC Study Guide

728 What is the minimum AWG size THW copper conductors allowed to feed a branch circuit for a 40 hp, 480 volt, 3 phase, 30 minute rated, crane motor, with 6 current carrying wires in the raceway, and 40 degrees C ambient temperature?

- A. #8
- B. #6
- C. #4
- D. #3

CORRECT: B NEC 610.14 (A) Table & 430.250 Table

Solution: $52 \div 80\% = 65$ amps, derate $65 \text{ amps} \div 0.88 = 73.86 \Rightarrow \#6$ AWG.
Comment: NEC 1996 & 1999 reference 610-14 (a) Table & 430-150 Table; NEC 2002 reference 610.14 (A) Table & 430.150 Table.

729 According to the NEC, the conductors to the hoistway door interlocks from the hoistway riser shall be flame retardant and suitable for a temperature of not less than:

- A. 159
- B. 200
- C. 205
- D. 210

CORRECT: B NEC 620.11 (A)

730 Chauncy's Chop Shop has a DC welder, that only has a 40% duty cycle. The welders' electrical characteristics are 480 volts, 3 phase, 23 amp nameplate rating. According to the NEC, the minimum ampacity for the ungrounded branch circuit conductors shall be no less than ___ amps.

- A. 10
- B. 15
- C. 20
- D. 25

CORRECT: B NEC 630.11 (A)

Solution: The multiplication factor for 40% duty cycle is 0.63 thus $23 \text{ amps} \times 0.63 = 14.49 \Rightarrow 15$ amps.
Comment: NEC 1996 & 1999 reference 630-11 (a).

NEC Study Guide

731 Calculate the feeder size for the following welders:

1. 200 amp 40% duty cycle resistive welder
2. 100 amp 60% duty cycle resistive welder
3. 100 amp 50% duty cycle resistive welder
4. 150 amp 50% duty cycle resistive welder

- A.** 550
- B.** 450
- C.** 429
- D.** 409

CORRECT: D NEC 630.11 (B)

Solution: $(200 \text{ amps} \times 0.63) + (150 \text{ amps} \times 0.71) + ((100 \text{ amps} \times 0.78) \times 85\%) + ((100 \text{ amps} \times 0.71) \times 70\%) = 126 \text{ amps} + 106.5 \text{ amps} + (78 \text{ amps} \times 85\%) + (71 \text{ amps} \times 70\%) = 232.5 \text{ amps} + 66.3 \text{ amps} + 49.7 \text{ amps} = 348.5 \text{ amps} \Rightarrow 350 \text{ amps}.$

Comment: NEC 1996 & 1999 reference 630-11 (b) FPN.

732 A sign indicating that welding cables are within a cable tray must be attached at ____ foot intervals.

- A.** 12
- B.** 18
- C.** 20
- D.** 24

CORRECT: C NEC 630.42 (C)

Comment: NEC 1996 & 1999 reference 630-42 (c).

733 Article 640 includes ____ systems.

- A.** public address
- B.** alarm
- C.** door bell
- D.** security

CORRECT: A NEC 640.1

Comment: NEC 1996 & 1999 reference 640-1.

NEC Study Guide

734 According to the NEC, article ___ addresses central sound systems.

- A. 640
- B. 650
- C. 670
- D. 680

CORRECT: A NEC 640.1

Comment: NEC 1996 & 1999 reference 640-1.

735 Amplifier output circuits carrying audio program signals of 70 volts or less and whose open circuit voltage will not exceed 100 volts shall be permitted to employ:

- A. Class 1 wiring only
- B. Class 2 wiring only
- C. Class 3 wiring only
- D. Class 2 or Class 3 wiring

CORRECT: A NEC 640-5

Comment: Article 640 was completely rewritten in 1999 and this requirement no longer appears in any of the NEC since then.

736 A means shall be provided to disconnect power to all electronic equipment in the Information Technology room. Where is the location of the disconnect means?

- A. within sight of the exit door
- B. The control for the disconnecting means shall be grouped and identified and shall be readily accessible at the principal exit door
- C. within 50 feet of the entrance door
- D. directly inside the entrance door

CORRECT: B NEC 645.10

Comment: NEC 1996 & 1999 reference 645-10.

NEC Study Guide

737 According to the NEC, the control for the disconnecting means for data processing room equipment must be near the rooms' principal ____ door.

- A. entry
- B. passage
- C. operations
- D. exit

CORRECT: D NEC 645.10

Comment: NEC 1996 & 1999 reference 645-10.

738 Under raised floors, power and communications cables are not allowed to be run in which of the following?

- A. flexible metal conduit
- B. rigid non-metallic conduit
- C. electrical non-metallic tubing
- D. type AC cable

CORRECT: C NEC 645.5 (D)(2)

Comment: NEC 1996 & 1999 reference 645-5 (d)(2).

739 Power cables, communications cables, connecting cables, interconnecting cables, and associated boxes, connectors, plugs, and receptacles that are listed for IT equipment:

- A. shall not be required to be secured in place
- B. shall be required to be secured in place
- C. must be fastened every four feet
- D. shall be placed conduit

CORRECT: A NEC 645.5 (E)

Comment: NEC 1996 & 1999 reference 645-5 (e).

NEC Study Guide

740 How shall all the power communications cables connection cables and associated boxes that are listed as part of Information Technology equipment be secured?

- A. secured where they enter and leave the area
- B. secured every six feet
- C. must be routed in conduit
- D. They shall not be required to be secured in place

CORRECT: D NEC 645.5 (E)

Comment: NEC 1996 & 1999 reference 645-5 (e).

741 A disconnecting means for x-ray equipment shall have adequate capacity for at least:

- A. 50% of the input requirement for the momentary rating of the equipment
- B. 100% of the input requirement for the momentary rating of the equipment
- C. 50% of the input requirement for the long time rating
- D. 125% of the input requirement for the long time rating

CORRECT: A NEC 660.5

Comment: NEC 1996 & 1999 reference 660-5.

742 Collector rings for rotating irrigation machine shall have a current rating of not less than ____ of the full load current of the largest device served plus the full load current of all other electrical devices on the machine.

- A. 75%
- B. 100%
- C. 125%
- D. 200%

CORRECT: C NEC 675.11 (A)

Comment: NEC 1996 & 1999 reference 675-11 (a).

NEC Study Guide

743 A center pivot irrigation machine has three motors on one circuit. The equivalent continuous rating is used to determine the branch circuit conductor size. This equivalent current rating is equal to 125% of the nameplate full load current rating of the largest motor plus what percentage of the sum of the nameplate currents of the other two motors?

- A. 125
- B. 80
- C. 100
- D. 60

CORRECT: D NEC 675.22 (A)

744 Which one of the following is not included in Article 680 of the NEC dealing with swimming pools?

- A. storable pools
- B. hot tubs
- C. therapeutic pools
- D. bath tubs

CORRECT: D NEC 680.1

Comment: NEC 1996 & 1999 reference 680-1.

745 Given: A swimming pool has underground wiring nearby. Disregarding exceptions of NEC, what is the minimum distance allowed by the NEC from the inside walls of the pool to underground conductors?

- A. 2'
- B. 3'
- C. 4'
- D. 5'

CORRECT: D NEC 680.10

Comment: NEC 1996 & 1999 reference 680-10.

NEC Study Guide

746 A metal structure designed to support a wet-niche lighting fixture assembly and intended for mount in a pool or fountain structure is called:

- A. niche mount
- B. pendant
- C. forming shell
- D. cove

CORRECT: C NEC 680.2 Definition of Wet Niche Luminaire

Comment: NEC 1996 & 1999 reference 680-4 Definition of Wet Niche Luminaire.

747 According to the NEC, permanent swimming pool circulating pumps that are rated 20 AMPS or less may be connected to the power supply with a grounded, flexible cord-and-plug. the flexible cord shall not exceed ___ feet in length.

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

CORRECT: C NEC 680.21 (A)(5)

Comment: NEC 1996 & 1999 reference 680-7.

748 A ceiling fan that is located directly over an indoor pool is required by Code to be:

- A. removed
- B. on a FGCI circuit
- C. a minimum of 9' above the pool
- D. a minimum of 8' from the floor

CORRECT: C NEC 680.22 (B)(1)

Comment: NEC 1996 & 1999 reference 680-6 (b)(1).

NEC Study Guide

749 The maximum voltage permitted for a pool light is ____ V.

- A. 150
- B. 15
- C. 12
- D. neither A, B, nor C

CORRECT: A NEC 680.23 (A)(4)

Comment: NEC 1996 & 1999 reference 680-20 (a)(2).

750 The top of the fixture lens of an underwater lighting fixture mounted in a permanently installed swimming pool must be at least ____ inches below the normal water level of the pool. (no exceptions)

- A. 12
- B. 14
- C. 16
- D. 18

CORRECT: D NEC 680.23 (A)(5)

751 Given: Underwater lighting fixtures are being placed in the walls of a permanently installed swimming pool. Disregarding NEC exceptions, the top of the fixture lens must be at least how far below the normal water level of the pool?

- A. 14'
- B. 18'
- C. 12'
- D. 24'

CORRECT: B NEC 680.23 (A)(5)

Comment: NEC 1996 & 1999 reference 680-20 (a)(3).

NEC Study Guide

752 What is the minimum size copper equipment grounding conductor permitted by Code for swimming pool lighting permitted under any condition?

- A. #14 AWG
- B. #12 AWG
- C. #10 AWG
- D. #8 AWG

CORRECT: B NEC 680.23 (F)(2)

Comment: NEC 1996 & 1999 reference 680-25 (b)(1).

753 How many feet from the edge of a swimming pool must a junction box be located that serves a 120 volt wet niche lighting fixture?

- A. 2
- B. 3
- C. 4
- D. 5

CORRECT: C NEC 680.24 (A)(2)(b)

Comment: NEC 1996 reference 680-21 (a)(4); NEC 1999 reference 680-21 (a)(5).

754 In the case of swimming pools, the equipment grounding conductor between a remote panel board and the service equipment shall be a ___ copper when the overcurrent protection device protecting the conductors supplying the panel board is a 30 AMP breaker.

- A. #12
- B. #10
- C. #8
- D. #6

CORRECT: B NEC 680.25 (B)(1) & 250.122 Table

Comment: NEC 1996 references are 680-25 (d) & Table 250-95, NEC 1999 references are 680-25 (d) & Table 250-122.

NEC Study Guide

755 A metal frame circulating pool pump that is permanently wired and located outside is required by Code to be protected by:

I - RIHEFI.

II - Bonding a metal housing to the pool bonding system

- A. I only
- B. II only
- C. both I & II
- D. neither I or II

CORRECT: B NEC 680.26 (B)(4)

Comment: NEC 1996 & 1999 reference 680-22 (a)(4).

756 How far does the associated swimming pool pump motor need to be located from the swimming pool to be considered to be of sufficient distance, that bonding with the metal parts of the pool is not required? (680-22 (a) (4))

- A. 5'
- B. 50'
- C. bonding is always required regardless of distance
- D. depends on the voltage of the motor

CORRECT: C NEC 680.26 (B)(4)

Comment: NEC 1996 & 1999 reference 680-22 (a)(4).

757 According to the NEC, the common bonding grid of a swimming pool shall be permitted to be the structural reinforcing steel of a concrete pool where the reinforcing rods are bonded together by the usual steel tie wire method.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 680.26 (C)(1)

Comment: NEC 1996 & 1999 reference 680-22 (b)(1).

NEC Study Guide

758 A spa or hot tub installed indoors, shall be provided with at least ____ 125 volt 15 or 20 ampere convenience receptacle to be located at least 5', but not more than 10 feet of the inside wall of the spa or hot tub.

- A. 0
- B. 1
- C. 2
- D. 3

CORRECT: B NEC 680.43 (A)

Comment: NEC 1996 & 1999 reference 680-41 (a).

759 A lighting outlet is located over an indoor hot tub. If it isn't protected by a ground-fault circuit interrupter, what is the minimum distance allowed between it and the maximum water level?

- A. 12'
- B. 6.5'
- C. 7.5'
- D. 5'

CORRECT: A NEC 680.43 (B)(1)(a)

Comment: NEC 1996 reference 680-41 (b)(1) exception 1; NEC 1999 reference 680-41 (b)(1).

760 According to the NEC, what is the minimum height allowed for a non-GFI protected lighting fixture to be mounted directly over a spa?

- A. 8'
- B. 10'
- C. 12'
- D. 14'

CORRECT: C NEC 680.43 (B)(1)(a)

Comment: NEC 1996 reference 680-41 (b)(1) exception 1; NEC 1999 reference 680-41 (b)(1).

NEC Study Guide

761 Which of the following types of flexible cord is approved for use on a 1 HP pool filter pump?

- A. EVT
- B. TPT
- C. SVTO
- D. SJTO

CORRECT: A NEC 680.56 (B) & Table 400.4

Comment: NEC 1996 & 1999 reference 680-56 & Table 400-4.

762 All electrical spa or hot tub heaters shall be listed and shall have its heating elements subdivided into loads not exceeding 48 amperes and protected at not more than ___ amperes

- A. 48
- B. 60
- C. 72
- D. 84

CORRECT: B NEC 680.9

Comment: NEC 1996 & 1999 reference 680-9.

763 According to the NEC, does a hot tub installed indoor installation?

- A. No, A hot tub installed outdoors shall comply with the requirements for a permanently installed pool
- B. Yes, A hot tub installed outdoors shall comply with the requirements of a permanently installed pool.
- C.
- D.

CORRECT: A NEC 680-42

Comment: NEC 1996 & 1999 reference 680-40.

NEC Study Guide

764 The NEC does NOT directly address door bell wiring.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 700 and 800 Low voltage wiring

765 All of the following battery types are permitted for use in emergency lighting except:

- A. lead acid
- B. glass jar
- C. NI CAD
- D. automotive

CORRECT: D NEC 700.12 (A)

Comment: NEC 1996 & 1999 reference 700-12 (a).

766 Where high-intensity discharge lighting such as high- and low-pressure _____ is used as the sole source of normal illumination, the emergency lighting system shall be required to operate until normal illumination has been restored.

- A. sodium
- B. mercury vapor
- C. metal halide
- D. all of the above

CORRECT: A NEC 700.16

Comment: NEC 1996 & 1999 reference 700-16.

NEC Study Guide

767 When automatic transfer switches are by-passed for an emergency system, the Code requires:

- A. an audible alarm
- B. avoidance of inadvertent parallel operation
- C. a visual alarm
- D. the switch to be rate less than 30 AMPS

CORRECT: B NEC 700.6 (B)

Comment: NEC 1996 reference 700-6; NEC 1999 reference 700-6 (b).

768 Given: A 1000 amp grounded WYE system. The maximum amperage setting allowed for a remote control or notification system is ____ amps.

- A. 1000 amps
- B. 1200 amps
- C. 2000 amps
- D. 3000 amps

CORRECT: B NEC 700.7 (D)

Comment: NEC 1996 & 1999 reference 700-7 (d)

769 According to the NEC, remote-control circuits for safety-control equipment shall be classified as Class 2 if the failure of the equipment to operate introduces a direct fire or life hazard.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 725.11 (A)

Class 1
Comment: NEC 1996 & 1999 reference is 225-8 (a),
NEC 2002 reference is 225.8 (A).

NEC Study Guide

770 According to the NEC, remote control circuits for safety-control equipment shall be classified as Class ____ if the failure of the equipment to operate introduces a direct fire or life hazard.

- A. 1
- B. 3
- C. 5
- D. 7

CORRECT: D NEC 725.11 (A)

Comment: NEC 1996 & 1999 reference 725-8 (a); NEC 2002 725.8 (A).

771 There are remote control circuits for safety control equipment. Some of them can introduce a direct fire or life hazard if the equipment should fail. Such as on elevator recall system. According to the NEC what is the remote control, signaling, and power limited classification of this circuit?

- A. Class IV
- B. Class II
- C. Class II
- D. Class I

CORRECT: D NEC 725.11 (A)

Comment: NEC 1996 & 1999 reference 725-8 (a); NEC 2002 725.8 (A).

772 Article 725 of the NEC specifically covers the installation of signaling equipment powered by a class 2 power source.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 725.2

Comment: NEC 1996 & 1999 reference 725-2.

NEC Study Guide

773 According to the NEC, a Class 1 power limited circuit must be supplied from a source having a rated output of not more than _____ volts and 1000 volt-amperes.

- A. 24
- B. 26
- C. 28
- D. 30

CORRECT: D NEC 725.21 (A)

Comment: NEC 1996 & 1999 reference 725-21 (a).

774 According to the NEC, Class 1 circuits are allowed a minimum wire size of ___ AWG.

- A. 16
- B. 18
- C. 22
- D. 24

CORRECT: B NEC 725.27 (A)

Note: Bells or sirens to control circuitry with runs of less than 40 feet are considered to be Class 1 circuits.

Comment: NEC 1996 & 1999 reference 700-27 (a).

775 According to the NEC, the minimum wire size a Class 1 signal circuit can be is:

- A. AWG #18
- B. AWG #16
- C. AWG #14
- D. AWG #12

CORRECT: A NEC 725.27 (A)

Comment: NEC 1996 & 1999 reference 725-27 (a).

NEC Study Guide

776 According to the NEC, a dry cell battery shall be considered an inherently limited Class ___ power source, provided the voltage is 30 volts or less and the capacity is equal to or less than that available from series connected No. 6 carbon zinc cells.

- A. 2
- B. 4
- C. 6
- D. 8

CORRECT: A NEC 725.41 (A) (5)

Comment: NEC 1996 & 1999 reference 725-41 (a)(5).

777 According to the NEC, Class 2 and 3 remote control circuits can be placed in a raceway or cable with Class 1 circuits:

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 725.55 (A)

Comment: NEC 1996 & 1999 reference 424-54 (a)(1).

778 Class 1, 2, and 3 circuit conductors for an automated fire safety control and for fire and intrusion alarm systems are all placed in the same enclosure. A Class 1 conductor connects to the same equipment as the Class 2 and 3 conductors. What, if any, is the requirement for separating these circuit conductors?

- A. not addressed in the code
- B. no separation needed because they all go to the same equipment
- C. minimum of 1/2" between each conductor
- D. a least 1/4" between Class 1 conductors and Class 2 and 3 conductors

CORRECT: D NEC 725.55 (D)(1)

Comment: NEC 1996 & 1999 reference 725-54 (a)(1) exception 2a.

NEC Study Guide

779 TV system cable (coaxial) may be installed in the same enclosure with power limited cables that are:

- A. Class 2 or 3 jacketed
- B. Class 1 jacketed
- C. Class 2 or 3 non-jacketed
- D. Class 1 non-jacketed

CORRECT: A NEC 725.56 (E)(4)

Comment: NEC 1996 reference 725-54 (b)(5)d; NEC 1999 reference 725-54 (b)(5)(d).

780 Class 1, Class 2, and Class 3 circuit conductors shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 725.6

781 According to the NEC, cables installed in ducts, plenums, and other spaces used for environmental air shall be

- I. Type CL2P
- II. Type CL3P

- A. I only
- B. II only
- C. either I or II
- D. neither I nor II

CORRECT: C NEC 725.61 (A)

Comment: NEC 1996 & 1999 reference 725-61 (a).

NEC Study Guide

782 According to the NEC, cables installed in ducts, plenums, and other spaces used for environmental air shall be

- I. Type CLP
- II. Type CL3P

- A. I only
- B. II only
- C. both I and II
- D. either I or II

CORRECT: B NEC 725.61 (A)

Comment: NEC 1996 & 1999 reference 725-61 (a).

783 According to the NEC, a Class 2 cable may be installed indoors in a cable tray using CL2R cable.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 725.61 (C)

Comment: NEC 1996 & 1999 reference 725-61 (c).

784 According to the National Electrical Code, type ____ communications cable shall be listed as being suitable for use in both in plenums and vertical shafts.

- A. MPP
- B. CMP
- C. CMPL
- D. CMR

CORRECT: D NEC 725.61 Figure

Comment: NEC 1996 & 1999 reference 725-61 Figure.

NEC Study Guide

785 According to the NEC, ___ may NOT be substituted for a CL3P requirement.

- A. FPLP
- B. FPLF
- C. MPP
- D. CMP

CORRECT: B NEC 725.61 Figure

Note: FPLF is not a type of cable. According to NEC 1996 type MPP can be substituted for CL3P; type MPP has been omitted since 1996.

Comment: NEC 1996 & 1999 reference 725-61 Figure.

786 According to NEC Cable Substitutions table for Class 1, Class 2 and Class 3 remote-control, signaling and power-limited circuits, all of the following are true EXCEPT:

- A. PLTC can substitute for CL3 & CL2
- B. CL3P can substitute for CL2P, but not the reverse
- C. CMP can substitute for any communication cable
- D. CLP can substitute for PTLC

CORRECT: D NEC 725.61 Table

Note: There is no PTLC communications cable.

Comment: NEC 1996 & 1999 reference 725-61 Table.

787 Disregarding exception, type PLTC non-metallic sheathed, shall be a minimum size ___ AWG for class 3 circuits and have an insulation rating of at least 300 volts.

- A. 22
- B. 20
- C. 18
- D. 16

CORRECT: A NEC 725.71 (E)

Comment: NEC 1996 & 1999 reference 725-71 (e).

NEC Study Guide

788 Class 1, Class 2 and Class 3, installed above suspended ceiling panels must be supported directly by the building structure in such manner as to not be damaged by building use.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 725.8

Comment: NEC 1996 & 1999 reference 725-7; NEC 2002 reference 725.6.

789 When Class 3 cables are used for a signal circuit it shall have a voltage rating of not less than:

- A. 200-volts
- B. 240-volts
- C. 360-volts
- D. 300-volts

CORRECT: D NEC 725.82 (G)

Comment: NEC 1996 & 1999 reference 725-71 (f); NEC 2002 reference 725.71 (F).

790 According to the NEC the smallest Class 3 single conductor in a signal circuit is:

- A. AWG #20
- B. AWG #18
- C. AWG #16
- D. AWG #14

CORRECT: B NEC 725.82 (H)

Comment: NEC 1996 & 1999 reference 425-71 (g); NEC 2002 reference 725.71 (G).

NEC Study Guide

791 According to the NEC, article ____ governs the installation of grounding for Class 1, 2, & 3 circuits.

- A. 250
- B. 720
- C. 725
- D. 760

CORRECT: A NEC 725.9

Comment: NEC 1996 & 1999 reference 725-6; This section was deleted in NEC 2005.

792 According to the NEC, Class 1, Class 2, and Class 3 circuits and equipment shall be grounded in accordance with article:

- A. 250
- B. 270
- C. 275
- D. 276

CORRECT: A NEC 725.9

Comment: NEC 1996 & 1999 reference 725-6; This section was deleted in NEC 2005.

793 According to the NEC, the minimum size copper equipment grounding conductor for an alarm circuit with a 15 amp over current device is:

- A. 10 AWG
- B. 11 AWG
- C. 13 AWG
- D. 14 AWG

CORRECT: D NEC 725.9 and 250.122 Table

Comment: NEC 1996 reference 725-6 and 250-95 Table; NEC 1999 reference 725-6 & 250-122 Table.

NEC Study Guide

794 Multiple conductor cable of #16 or #18 copper solid or stranded that is listed for nonpower limited signaling circuits are permitted in circuits of ____ volts or less.

- A. 600
- B. 480
- C. 208
- D. 115

CORRECT: A NEC 760.21

Comment: NEC 1996 & 1999 reference 760-21.

795 According to the NEC, ____ is the minimum size conductors permitted to be used on nonpower-limited protective signaling circuits:

- A. 36 AWG
- B. 18 AWG
- C. 32 AWG
- D. 22 AWG

CORRECT: B NEC 760.27 (A)

Comment: NEC 1996 & 1999 reference 760-27 (a).

796 According to NEC Insulation on single conductors (not a multiconductor cable) for non-power limited fire protective signaling circuits shall be suitable for at least ____ volts.

- A. 150
- B. 600
- C. 300
- D. 50

CORRECT: B NEC 760.27 (B)

Comment: NEC 1996 & 1999 reference 760-27 (b).

NEC Study Guide

797 Only copper conductors shall be permitted for fire alarm systems. According to table 402-5, the maximum ampacity of size 18 AWG is:

- A. 6 amps
- B. 8 amps
- C. 9 amps
- D. 10 amps

CORRECT: A NEC 760.27 (C) & 402.5

Comment: NEC 1996 & 1999 reference 760-27 (c) & 402-5.

798 Power limited circuit conductor cables used for fire protective signaling systems are located 7' from the floor. These cables must be securely fastened at maximum intervals of _____ inches.

- A. 6
- B. 12
- C. 18
- D. 24

CORRECT: C NEC 760.52 (B)(1)

Comment: NEC 1996 & 1999 reference 760-52 (b)(1).

799 Power limited cables described in section NEC 760-30 when located within ___ feet of the floor, should be securely fastened.

- A. 6
- B. 7
- C. 8
- D. 9

CORRECT: B NEC 760.52 (B)(1)

Comment: NEC 1996 & 1999 reference 760-52 (b)(1).

NEC Study Guide

800 According to the NEC, Fire alarm circuits shall be installed

- I. In a neat manner
- II. In a workmanlike manner

- A. I only
- B. II only
- C. both I and II
- D. either I or II

CORRECT: C NEC 760.8

Comment: NEC 1996 & 1999 reference 760-8; NEC 2002 reference 760.8.

801 Once fire alarm circuits have been installed in an appropriate manner, the cables will then be supported by which of the following?

- A. the plan considers future support requirements
- B. placed efficiently and conveniently
- C. by the building structure in such a manner that the cable will not be damaged by normal building use
- D. adequate for good service

CORRECT: C NEC 760.8

Comment: NEC 1996 & 1999 reference 760-8; NEC 2002 reference 760.8.

802 According to the NEC, one method of defining fire alarm CI cable is by establishing a minimum 2-hour fire resistance rating for the cable when tested in accordance with UL 2196-1995.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 760.81 (F) FPN 2

Comment: NEC 1996 no reference; NEC 1999 reference 760-31 (f) FPN 2; NEC 2002 reference 760.31 (F) FPN 2.

NEC Study Guide

803 According to the NEC, the size of conductors in a multi-conductor (power-limited fire alarm) cable shall not be smaller than ____.

- A. 22 AWG
- B. 24 AWG
- C. 26 AWG
- D. 28 AWG

CORRECT: C NEC 760.82 (B)

Comment: NEC 1996 & 1999 reference 760-71 (b); NEC 2002 reference 760.71 (B).

804 A prime advantage that optical fiber has over copper cable pair is that a fiber optic transmission line offers.

- A. RFI and EMI immunity
- B. unlimited band width
- C. Low cost of signal conversion devices
- D. More electrical power in the transmitted signal

CORRECT: A NEC 770

805 According to the NEC, ____ cables contain optical fibers and current-carrying electrical conductors.

- A. non-conductive
- B. composite
- C. conductive
- D. acrylic

CORRECT: B NEC 770.0 (C)

Comment: NEC 1996 reference 770-4 (c); NEC 1999 reference 770-5 (c); NEC 2002 reference 770.5 (C).

NEC Study Guide

806 According to the NEC, article ___ applies to the installation of optical fiber cables and raceways.

- A. 770
- B. 770.1
- C. 770.2
- D. 770.3

CORRECT: B NEC 770.1

Comment: NEC 1996 & 1999 reference 770-1.

807 Article 770 of the National Electrical Code specifically addresses the requirements for fiber optic cables.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 770.1

Comment: NEC 1996 & 1999 reference 770-1.

808 According to the NEC, fiber optic conductors installed in EMT with no other current carrying conductors, shall have a maximum fill of ___ %.

- A. 20
- B. 40
- C. 60
- D. Raceway fill tables do not apply

CORRECT: D NEC 770.12 (A)

Comment: NEC 1996 no reference; NEC 1999 reference 770-6; NEC 2002 reference 770.6.

NEC Study Guide

809 Which of the following is not considered a type of optical fiber cable in NEC

- I. Non-conductive, conductive
- II. Low-capacitive, capacitive

- A. I only
- B. II only
- C. both I and II
- D. neither I nor II

CORRECT: B NEC 770.9

Comment: NEC 1996 reference 770-4; NEC 1999 reference 770-5; NEC 2002 770.5.

810 According to the NEC, ___ optical fiber cable contains no metallic members and no other electrically conductive materials.

- A. acrylic
- B. composite
- C. non conductive
- D. conductive

CORRECT: C NEC 770.9 (A)

Comment: NEC 1996 reference 770-4 (a); NEC 1999 reference 770-5 (a); NEC 2002 reference 770.5 (A).

811 Which type of optical fiber cable contains no metallic members and no other materials that carry electric current.

- A. Conductive
- B. ceramic
- C. non-conductive
- D. Composite

CORRECT: C NEC 770.9 (A)

Comment: NEC 1996 reference 770-4 (a); NEC 1999 reference 770-5 (a); NEC 2002 reference 770.5 (A).

NEC Study Guide

812 According to the NEC ____ cable contains noncurrent-carrying conductive members such as strength members, metallic vapor barriers, and metallic armor sheath.

- A. Acrylic type B
- B. nonconductive
- C. Conductive
- D. composite

CORRECT: C NEC 770.9 (B)

Comment: NEC 1996 reference 770-4 (b); NEC 1999 reference 770-5 (b); NEC 2002 reference 770.5 (B).

813 According to the NEC, article 800.1 covers telephone, telegraph, outside wiring of fire alarm and burglar alarms.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 800.1

Comment: NEC 1996 & 1999 reference 800-1.

814 Article 800 communications circuits does not include:

- A. radio
- B. telephone
- C. telegraph
- D. outside wiring for fire alarms

CORRECT: A NEC 800.1

Comment: NEC 1996 & 1999 reference 680-1.

NEC Study Guide

815 According to the NEC, the grounding conductor for a communications circuit shall not be smaller than:

- A. No. 12
- B. No. 14
- C. No. 16
- D. No. 18

CORRECT: B NEC 800.100 (A)(3)

Comment: NEC 1996 & 1999 reference 800-40 (a)(3);
NEC 2002 reference 800.40 (A)(3).

816 According to article 800 of the NEC, the minimum size copper conductor allowed to be used as communications equipment grounding conductor shall be no less than ___ AWG.

- A. 14
- B. 15
- C. 16
- D. 17

CORRECT: A NEC 800.100 (A)(3)

Comment: NEC 1996 & 1999 reference 800-40 (a)(3);
NEC 2002 reference 800.40 (A)(3).

817 According to the NEC, communication cables shall be grounded by a copper conductor not smaller than ____, where required to be grounded.

- A. AWG #18
- B. AWG #16
- C. AWG #14
- D. AWG #12

CORRECT: A NEC 800.100 (A)(3)

Comment: NEC 1996 & 1999 reference 800-40 (a)(3);
NEC 2002 reference 800.33 (A)(3).

NEC Study Guide

818 According to NEC, the primary grounding conductor in a communications circuit, shall be run to the grounding electrode:

- A. in at least EMT
- B. in as straight a line as practicable
- C. no smaller than size 8 AWG copper
- D. in flexible non-metallic

CORRECT: B NEC 800.100 (A)(5)

Comment: NEC 1996 & 1999 reference 800-40 (a)(4);
NEC 2002 reference 800.40 (A)(5).

819 According to the NEC, in a communications circuit, the grounding electrode conductor shall be connected to the building or structure grounding electrode system as covered in 250.50 (250-81 for NEC 1996).

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 800.100 (B)(1)(1)

Comment: NEC 1996 reference 800-40 (b)(1)(1); NEC
1999 reference 800-40 (b)(1)(a); NEC 2002 reference
800.40 (B)(1)(1).

820 The Garrett Interoffice Communications office building has a 120/208 volt, three phase service. Which of the following statements regarding the communications system grounding electrode conductor is true?

- A. It needs another ground of 35 ohms or more
- B. it should be connected to the power grounding electrode system.
- C. It needs another ground of 35 ohms or less
- D. it needs a separate ground electrode

CORRECT: B NEC 800.100 (B)(1)(1)

Comment: NEC 1996 reference 800-40 (b)(1)(1); NEC
1999 reference 800-40 (b)(1)(1); NEC 2002 reference
800.40 (B)(1)(1).

NEC Study Guide

821 A telephone system must be grounded with which of the following?

- A. water piping system
- B. TV cable system
- C. gas line system
- D. same as a power system

CORRECT: A NEC 800.100 (B)(1)(2)

Comment: NEC 1996 reference 800-40 (b)(1)(2); NEC 1999 reference 800-40 (b)(1)(b); NEC 2002 reference 800.40 (B)(1)(2).

822 According to the NEC, a bonding jumper not smaller than ___ copper or equivalent shall be connected between the communications grounding electrode and the power grounding electrode system at the building or structure served where separate electrodes are used.

- A. 6
- B. 7
- C. 8
- D. 9

CORRECT: A NEC 800.100 (D)

Comment: NEC 1996 & 1999 reference 800-40 (d); NEC 2002 reference 800.40 (D).

823 According to the NEC, disregarding exception, a bonding jumper not smaller than ___ copper or equivalent shall be connected between the communications grounding electrode and the power grounding electrode system at the building or structure served where separate electrodes are used.

- A. 6 AWG
- B. 7 AWG
- C. 8 AWG
- D. 9 AWG

CORRECT: A NEC 800.100 (D)

Comment: NEC 1996 & 1999 reference 800-40 (d); NEC 2002 reference 800.40 (D).

NEC Study Guide

824 According to the NEC, communication wire and cables installed as wiring within buildings shall be listed as being suitable for the purpose and installed in accordance with 800.52 (A)-(E).

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 800.133

Comment: NEC 1996 & 1999 reference 800-52; NEC 2002 reference 800.52.

825 Which of the following circuit conductors may be placed in the same raceway or junction box with jacketed communications wires?

- A. electric light
- B. power
- C. Class 1 signaling
- D. community antenna signals

CORRECT: D NEC 800.133 (A)(1)(a)

Comment: NEC 1996 reference 800-52 (a)(1) a.; NEC 1999 reference 800-52 (a)(1)(a); NEC 2002 reference 800.52 (A)(1)(a).

826 Which of the following is a requirement for telecommunications cables that are placed in the same enclosure with Class 1 circuits?

- A. installation must be UL approved equipment
- B. the installation must be authorized by the NFBA
- C. the enclosure may take just power conductors of less than 600 volts
- D. the conductors must be separated by a barrier

CORRECT: D NEC 800.133 (A)(1)(c) Exception 1

Comment: NEC 1996 reference 800-52 (a)(1) c. 1. exception 1; NEC 1999 reference 800-52 (a)(1)(c) 1. exception 1; NEC 2002 reference 800.52 (A)(1)(c) exception 1.

NEC Study Guide

827 According to NEC, communications wires (telephone) and cables shall be separated at least ___ inches from conductors of any electric light, power, Class 1, non-power limited fire alarm, or medium power network-powered broadband communications circuit.

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

CORRECT: B NEC 800.133 (A)(2)

Comment: NEC 1996 reference 800-52 (a)(1) c; NEC 1999 reference 800-52 (a)(2); NEC 2002 reference 800.52 (A)(2).

828 According to Code, communications conductors shall be separated from electric light conductors by no less than ___ inches.

- A. 2
- B. 3
- C. 4
- D. 5

CORRECT: A NEC 800.133 (A)(2)

Comment: NEC 1996 reference 800-52 (a)(1) c; NEC 1999 reference 800-52 (a)(2); NEC 2002 reference 800.52 (A)(2).

829 Which of the following wiring methods is permissible for a category five telephone cable installation?

- A. 0 circuit protectors on aerial runs
- B. pulling tension equal to the cable breaking strength
- C. 2" separation from Class 1 circuits
- D. installation in cable trays for support

CORRECT: C NEC 800.133 (A)(2)

Comment: NEC 1996 reference 800-52 (a)(1) c; NEC 1999 reference 800-52 (a)(2); NEC 2002 reference 800.52 (A)(2).

NEC Study Guide

830 According to the National Electrical Code, disregarding exceptions, communications wires and cables shall be separated by at least ___ inches from any electric light, power, Class 1, non-power-limited fire alarm, or medium power network-powered broadband communications circuit.

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

CORRECT: B NEC 800.133 (A)(2)

Comment: NEC 1996 reference 800-52 (a)(1) c; NEC 1999 reference 800-52 (a)(2); NEC 2002 reference 800.52 (A)(2).

831 An underground power wire is being extended through a raceway into a commercial building. The raceway also contains non-power limited fire alarm cabling. Which of the following wiring methods may be used in this situation?

- A. the telecom cable must be run below the non-power limited circuit.
- B. the communication wire may be run in a flexible tube
- C. The communication wire may be run in a porcelain tube
- D. B and C are correct

CORRECT: C NEC 800.133 (A)(2) exception 2

Comment: NEC 1996 & 1999 reference 800-52 (a)(2) exception 2; NEC 2002 reference 800.52 (A)(2) exception 2.

832 According to the National Electrical Code, type CMR communication cable may be installed in an environmental air duct.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC 800.154 (A)

Comment: NEC 1996 & 1999 reference 800-53 (a); NEC 2002 reference 800.53 (A).

NEC Study Guide

833 According to the NEC, _____ is the type of communication cable allowed in a plenum.

- A. CMP
- B. TPM
- C. PMC
- D. MCT

CORRECT: A NEC 800.154 (A)

Comment: NEC 1996 & 1999 reference 800-53 (a); NEC 2002 reference 800.53 (A).

834 CMP communications cable
I. may be installed in an environmental air duct
II. Must be installed in conduit

- A. I only
- B. II only
- C. either I or II
- D. both I and II

CORRECT: D NEC 800.154 (A) & 300.22 (B)

Comment: Prior to NEC 2005 the first reference would be 800-/.53 (a/A).

835 Type CMR communications cable which is NOT listed for use in air ducts, may be installed in environmental ducts if:

- A. all penetrations of the ducts are sealed and the cable is protected from damage
- B. the cable is properly grounded
- C. the cable is installed in EMT
- D. under NO conditions. Cable must be run outside any air duct.

CORRECT: C NEC 800.154 (A) & 300.22 (B)

Comment: NEC 1996 & 1999 reference 800-53 (a) exception & 300-22 (b); NEC 2002 reference 800.53 (A) & 300.22 (B).

NEC Study Guide

836 According to the markings and substitution guidelines which multipurpose communications cable has no permitted substitutions?

- A. MPP
- B. MP
- C. CM
- D. CMP

CORRECT: A NEC 800.154 (G)

Comment: NEC 1996 & 1999 reference 800-53 (f); NEC 2002 reference 800.53 (G).

837 Type ___ communications cable may be installed in both plenums and shafts.

- A. CNG
- B. CMP
- C. CMB
- D. CNPL

CORRECT: B NEC 800.154 Figure

Comment: NEC 1996 & 1999 reference 800-53 Figure; NEC 2002 reference 800.53 Figure.

838 According to the NEC listing, which of the following may be substituted for type CMX cable?

- A. CM
- B. FPL
- C. FRN
- D. CL3PL

CORRECT: A NEC 800.154 Figure

Comment: NEC 1996 & 1999 reference 800-53 Figure; NEC 2002 reference 800.53 Figure.

NEC Study Guide

839 According to the NEC, ___ may be installed in both risers and plenums.

- A. CMP
- B. FPLP
- C. FPLR
- D. CL2R

CORRECT: A NEC 800.154 Figure

Comment: NEC 1996 & 1999 reference 800-53 Figure;
NEC 2002 reference 800.53 Figure.

840 Class 2 speaker wiring is being combined with existing power limited, music and fire alarm systems in a 4 story structure. Wiring is in the drop ceiling which is also used for return air. Which one of the following cable types could be used to accommodate all?

- A. 16 AWG MP
- B. 18 AWG MP
- C. 20 AWG FPLR
- D. 22 AWG CMP

CORRECT: D NEC 800.154 Figure

Comment: NEC 1996 & 1999 reference 800-53 Figure;
NEC 2002 reference 800.53 Figure.

841 According to the NEC, type ___ communications plenum cable shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall be listed as having adequate fire-resistive and low smoke-producing characteristics.

- A. MPX
- B. CMX
- C. WCP
- D. CMP

CORRECT: D NEC 800.179 (A)

Comment: NEC 1996 & 1999 reference 800-51 (a); NEC 2002 reference 800.51 (A).

NEC Study Guide

842 CMP conductors are permitted in a plenum and shall also be listed as having adequate fire resistant and low smoke producing characteristics.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 800.179 (A)

Comment: NEC 1996 & 1999 reference 800-51 (a); NEC 2002 reference 800.51 (A).

843 According to the NEC, Type CMX limited use communications shall be listed as being suitable for use in dwellings and for use in raceways.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 800.179 (E)

Comment: NEC 1996 & 1999 reference 800-51 (e); NEC 2002 reference 800.51 (E).

844 According to the NEC, type ___ limited use communications cable shall be suitable for use in dwellings and for use in raceway and shall also be listed as being resistant to flame spread.

- A. CMX
- B. CMUC
- C. MP
- D. CMP

CORRECT: A NEC 800.179 (E)

Note: Also acceptable for use as sound cable in churches.
Comment: NEC 1996 & 1999 reference 800-51 (e); NEC 2002 reference 800.51 (E).

NEC Study Guide

845 CMX cable may be installed without a raceway in single family residences.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 800.179 (E)

Comment: NEC 1996 & 1999 reference 800-51 (e); NEC 2002 reference 800.51 (E).

846 According to the NEC, overhead communication wires and cables, which are run parallel to and below service drops, must maintain a minimum separation of at least ___ inches at any point along the span.

- A. 6"
- B. 12"
- C. 18"
- D. 24"

CORRECT: B NEC 800.44 (A)(4)

Comment: NEC 1996 & 1999 reference 800-10 (a)(4); NEC 2002 reference 800.10 (A)(4).

847 According to the National Electrical Code, overhead service conductors carrying a voltage up to 750 volts, including 208Y / 120 volt services, must be separated from communications conductors by no less than ___ inches.

- A. 10
- B. 12
- C. 14
- D. 16

CORRECT: B NEC 800.44 (A)(4)

Comment: NEC 1996 & 1999 reference 800-10 (a)(4); NEC 2002 reference 800.10 (A)(4).

NEC Study Guide

848 When routing general purpose communications cabling across a roof, it must clear the roof by at least ___ feet.

- A. 2
- B. 4
- C. 6
- D. 8

CORRECT: D NEC 800.44 (B)

Comment: NEC 1996 & 1999 reference 800-10 (b); NEC 2002 reference 800.10 (B).

849 Communications cable which are installed above roofs, must have a vertical clearance of not less than ___ feet from all points on the roof above which they pass.

- A. 6'
- B. 7'
- C. 8'
- D. 10'

CORRECT: C NEC 800.44 (B)

Comment: NEC 1996 & 1999 reference 800-10 (b); NEC 2002 reference 800.10 (B).

850 According to the NEC, underground communication wires and cables in a raceway, manhole, or manhole containing electric light power, Class 1 or non-power limited fire alarm circuit conductors, shall be in a section separated from such conductors by:

- A. 12" space
- B. brick, concrete, or tile partition
- C. metal barrier
- D. no barrier needed

CORRECT: B NEC 800.47 (A)

Comment: NEC 1996 & 1999 reference 800-11 (a); NEC 2002 reference 800.11 (A).

NEC Study Guide

851 According to the NEC, article ____ covers communications wires and cables without a metallic shield, running from the last outdoor support to the primary protector.

- A. 800-12 (a)
- B. 800-12 (b)
- C. both A and B
- D. A only

CORRECT: C NEC 800.50 (A) & (B)

Note: Assume 300 volts to ground.
Comment: NEC 1996 & 1999 reference 800-12 (a) & (b);
NEC 2002 reference 800.12 (A) & (B).

852 The NEC classifies computer circuits as class 2 circuits. Considering office environments, which of the following statement is correct?

- A. They may be run alongside class 1 fiber optic circuits operating at 600 volts or less
- B. Non-coaxial telephone and data cables may both be aluminum
- C. If rated for 600 volts both may run alongside A/C circuits
- D. Both may be contained in the same multipurpose raceway

CORRECT: D NEC 800.52 (A)

853 According to the NEC, Which type of communication cable is an allowable substitution for CMP cable in plenum?

- A. PMP
- B. MPC
- C. MPP
- D. MCP

CORRECT: C NEC 800.53

Comment: NEC 1996 & 1999 reference 800-53. NEC 2005 removed type MPP from article 800.

NEC Study Guide

854 According to the NEC, fused-type primary protectors for communications circuits, shall consist of an arrester connected between each line conductor and ground,

- I. A fuse in series with each line conductor
- II. Metallic mounting devices

- A. I only
- B. II only
- C. both I and II
- D. either I or II

CORRECT: A NEC 800.90 (A)(2)

Comment: NEC 1996 & 1999 reference 800-30 (a)(2);
NEC 2002 reference 800.30 (A)(2).

855 The outer sheath of coax cable used in a communication system must be grounded at the buildings premises.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 800.93

Comment: NEC 1996 & 1999 reference 800-33; NEC
2002 reference 800.33.

856 Where communications circuits enter a building the metallic sheath must be grounded at the point of entrance or shall be interrupted by the use of which of the following?

- A. insulating joint
- B. support bracket
- C. grounding sleeve
- D. sheath carrier

CORRECT: A NEC 800.93

Comment: NEC 1996 & 1999 reference 800-33; NEC
2002 reference 800.33.

NEC Study Guide

857 The NEC specifies that the clearance required between receiving equipment on antenna systems and conductors of other systems of 250 volts or less to be at least 2'.

- A. True
- B. False
- C.
- D.

CORRECT: A NEC 810.13

Comment: NEC 1996 & 1999 reference 810-13.

858 A self supporting satellite dish antennae is being installed on the roof of a multi-story apartment building. The roof is crossed by overhead power and communication conductors. The dish is unprotected from the weather. This dish must be:

- A. sized not less than specified when using Table 810-116 (a)
- B. strong enough to withstand ice and wind blowing
- C. kept away from overhead power lines of 120 volts or less
- D. at least 12' from light circuits

CORRECT: B NEC 810.16 (B)

Comment: NEC 1996& 1999 reference 810-16 (b).

859 According to the NEC, and disregarding exceptions, underground power supply conduits should be separated from communication system conduits by at least ___ of well tamped earth.

- A. 12
- B. 13
- C. 14
- D. 15

CORRECT: A NEC 810.18 (A), 820.47 (B) & 830.47 (B)

Comment: NEC 1996 reference 810-18 (a) & 820-11 (b); NEC 1999 reference 810-18 (a), 820-11 (b) & 830-11 (b); NEC 2002 810.18 (A), 820.11 (B) & 830.12 (B)

NEC Study Guide

860 An antenna is installed on a building for single reception. What is the smallest size copper grounding conductor permitted?

- A. 14 AWG
- B. 12 AWG
- C. 10 AWG
- D. 8 AWG

CORRECT: C NEC 810.21 (H)

Comment: NEC 1996 & 1999 reference 810-21 (h).

861 According to the NEC, a bonding jumper not smaller than ____ copper shall be connected between the radio and television equipment grounding electrode and the power grounding electrode system.

- A. 2
- B. 3
- C. 4
- D. 6

CORRECT: D NEC 810.21 (J)

Comment: NEC 1996 & 1999 reference 810-21 (j).

862 CATV is defined as:

- A. Community antenna transmitting vehicle
- B. Community antenna television
- C. Coax television
- D. Cable transmitting vehicle

CORRECT: B NEC 820.1

Comment: NEC 1996 & 1999 reference 820-1.

NEC Study Guide

863 According to the NEC, what is the minimum size copper bonding jumper between a CATV system grounding electrode and the electrical power system grounding electrode where both of these electrodes are used? Do not take into consideration the exceptions.

- A. 10 awg
- B. 6 awg
- C. 8 awg
- D. 12 awg

CORRECT: B NEC 820.100 (D)

Comment: NEC 1996 & 1999 reference 820-40 (d); NEC 2002 reference 820.40 (D).

864 A building has a 120/208 volt 3-phase service. To insure adequate ground the CATV system grounding electrode conductor _____.

- A. Must be attached to a grounding rod
- B. Must be bonded to the power grounding electrode system
- C. is not required by NEC
- D. Is not required to be connected to any grounding electrode because just low voltages are involved

CORRECT: B NEC 820.100 (D)

Comment: NEC 1996 & 1999 reference 820-40 (d); NEC 2002 reference 820.40 (D).

865 Given: A building has a 120/208 3 phase service. A low voltage system that requires a separate grounding electrode is installed. Which of the following statements regarding electrode conductor is true?

- A. It is not required by the NEC
- B. Must be attached to a grounding rod that is not connected to any other grounding electrode system
- C. It is not required because just low voltages are involved
- D. Must be connected to the power grounding electrode system

CORRECT: D NEC 820.100 (D)

Comment: NEC 1996 & 1999 reference 820-40 (d); NEC 2002 reference 820.40 (D).

NEC Study Guide

866 TV coax cable shall be separated at least ___ inches from conductors of any electrical light, power, or class 1 non-power limited fire alarm.

- A. 6
- B. 4
- C. 2
- D. 1

CORRECT: C NEC 820.133 (A)(2)

Comment: NEC 1996 reference 820-52 (a)(1); NEC 1999 reference 820-52 (a)(2); NEC 2002 reference 820.52 (A)(2).

867 According to the National Electrical Code, where practicable, a separation of at least ___ feet shall be maintained between any coaxial cable and a lightning conductor.

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: D NEC 820.44 (F)(3)

Comment: NEC 1996 & 1999 reference 820-10 (f)(3); NEC 2002 reference 820.10 (F)(3).

868 According to the National Electrical Code, where practicable, a separation of at least ___ feet shall be maintained between any coaxial cable and lightning conductors.

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: C NEC 820.44 (F)(3)

Comment: NEC 1996 & 1999 reference 820-10 (f)(3); NEC 2002 reference 820.10 (F)(3).

NEC Study Guide

869 According to the NEC, communications cables shall be permitted in the same raceway or enclosure with cables of:

- I. Class 2 and Class 3 remote control, signaling, and power-limited circuits in compliance with 725
- II. Community antenna television and radio distribution systems in compliance with 820.

- A. I only
- B. II only
- C. both I and II
- D. neither I nor II

CORRECT: C NEC 830.133 (A)(1)(b) (1) & (A)(1)(b)(5)

Comment: NEC 1996 no reference; NEC 1999 reference 830-58 (a)(1)(b)(1) & (a)(1)(b)(5); NEC 2002 reference 830.58 (A)(1)(b)(1) & (A)(1)(b)(5).

870 According to the National Electrical Code, network-powered broadband communications cables shall have a separation of at least ___ inches from non-power limited fire alarm circuits.

- A. 2
- B. 3
- C. 4
- D. 5

CORRECT: C NEC 830.44 (I)(1)

Comment: NEC 1996 no reference; NEC 1999 reference 830-10 (i)(1); NEC 2002 reference 830.11 (I)(1).

871 A listed primary protector must be provided on each communications circuit that is exposed to accidental contact with electric power conductors operating at what minimum voltage to ground?

- A. 240 Volts
- B. 300 Volts
- C. 120 Volts
- D. 600 Volts

CORRECT: B NEC 830.90 (A) & 800.90 (A)

Comment: NEC 1996 & 1999 reference 820-33; NEC 2002 reference 830.30 (A) & 800.30 (A).

NEC Study Guide

872 What is the maximum number of THWN #14 standard conductors permitted in a 10' raceway that is 1/2" EMT?

- A. 9
- B. 10
- C. 12
- D. 15

CORRECT: C NEC Annex C Table C1 pg. 70-659

Comment: NEC 1996 reference Appendix C Table C1 pg. 70-938; NEC 1999 reference Appendix C Table C1 pg. 70-585; NEC 2002 reference Annex C Table C1 pg. 70-645.

873 Compute the net load for a residence using the following data:

1. 1100 SF living area
2. Service 120/240 single phase
3. 10Kw range
4. Laundry
5. 240 Volt clothes dryer
6. Water heater 240 volt 6K

- A. 78 amps
- B. 88 amps
- C. 99 amps
- D. 102 amps

CORRECT: C NEC Annex D Example D1(A) pg. 70-717

Solution: Lighting load, $1100 \text{ ft.}^2 \times 3 \text{ VA/ft.}^2 = 3300 \text{ VA}$; small appliance load 3000 VA; laundry load 1500 VA; total 7800 VA; take 100% for first 3000 VA + 1680 VA (35% of remainder) + 8000 VA (range) + 5000 VA (dryer) + 6000 VA (water heater) = 23,680 VA; $23,680 \text{ VA} \div 240 \text{ volts} = 98.666 \text{ amps}$ or 99 amps.

Comment: NEC 1996 reference Chapter 9 Example 1(A) pg. 70-897; NEC 1999 reference Appendix D Example D1(A) pg. 70-609; NEC 2002 Annex D Example D1(A)

NEC Study Guide

- 874** What size load is required to service a residence 1100 sq.ft.

1-10 kw range
1-electric dryer
1-6kw hot water heater
no A/C or Heat
Single phase 240 V.

Use the standard method.

- A. 79
- B. 99
- C. 107
- D. 125

CORRECT: B NEC Annex D Example D1(a) pg. 70-717

Solution: Lighting load, $1100 \text{ ft.}^2 \times 3 \text{ VA/ft.}^2 = 3300 \text{ VA}$; small appliance load (2-20 amp circuits) 3000 VA; laundry load 1500 VA; total 7800 VA, take 100% of first 3000 VA then the remainder (4800 VA) for a load of 4680 VA; add in the load for range, dryer and water heater ($1600 \text{ VA} \times 125\% = 2000 \text{ VA}$), $4680 \text{ VA} + 10,000 \text{ VA} + 5000 \text{ VA} + 2000 \text{ VA} = 21,680 \text{ VA}$; determine current $21,680 \text{ VA} / 240 \text{ volts} = 90.33 \text{ amps}$.
Comment: NEC 1996 Chapter 9 Example 1(a) pg. 70-897; NEC 1999 reference Appendix D Example D1(a) pg. 70-609; NEC 2002 reference Annex D Example D1(a) pg. 70-667.

- 875** A new 4000 SF residence would have a minimum net computed feeder load, after derating for the general lighting, of ___ VA.

- A. 6150 VA
- B. 6,800 VA
- C. 7,000 VA
- D. 7,600 VA

CORRECT: A NEC Annex D Example D1(a) pg. 70-717.

General lighting is $4000 \times 3 \text{ Va} = 12,000 \text{ Va}$. Derate the first 3000 Va at 100%. Derate the remaining 9,000 SF for general lighting at 35% = 3150 Va. For a total of 6150 Va after the general lighting derate.
Comment: NEC 1996 Chapter 9 Example 1(a) pg. 70-897; NEC 1999 reference Appendix D Example D1(a) pg. 70-609; NEC 2002 reference Annex D Example D1(a) pg. 70-667.

NEC Study Guide

- 876** Determine the general lighting and appliance load requirements for a multifamily dwelling unit:
40 apartments 800 sf each
2 banks of meters of 20 each, and
individual subfeeders to each apartment.
20 apartments have electric ranges; these
apartments (with ranges) are evenly
divided, 10 on each meter bank; the
ranges are 9 kw each.
Service is 120/240 volts.

The general lighting load and small appliance load for each apartment would be:

- A. 5250 VA
- B. 5400 VA
- C. 5750 VA
- D. 5850 VA

CORRECT: B NEC Annex D Example D4(a) pg. 70-720

Solution: Lighting load, $800 \text{ ft.}^2 \times 3 \text{ VA/ft.}^2 = 2400 \text{ VA}$; small appliance load (2-20 amp circuits) 3000 VA ; $2400 \text{ VA} + 3000 \text{ VA} = 5400 \text{ VA}$.
Comment: NEC 1996 Chapter 9 Example 4(a) pg. 70-903; NEC 1999 reference Appendix D Example D4(a) pg. 70-611; NEC 2002 reference Annex D Example D4(a) pg. 70-669.

- 877** Common voltages for a residence are:

- A. 120/208
- B. 120/240
- C. 240/480
- D. 277/480

CORRECT: B NEC Annex D Voltage pg. 70-717

Comment: NEC 1996 reference Chapter 9 Voltage pg. 70-897; NEC 1999 reference Appendix D Voltage pg. 70-709; NEC 2002 reference Annex D Voltage pg 70-667.

NEC Study Guide

878 A 1500 square foot dwelling has a 10kw range and a 5.5 kw dryer. According to NEC, what minimum size over current device is required?

- A. 80 amp
- B. 100 amp
- C. 125 amp
- D. 150 amp

CORRECT: B NEC appendix D example D (1) (a)

Solution: Lighting load, $1500 \text{ ft.}^2 \times 3 \text{ VA/ft.}^2 = 4500 \text{ VA}$; small appliance load (2-20 amp circuits) 3000 VA; laundry load 1500 VA; total 9000 VA, take 100% of first 3000 VA then the remainder (6000 VA) for a load of 5100 VA; add in the load for the range and the dryer, $5100 \text{ VA} + 10,000 \text{ VA} + 5500 \text{ VA} = 20,600 \text{ VA}$; determine current $20,600 \text{ VA} / 240 \text{ volts} = 85.8 \text{ amps} \Rightarrow$ 100 amp overcurrent device.

Comment: NEC 1996 Chapter 9 Example 1(a) pg. 70-897; NEC 1999 reference Appendix D Example D1(a) pg. 70-609; NEC 2002 reference Annex D Example D1(a) pg. 70-667.

879 A branch circuit, consisting of two or more ungrounded conductors that have a potential difference between them, and a grounded conductor that has equal potential difference between it and each ungrounded conductor of the circuit and that is connected to the neutral or grounded conductor of the system, is _____.

- A. branch circuit
- B. general purpose
- C. multi-wire
- D. dual purpose

CORRECT: C NEC Article 100 Definitions - Branch Circuit, Multiwire

880 A hoistway in which an elevator is designed to operate can be all of these except:

- A. any shaftway
- B. any hatchway
- C. any well hole
- D. any stairway

CORRECT: D NEC Article 100 Definitions - Hoistway

NEC Study Guide

881 A 2" conduit no more than ___ in length connecting a gutter and a switch case may have conductor fill of 60% of the internal cross sectional area.

- A. 6"
- B. 12"
- C. 18"
- D. 24"

CORRECT: D NEC Chapter 9 Table 1 Note (4)

882 According to the NEC, a 1 1/2" nipple with three conductors can be filled to an area of ___ square inches.

- A. .999
- B. 1.111
- C. 1.211
- D. 1.224

CORRECT: D NEC Chapter 9 Table 1 Note 4 pg. 70-625

Solution: 60% of cross sectional area, $0.7854 \times 1.5 \times 1.5 \times 60\% = 1.22$. (Note r is the radius and d is the diameter then area is $\pi r^2 = \pi \times (d \div 2)^2 = \pi \times (d^2 \div 2^2) = \pi \times d^2 \div 4 = (\pi \div 4) \times d^2 = 0.7854 \times d^2 = 0.7854 \times d \times d$)
Comment: NEC 1996 reference Chapter 9 Table 1 Note 4 pg. 70-879; NEC 1999 reference Chapter 9 Table 1 Note 4 pg 70-561; NEC 2002 reference Chapter 9 Table 1 Note 4 pg 70-617.

883 When calculating the maximum number of conductors permitted in a conduit or tubing, all of the same size, the next higher whole number shall be used to determine the maximum number of conductors permitted when the calculation results in a decimal of ___ or higher.

- A. .5
- B. .6
- C. .7
- D. .8

CORRECT: D NEC Chapter 9 Table 1 Note 7 pg. 70-625

Comment: NEC 1996 reference Chapter 9 Table 1 Note 7 pg. 70-879; NEC 1999 reference Chapter 9 Table 1 Note 7 pg 70-561; NEC 2002 reference Chapter 9 Table 1 Note 7 pg 70-617.

NEC Study Guide

884 What is the internal diameter of a 1 1/4" liquid tight, flexible non metallic conduit (type LFNC-A)?

- A. 1.34"
- B. 1.383"
- C. 1.394"
- D. 1.395"

CORRECT: D NEC Chapter 9 Table 4 pg. 70-627

Comment: NEC 1996 reference Chapter 9 Table 4 pg. 70-881; NEC 1999 reference Chapter 9 Table 4 pg. 70-562; NEC 2002 reference Chapter 9 Table 4 pg. 70-619.

885 Five conductors, in a 12" nipple of rigid metal conduit, has a total cross sectional area of 2.5 square inches. What is the minimum trade size conduit?

- A. 2"
- B. 2½"
- C. 3"
- D. 4"

CORRECT: C NEC Chapter 9 Table 4 pg. 70-628

Solution: Look in the table for Rigid Metal Conduit for a value in the over 2 wires column that is 2.5 in.² or larger.
Comment: NEC 1996 reference Chapter 9 Table 4 pg. 70-881; NEC 1999 reference Chapter 9 Table 4 pg. 70-563; NEC 2002 reference Chapter 9 Table 4 pg. 70-620.

886 How many #12 RHW copper conductors (with outer covering) can be placed in a 1" EMT conduit?

- A. 7
- B. 8
- C. 9
- D. 13

CORRECT: C NEC Chapter 9 Table 5 pg. 70-630 & Table 4 pg. 70-625

Solution: #12 RHW 0.0353 in.², 1" EMT 0.864 in.², 40% is 0.346 in.²; $0.346 \div 0.353 = 9.801 \Rightarrow 9$.
Comment: NEC 1996 reference Chapter 9 Table 5 pg. 70-883 & Table 4 pg. 70-880; NEC 1999 reference Chapter 9 Table 5 pg. 70-564 & Table 4 pg. 70-562; NEC 2002 Chapter 9 Table 5 pg. 70-622 & Table 4 pg. 70-617.

NEC Study Guide

887 The number of #12 THW conductors allowed in a 3/4" conduit will be more than the number of #12 TW conductors allowed in a 3/4" conduit.

- A. True
- B. False
- C.
- D.

CORRECT: B NEC Chapter 9 Table 5 pg. 70-631 & Table 1 pg. 70-625

Comment: NEC 1996 reference Chapter 9 Table 5 pg. 70-883,884 & Table 1 pg. 70-879; NEC 1999 reference Chapter 9 Table 5 pg. 70-564 & Table 1 pg 70-561; NEC 2002 reference Chapter 9 Table 5 pg 70-622 & Table 1 pg 70-617.

888 Determine the cross sectional area in square inches for the following combinations of copper conductors: 4-#8 AWG, THHN; 8-#12 AWG, RHW; 6 - #10 AWG, XHHW: (Table 5)

- A. 0.5746 SI
- B. 0.02053 SI
- C. 0.4029 SI
- D. 5.2060 SI

CORRECT: A NEC Chapter 9 Table 5 pg. 70-631,632,633

Solution: The cross sectional areas are #8 THHN - 0.0366 in.², #12 RHW - 0.0353 in.², #10 XHHW - 0.0243 in.²; $(0.0366 \times 4) + (0.0353 \times 8) + (0.0243 \times 6) = 0.1464 + 0.2824 + 0.1458 = 0.5746$.

Comment: NEC 1996 reference Chapter 9 Table 5 pg. 70-884,886; NEC 1999 reference Chapter 9 Table 5 pg. 70-564,565; NEC 2002 reference Chapter 9 Table 5 pg. 70-622,623.

NEC Study Guide

889 What size EMT raceway is required for 24, AWG #6 THHN?

- A. 1 1/2"
- B. 2"
- C. 2 1/2"
- D. 3"

CORRECT: A NEC Chapter 9 Table 5 pg. 70-632 & Table 4 pg. 70-626

Solution: From Table 5, #6 THHN's area is .0507. $24 \times .0507 = 1.2168$ SI. From Table 4 (and Note (4) Table Notes) the maximum fill for 1 1/2" EMT nipple is (60%) or 1.22. Therefore a 1 1/2" EMT nipple can carry 24 #6 THHN conductors.

Comment: NEC 1996 reference Chapter 9 Table 5 pg. 70-884, Table 4 pg. 70-880 & Note 4 pg. 70-879; NEC 1999 reference Chapter 9 Table 5 pg 70-564, Table 4 pg. 70-562 & Note 4 pg. 70-561; NEC 2002 reference Chapter 9 Table 5 pg. 70-622, Table 4 pg. 70-617 & Note 4 pg. 70-617.

890 Using Table 4 and Table 5 of the NEC, compute the maximum number of # 10 AWG, Type THHN, copper conductors allowed in 32' run of 1/2" "IMC".

- A. 4
- B. 5
- C. 6
- D. 7

CORRECT: C NEC Chapter 9 Table 5 pg. 70-632 & Table 4 pg. 70-627

Solution: From table 4 the cross sectional area for more than 2 conductors in 1/2" IMC is 0.137 in.², from table 5 the cross sectional area of #10 THHN is 0.0211 in.², $0.137 \text{ in.}^2 \div 0.0211 \text{ in.}^2/\text{wire} = 6.49 \Rightarrow 6$ wires.

Comment: NEC 1996 reference Chapter 9 Table 5 pg. 70-884 & Table 4 pg. 70-880; NEC 1999 reference Chapter 9 Table 5 pg. 70-564 & Table 4 pg. 70-562; NEC 2002 reference Chapter 9 Table 5 pg. 70-619 & Table 4 pg. 70-619.

NEC Study Guide

891 What size RMC nipple (18" long) is required for 24, AWG #8 THHN?

- A. 1"
- B. 1.25"
- C. 1.5"
- D. 2"

CORRECT: B NEC Chapter 9 Table 5 pg. 70-632, Table 4 pg. 70-628 & Note 4 pg. 70-625

Solution: From Table 5, #8 THHN's area is .0366 SI. $24 \times .0366 = .8784$ SI. From Table 4 (and Note (4) Table Notes) the maximum fill for 1 1/2" RMC nipple is (60%) or .916. Therefore a 1 1/2" RMC nipple can carry 24 #8 THHN conductors.

Comment: NEC 1996 reference Chapter 9 Table 5 pg. 70-884, Table 4 pg. 70-880 & Note 4 pg. 70-879; NEC 1999 reference Chapter 9 Table 5 pg. 70-564, Table 4 pg. 70-562 & Note 4 pg. 70-561; NEC 2002 reference Chapter 9 Table 5 pg. 70-622, Table 4 pg. 70-617 & Note 4 pg. 70-617.

892 Eighteen, 250 KCMIL, THWN copper conductors are in a rigid metal conduit nipple. What is the minimum diameter in inches permitted by for the conduit? Assume that the conductors are not lead covered and the nipple is 1' in length.

- A. 3"
- B. 3 1/2"
- C. 4"
- D. 5"

CORRECT: D NEC Chapter 9 Table 5 pg. 70-632, Table 4 pg. 70-628, Note 4 pg. 70-625

Solution: 250 Kcmil THWN has an area of 0.397 in.², total area required - 18 conductors \times 0.397 in.² = 7.146 in.², 60% for 4" RMC = 7.729 in.².

Comment: NEC 1996 reference Chapter 9 Table 5 pg. 70-884, Table 4 pg. 70-880 & Note 4 pg. 70-879; NEC 1999 reference Chapter 9 Table 5 pg. 70-564, Table 4 pg. 70-562 & Note 4 pg. 70-561; NEC 2002 reference Chapter 9 Table 5 pg. 70-622, Table 4 pg. 70-617 & Note 4 pg. 70-617.

NEC Study Guide

893 The cross sectional area of a conductor is compared to a conductor that is four times its area. What is the approximate resistance of the larger conductor compared to the smaller?

- A. 1/2 resistance
- B. 1/4 resistance
- C. 2 times resistance
- D. 4 times resistance

CORRECT: B NEC Chapter 9 Table 8

Solution: Take for example 500 kcmil - resistance is 0.0258 Ω /kft. and 2000 kcmil - resistance is 0.00643 Ω /kft. $0.0258 \times \frac{1}{4} = 0.00645$, which is approximately equal to 0.00693.

Comment: NEC 1996 & 1999 reference Chapter 9 Table 8.

894 The circular mil area of a number 12 conductor is _____.

- A. 6350
- B. 6530
- C. 6650
- D. 6750

CORRECT: B NEC Chapter 9 Table 8 pg. 70-635

Comment: NEC 1996 reference Chapter 9 Table 8 pg. 70-888; NEC 1999 reference Chapter 9 Table 8 pg 70-567; NEC 2002 reference Chapter 9 Table 8 pg 70-625.

895 The cross-sectional area of a conductor is decreased by a factor of 4. What is the new conductor's resistance?

- A. 4 times resistance
- B. 2 times resistance
- C. 1/2 the resistance
- D. 1/4 the resistance

CORRECT: A NEC Chapter 9 Table 8 pg. 70-635

Comment: NEC 1996 reference Chapter 9 Table 8 pg. 70-888; NEC 1999 reference Chapter 9 Table 8 pg 70-567; NEC 2002 reference Chapter 9 Table 8 pg 70-625.

NEC Study Guide

- 896** A compressor motor is rated 1HP, 115V, 16 amps. It is connected to a receptacle providing 120 volts with a 100' extension cord. Due to the load conditions, the maximum voltage drop allowed during starting locked-rotor condition is 30% of motor voltage rating. Using 96 amps for locked-rotor current. Resistance equals impedance. Use resistance values in Table 8 & 9. What is the minimum size of uncoated copper?

- A. 3 AWG
- B. 6 AWG
- C. 10 AWG
- D. 14 AWG

CORRECT: C NEC Chapter 9 Table 8 pg. 70-635

Solution: Determine what 30% voltage drop by 115 volts - (115 volts x 30%) = 115 volts - 34.5 volts = 80.5 volts, the resistance is calculated using the locked rotor current thus $80.5 \text{ volts} \div 96 \text{ amps} = .84 \Omega$, since there are two current carrying conductors each 100' long the resistance is $.84 \Omega$ for 200' of cable and since 200' is 20% of 1000' the resistance per 1000' is $.84 \Omega \div 20\% = 4.2 \Omega/1000'$, look in table 8 and find that #16 AWG has a resistance of $4.99 \Omega/1000'$ and #14 AWG has a resistance of $3.14 \Omega/1000'$ so we would want to use #14 AWG.
Comment: NEC 1996 reference Chapter 9 Table 8 pg. 70-888; NEC 1999 reference Chapter 9 Table 8 pg. 70-567; NEC 2002 reference Chapter 9 Table 8 pg. 70-625.

- 897** Using the information in the National Electrical Code, table 8, calculate the total resistance of 495' of uncoated, 18 AWG, stranded, copper.

- A. less than 3.75 ohms
- B. 3.76 to 3.85 ohms
- C. 3.85 to 3.93 ohms
- D. more than 3.93 ohms

CORRECT: C NEC Chapter 9 Table 8 pg. 70-635

Solution: From the table find the multiplier of 7.95 per 1000'. $7.95 \times 495 / 1000 = 3.93$.
Comment: NEC 1996 reference Chapter 9 Table 8 pg. 70-888; NEC 1999 reference Chapter 9 Table 8 pg. 70-567; NEC 2002 reference Chapter 9 Table 8 pg. 70-625.

NEC Study Guide

898 According to Table 8 of the NEC and assuming solid uncoated copper conductor; cross-sectional area of 10,380 CM; resistance of 12.6 Ω /circular mill-foot (KF), calculate the conductors resistance at 75 degrees C. ("R" is resistance in Ohms, "L" is the length of the conductor. Use the formula: $R=KL/CM$.)

- A. 0.8 Ohms/1000 ft
- B. 1.2 Ohm/1000 ft.
- C. 1.9 Ohms/1000 ft.'
- D. 2.5 Ohms/1000 ft.

CORRECT: B NEC Chapter 9 Table 8 Pg. 70-635

Solution: $1000 \times 12.6\Omega/\text{cmil-ft.} \div 10,380 = 1.2$.
Comment: NEC 1996 reference Chapter 9 Table 8 pg. 70-888; NEC 1999 reference Chapter 9 Table 8 pg. 70-567; NEC 2002 reference Chapter 9 Table 8 pg. 70-625.

899 The circular mil area of a #18 AWG would be ____ CMILS for solid or stranded.

- A. 1331
- B. 1620
- C. 2580
- D. 3000

CORRECT: B NEC Chapter 9 Table 8 pg. 70-635

Comment: NEC 1996 reference Chapter 9 Table 8 pg. 70-888; NEC 1999 reference Chapter 9 Table 8 pg. 70-567; NEC 2002 reference Chapter 9 Table 8 pg. 70-625.

900 How many AWG #12 THHN conductors are allowed in a 1" RMC?

- A. 24 #12 THHN conductors
- B. 22 #12 THHN conductors
- C. 18 #12 THHN conductors
- D. 26 #12 THHN conductors

CORRECT: D NEC Chapter 9 Tables 5 pg. 70-632, Table 4 pg. 70-678 & Table 1 pg. 70-625

Solution: #12 THHN = .0133 Sq/In approximate area (table 5) ; 1" RMC (40% column) = .355 Sq/In usable ; .355 divided by .013 = 26.69 = 26 # 12 THHN conductors.

Comment: NEC 1996 reference Chapter 9 Table 5 pg. 70-884, Table 4 pg. 70-881 & Table 1 pg. 70-879; NEC 1999 reference Chapter 9 Table 5 pg 70-564, Table 4 pg. 70-563 & Table 1 pg. 70-561; NEC 2002 reference Chapter 9 Table 5 pg. 70-622, Table 4 pg. 70-620 & Table 1 pg. 70-617.

NEC Study Guide

901 How many AWG #12 THHN conductors are allowed in a 1" RMC nipple?

- A. 45 wires
- B. 10 wires
- C. 40 wires
- D. 35 wires

CORRECT: D NEC Chapter 9, Tables 4 and 5

#12 THHN = .0133 in.² approximate area (table 5) ; 1" RMC = .887 in.² Total area 100% ; .887 in.² x 60% = .5322 in.² divided by .0133 = 40 wires. Note that prior to NEC 2002 total area of 1" RMC = .888 in.² - this does not change the answer.

902 According to the National Electrical Code, the minimum size TW copper conductor for a 5 HP, 3 phase, 230 volt, squirrel cage motor started at full voltage shall not be less than # ___ AWG.

- A. 8
- B. 10
- C. 12
- D. 14

CORRECT: D NEC Table 430.250, 430.22 (A) & Table 310.16

Solution: Motor full-load current is 15.2 amps, for continuous duty application use 125%, 15.2 amps x 125% = 19 amps => #14 AWG.
Comment: NEC 1996 & 1999 reference Table 430-150, 430-22 (a) & Table 310-16; NEC 2002 reference Table 430.150, 430.22 (A) & Table 310.16.