

Spring Test 2 due 04/09/2013

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- ___ 1. Where the rating specified in Table 430.52, as modified by Exception No. 1, is not sufficient for the starting current of the motor, the rating of an inverse time circuit breaker shall be permitted to be increased but shall in no case exceed ___ percent for full-load currents of 100 amperes or less.
- 125
 - 250
 - 400
 - 225
- ___ 2. The maximum volt-ampere loading permitted on a 20-ampere branch circuit is ___.
- 1,440 VA
 - 1,800 VA
 - 1,920 VA
 - 2,400 VA
- ___ 3. A mobile home served with 120/240 volt 3-wire service that has a calculated load greater than 50 amperes is required to be supplied power using a permanent wiring method from the adjacent power supply pole to the mobile home. The power supply feeder is required to consist of:
- three insulated conductors and an equipment ground permitted to be bare.
 - two insulated and color coded ungrounded conductors with the neutral permitted to be bare.
 - only three insulated conductors if the mobile home panel is grounded to the earth.
 - four insulated and color coded conductors one of which is an equipment grounding conductor.
 - three insulated conductors and an equipment grounding conductor with the insulated conductors permitted to be identified with colored tape.
- ___ 4. A legally required standby power system is one that automatically supplies power to:
- batteries of unit emergency equipment such as area lighting and exit signs.
 - selected loads other than emergency electrical system.
 - exit signs and required building evacuation lighting units.
 - emergency electrical systems.
 - loads in not more than 10 seconds.
- ___ 5. Fixture whips used with fixtures in suspended ceilings are permitted to be of various types of cables or conductors in flexible raceways. Regardless of the wiring method used, fixture whips are permitted to be a maximum of ___ long between outlet box and fixture.
- 6 feet 7 inches (2 meters)
 - 6 feet
 - 3 feet
 - 4 1/2 feet
- ___ 6. For a one-family residence, the minimum size main service disconnecting means is ___ three-wire.
- 30-ampere
 - 100-ampere
 - 150-ampere
 - 60-ampere
- ___ 7. An optional standby power system is required to restore power to the electrical system supplied in a time period after power interruption of not less than:
- 10 seconds.

- b. 30 seconds.
 - c. 2 minutes.
 - d. what ever is considered to be a reasonable time.
 - e. 60 seconds.
- _____ 8. Recessed lighting fixtures constructed for installation in thermal insulation are rated as _____.
- a. Class P
 - b. Type IC
 - c. UL
 - d. Type R
- _____ 9. The photovoltaic source circuits of a photovoltaic power system each have an output of 7.2 amperes. There are ten photovoltaic source circuits connected to operate in parallel. The photovoltaic output circuit for a particular installation runs from the photovoltaic array to a building that contains the other components of the system. The photovoltaic source output current used to size the dc conductor from the array is:
- a. 113 amperes.
 - b. 70 amperes.
 - c. 90 amperes.
 - d. 85 amperes.
 - e. 78 amperes.
- _____ 10. All of the following shall be counted when calculating box conductor fill, except for _____.
- a. fixtures, hickies, and clamps
 - b. conductors that pass through the box without splice or termination
 - c. grounded (white) conductor entering the box from an attached lighting fixture
 - d. grounding (green) conductor entering the box from an attached lighting fixture
- _____ 11. Underground wiring is not permitted under pools or within _____ horizontally from the inside walls of a pool.
- a. 6 ft (1.8 m)
 - b. 10 ft (3 m)
 - c. 15 ft (4.5 m)
 - d. 5 ft (1.5 m)
- _____ 12. The circuit conductors from an emergency panelboard to exit signs in a building are:
- a. permitted to be run in the same electrical metallic tubing with normal power conductors provided all conductors have 600 volt insulation.
 - b. required to be run only in metallic raceway.
 - c. required to be run only as metal sheathed cable.
 - d. not permitted to be run in the same raceway with other power or lighting circuit conductors.
 - e. required to be run in rigid metal conduit.
- _____ 13. The disconnect for motor-driven appliances having a motor of greater than _____ must be within sight of the appliance.
- a. 3/4 hp
 - b. 1/8 hp
 - c. 1/2 hp
 - d. 1/4 hp
- _____ 14. A line-voltage thermostat used to control household heating apparatus rated 240 volts disconnects _____.
- a. the grounding conductor only
 - b. all circuit conductors
 - c. both ungrounded conductors
 - d. the grounded conductor only

- ___ 15. In general, equipment grounding conductors can be either solid or stranded, insulated or bare; but, some applications have particular requirements. Give the *Code* Section that requires swimming pool grounding conductors to be insulated in order to protect them from corrosion.
- NEC® 310.1
 - NEC® 250.36(b)
 - Article 100
 - NEC® 680.23(B)
- ___ 16. A 50 horsepower, 480 volt, three-phase, design B fire pump motor in a building is supplied with copper conductors size 4 AWG with 75°C insulation and terminations. The fire pump circuit is protected with a fusible disconnect. The minimum size fuses permitted for the circuit is:
- 500 amperes.
 - 400 amperes.
 - 350 amperes.
 - 90 amperes.
 - 100 amperes.
- ___ 17. Fluorescent fixtures mounted on low-density cellulose fiberboard must generally be mounted ___ the fiberboard surface.
- with a backboard of fire-resistant material between the fixture and
 - on strut-type channels or rod-type hangers below
 - 1 1/2 (38 mm) from
 - none of these
- ___ 18. All of the following are acceptable disconnecting means for appliances, *except* for ____.
- a horsepower-rated switch
 - a circuit-breaker or switch capable of being locked in the off position
 - an attachment cord and plug
 - a circuit-breaker in sight of the appliance
- ___ 19. How many lighting outlets are permitted on one branch circuit?
- no limit
 - 12
 - 10
 - 15
- ___ 20. A self-contained spa or hot tub assembly may be connected to interior wiring systems using a wiring method that contains a copper equipment-grounding conductor not smaller than:
- 18 AWG
 - 10 AWG
 - 12 AWG
 - 14 AWG
- ___ 21. GFCI protection is required for which of the following?
- a receptacle installed within 6 feet of a wet-bar sink
 - a receptacle installed for a kitchen clock
 - a kitchen receptacle installed inside a cabinet to supply a microwave oven
 - outdoor receptacles installed at eaves for snow melting equipment
- ___ 22. *Luminaire* is a term that refers to ____.
- incandescent lighting fixtures
 - fluorescent lighting fixtures
 - outdoor pole-mounted fixtures
 - All of the above
- ___ 23. In all dwelling units, a general use receptacle is not required:
- to serve wall counter spaces over 12
 - in an alcove more than 2' deep and 3'

- _____ inches wide. _____ feet long.
- b. on a 4' by 6' balcony with no stairway to the ground. e. a receptacle is required in all of these locations.
- c. in an unfinished basement.
- _____ 24. A 200 amperes panelboard is supplied with a 120/240 volt, three-wire electrical supply containing a neutral conductor. The 12 space panelboard contains only six two-pole circuit breakers, one rated at 100 amperes, three rated at 40 amperes and two rated at 20 amperes. The neutral conductor is only used with the 100 ampere circuit breaker. This panelboard is rated as a:
- a. load center.
 - b. heavy duty panelboard.
 - c. power panel.
 - d. lighting and appliance branch circuit panelboard.
 - e. sub-panel.
- _____ 25. The 125-volt, 20-ampere receptacles installed to serve kitchen countertops are required to have GFCI protection _____.
- a. when they are within 6 feet of the sink
 - b. under all circumstances
 - c. unless provided with assured grounding conductor protection
 - d. none of these
- _____ 26. The grounded conductor of a branch circuit is permitted to serve as the equipment grounding conductor for a replacement electric dryer when all the following conditions are met, *except* for _____.
- a. the grounded conductor is insulated, unless it is part of type se cable
 - b. the branch circuit is protected by time-delay fuses
 - c. the grounded conductor is not smaller than 10 AWG copper or 8 AWG aluminum
 - d. the individual branch circuit is existing
- _____ 27. When 120-volt receptacles and TV outlets are mounted in double-gang boxes, _____ is required in the box to isolate the TV conductors from the power wiring.
- a. double-insulation
 - b. a barrier
 - c. double-grounding
 - d. a metal EMI shield
- _____ 28. The disconnecting means and branch circuit conductors for an electric furnace shall be sized not less than _____ percent of the total nameplate load shown on the furnace.
- a. 225
 - b. 125
 - c. 150
 - d. none of these
- _____ 29. *NEC® 400.7(A)(8)* permits flexible cords to be used to supply appliances where _____.
- a. the appliance is designed to permit ready removal for maintenance and repair
 - b. the appliance weighs less than 100 pounds
 - c. the appliance is identified for flexible cord connection
 - d. both a and c
- _____ 30. A flexible extension cord Type SO with two current-carrying size 12 AWG copper conductors has an allowable ampacity of:
- a. 16 amperes.
 - b. 25 amperes.
 - c. 12 amperes.
 - d. 20 amperes.
 - e. 15 amperes.

- ___ 31. A lighting and appliance branch-circuit panelboard must not have more than ___ overcurrent devices in it.
- 36
 - 42
 - 24
 - none of the above
- ___ 32. GFCI protection is not required for:
- kitchen countertop receptacles
 - crawl spaces
 - freezer receptacles
 - bathroom receptacles
- ___ 33. When calculating residential service load, ___ is allowed for each branch circuit serving laundry receptacles.
- 1,920 watts
 - 1,440 watts
 - 2,000 volt-amperes
 - 1,500 volt-amperes
- ___ 34. Receptacles installed on 15 and 20-ampere branch circuits must be of the ___ type.
- grounding
 - ground-fault protected
 - arc-fault protected
 - duplex
- ___ 35. On circuits supplying cord-and-plug connected air conditioners, the branch circuit overcurrent protective device rating is not permitted to exceed ___.
- the rating of the receptacle to which the air conditioner is connected
 - the ampacity of the branch circuit conductors
 - 50 percent of the total load of the air conditioner plus other loads on the same circuit
 - either a or b, whichever is greater
- ___ 36. Overheating of lighting fixtures, which often results in fires, is most often caused by ___.
- burying recessed fixtures under thermal insulation
 - failure to ground metal fixture bodies properly
 - overlamping
 - both a and c
- ___ 37. *NEC® 410.36(B)* requires that when a suspended ceiling grid is used to support lay-in type lighting fixtures, ___.
- the grid be securely fastened together and secured to the building structure
 - the lay-in fixtures be securely fastened to the grid members using bolts, screws, rivets, or listed clips
 - the fixtures be Class P rated
 - both a and b
- ___ 38. The authority having jurisdiction (electrical inspector) may rule in some situations that the electrical supply for an emergency panel is permitted to be:
- a tap to the normal service conductors entering the building provided the tap is made ahead of the main service disconnect.
 - a separate and independent service to the building supplying only the emergency panelboard.
 - a circuit in the first panelboard of the normal power system.
 - a tap to the normal service made at the main lugs of the disconnect.
 - any circuit from the normal power system in the building.
- ___ 39. Where nonmetallic-sheathed cable is used to connect recessed luminaires (fixtures), it is permitted to be unsupported not more than ___ from the last point of cable support to the luminaire (fixture).

- a. 4-1/2 ft
 - b. 3 ft
 - c. 6 ft
 - d. none of the above
- ___ 40. In accessible attics, exposed cables must be protected by guard strips when ____.
- a. they are run across the top of joists
 - b. they are installed within 7 feet of the floor or floor joists
 - c. they are run across the face of studs
 - d. all of these
- ___ 41. Which of the following 125-volt, 15- and 20-ampere receptacle(s) installed in kitchens is (are) not required to be connected to the two 20-ampere small-appliance circuits required for the kitchen and dining room area?
- a. a receptacle installed below the sink to serve a food-waste disposer
 - b. a receptacle installed to plug in a refrigerator
 - c. a receptacle installed to plug in a gas appliance to serve the ignition and/or clock devices
 - d. all of these
- ___ 42. *NEC® 406.3(D)(3)* permits existing two-wire, nongrounded-type receptacles to be replaced with a ____ where no equipment grounding conductor exists.
- a. two-wire nongrounding-type receptacle
 - b. GFCI receptacle
 - c. three-wire grounding-type receptacle
 - d. all of these
- ___ 43. *NEC® 680.2* describes a "permanently installed . . . pool" as ____.
- a. a pool with a water depth greater than 42 inches
 - b. one constructed in or partially in the ground
 - c. any pool outside of a building
 - d. any pool inside a building
 - e. any of these
- ___ 44. When an existing dryer or electric range is replaced, *NEC® 250.140 Exception* ____ the grounded conductor of an existing individual branch circuit to be used for grounding the appliance frame.
- a. permits
 - b. does not permit
- ___ 45. Storage batteries are installed at a dwelling as a part of a solar photovoltaic power system. The cells of the storage batteries are not permitted to be connected in such a way that the system operates at:
- a. more than 12 volts.
 - b. less than 24 volts.
 - c. more than 24 volts.
 - d. less than 50 volts.
 - e. 50 volts or more.
- ___ 46. An area requiring emergency illumination is provided with self-contained battery powered automatically controlled lighting units with a built-in battery charger. The illumination units are required to be connected to:
- a. a branch circuit serving the lighting in the area covered by the emergency lighting unit, and connected on the supply side of any switching.
 - b. a dedicated circuit from the emergency panelboard serving the building.
 - c. a dedicated circuit from the first normal power panelboard serving the building.
 - d. any circuit serving the building.
 - e. a branch circuit serving the lighting in the area covered by the emergency lighting unit, and connected on the load side of any switching.
- ___ 47. The total load of an air conditioner shall not exceed ____ percent of the rating of a separate branch circuit.
- a. 75

- b. 125
 - c. 50
 - d. 80
- ___ 48. *NEC*® 422.12 on central heating equipment requires that ___.
- a. central heating equipment be provided by a separate branch circuit
 - b. electric furnace overcurrent protection be provided by fuses only
 - c. electric furnaces be grounded according to the requirements of Article 250
 - d. a disconnecting means be provided for central heating equipment
- ___ 49. Where a flexible cord is used to supply a room air conditioner, the length of the flexible cord shall not exceed ___ for 120-volt units.
- a. 8.0 ft (2.4 m)
 - b. 10 ft (3.0 m)
 - c. 6.0 ft (1.8 m)
 - d. 12.0 ft (3.6 m)
- ___ 50. According to the Administrative Rules, only qualified persons are allowed to make installations on exempted equipment such as a positronic emission tomography machine. Some of these persons would be,
- a. an employee of a Nationally Recognized Testing Laboratory
 - b. employees of the electrical contractor
 - c. an employee or agent of a manufacturer, with training in the installation
 - d. all of these
- ___ 51. *NEC*® 422.60(A) requires that an appliance nameplate show ___.
- a. the appliance rating in volts and amperes
 - b. the recommended overcurrent protection
 - c. the appliance connected load in volts and watts
 - d. either a or c
- ___ 52. When making up cord connections on a chain hung fixture, the conductor with the grooved or raised insulation is the ___ conductor.
- a. switch leg
 - b. identified grounded
 - c. grounding
 - d. ungrounded

Spring Test 2 due 04/09/2013
Answer Section

MULTIPLE CHOICE

1. ANS: C
430.52(C)(1) Excp (2)(c)

PTS: 1

2. ANS: D
If a continuous load the answer would be (c)
NEC® 210.20

PTS: 1

3. ANS: D
550.33(A)

PTS: 1

4. ANS: B
701.2

PTS: 1

5. ANS: B PTS: 1

6. ANS: B
NEC® 230.79(C)

PTS: 1

7. ANS: D
Article 702

PTS: 1

8. ANS: B
NEC® 410.116(A)(2)

PTS: 1

9. ANS: C
 $7.2 \text{ A} \times 1.25 = 9.0 \text{ A}$
 $9.0 \text{ A} \times 10 = 90 \text{ A}$
690.8(A)(1), 690.8(A)(2)

PTS: 1

10. ANS: D
NEC® 314.16

PTS: 1

11. ANS: D
NEC® 680.10

PTS: 1

12. ANS: D
700.9(B)

PTS: 1

13. ANS: B
NEC® 422.32

PTS: 1

14. ANS: C
NEC® 424.20(A)

PTS: 1

15. ANS: D PTS: 1

16. ANS: B
695.4(B)(1), Table 430.251(B), 240.6
Must use lock rotor table and go up to next standard size.

PTS: 1

17. ANS: C
NEC® 410.136(B)

PTS: 1

18. ANS: A
NEC® 422.31, 32 and 33

PTS: 1

19. ANS: A
The NEC® does not specify the maximum of lighting outlets that may be connected on one branch circuit.

PTS: 1

20. ANS: C
NEC® 680.42(C)

PTS: 1

21. ANS: A
NEC® 210.8(A)(7)

PTS: 1

22. ANS: D
NEC® 410.2, Part IV, X, XIII

PTS: 1

23. ANS: E
210.52, OAR 918-305-0130(3)(a)

PTS: 1

24. ANS: C
the neutral is not used with the two 20 ampere circuits
408.34

- PTS: 1
25. ANS: B
NEC® 210.8(A)(6)
- PTS: 1
26. ANS: B
NEC® 250.140 Exception
- PTS: 1
27. ANS: B
NEC® 810.18(C)
- PTS: 1
28. ANS: B
NEC® 424.3
- PTS: 1
29. ANS: D PTS: 1
- PTS: 1
30. ANS: B
Table 400.5(A)
- PTS: 1
31. ANS: D
NEC® 408. Requirement for 42 circuits removed from 2008 Code
- PTS: 1
32. ANS: C
NEC® 210.8
- PTS: 1
33. ANS: D
NEC® 220.52(B)
- PTS: 1
34. ANS: A
NEC® 406.3(A)
- PTS: 1
35. ANS: D
NEC® 440.62(A)
- PTS: 1
36. ANS: D
NEC® 410.76(B)
- PTS: 1
37. ANS: D PTS: 1
- PTS: 1
38. ANS: B
700.12(D)

- PTS: 1
39. ANS: A
NEC® 334.30(B)(2)
- PTS: 1
40. ANS: D
NEC® 320.23
- PTS: 1
41. ANS: D
NEC® 210.52(B)(1) and (2) Excp. 422.10 and 422.16(B)(1)
- PTS: 1
42. ANS: A
NEC® 406.3(D)(3)(a)
- PTS: 1
43. ANS: E PTS: 1
44. ANS: A
NEC® 250.140 Exception
- PTS: 1
45. ANS: E
690.71(B)(1)
- PTS: 1
46. ANS: A
700.12(E)
- PTS: 1
47. ANS: D
NEC® 440.62(B)
- PTS: 1
48. ANS: A
NEC® 422.12
- PTS: 1
49. ANS: B
NEC® 440.64(A)
- PTS: 1
50. ANS: C

918-261-0000

Partial Exemption for Medical Diagnostic Imaging and Therapy Equipment

(3) Only qualified personnel are authorized to make the electrical installations in sections (1) and (2) of this rule. The installation is exempt if the person making the installation is:

(a) An employee or agent of a manufacturer, with training in installation, warranty work and maintenance involving the specific product of the manufacturer;

(b) A contractor or employee of a contractor, if the contractor is a business entity other than a sole proprietor, who has training by the manufacturer or a nationally recognized training facility to perform the specific work on the specific type product of the manufacturer; or

(c) An employee or agent of a health care facility which owns or leases the medical equipment with training by the manufacturer or a nationally recognized training facility to perform the specific work on the specific type product of the manufacturer.

PTS: 1

51. ANS: D
NEC® 422.60(A)

PTS: 1

52. ANS: B
NEC® 400.22

PTS: 1