



Texas Journeyman Electrician

Solution key

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1. NEC 550.10 governs mobile homes. The minimum ampere rating for a mobile home service equipment (feeder assembly) is:

- A. 200 amperes, 120/240V, 3-wire
- B. 50 amperes, 120/240V, 3-wire
- C (correct). 100 amperes, 120/240V, 3-wire**
- D. 60 amperes, 120/240V, 3-wire

Rationale: NEC 550.10(A) requires that the power supply to a mobile home be rated at not less than 100 amperes, 120/240V, 3-wire.

2. Per NEC 250.50, which electrodes must be bonded together to form the grounding electrode system when present at a building?

- A. Concrete-encased electrodes are not permitted if a ground rod is installed
- B. Only one electrode is needed if it achieves 25 ohms resistance
- C (correct). All grounding electrodes present must be bonded together**
- D. Only the metal underground water pipe is required

Rationale: NEC 250.50 requires that all grounding electrodes present at a building (metal underground water pipe, metal building frame, concrete-encased electrodes, ground rings, rod/pipe electrodes) be bonded together to form the grounding electrode system.

3. NEC 110.26 requires a minimum working space depth of how many inches in front of electrical equipment rated 0–150V to ground?

- A (correct). 36 inches (3 feet)**
- B. 48 inches (4 feet)
- C. 24 inches (2 feet)
- D. 30 inches (2.5 feet)

Rationale: NEC 110.26(A)(1) Condition 1 requires a minimum working space depth of 36 inches (3 feet) in front of equipment rated 0–150V to ground when there are no exposed live parts or grounded parts on the opposite side.

4. NEC 220.87 provides an optional method for determining existing loads using the maximum demand. This method requires the maximum demand data be based on a minimum of:

- A. 90 days of utility billing records
- B. 30 days of actual metered demand data
- C. No time period specified — any data may be used
- D (correct). 1 year minimum of actual metered demand data**

Rationale: NEC 220.87 requires that maximum demand data used for the optional method be based on

actual measurement over a minimum of 1-year period at the metering point.

5. Per NEC 240.6(A), which of the following is a standard ampere rating for overcurrent protective devices?

- A. 90 amperes is not a standard rating
- B (correct). 100 amperes**
- C. 110 amperes
- D. 115 amperes

Rationale: NEC 240.6(A) lists standard ampere ratings for fuses and circuit breakers. Common standard ratings include 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500 amperes.

6. According to NEC 310.15(B)(3)(a), what is the ampacity adjustment factor when four current-carrying conductors are installed in a conduit?

- A. 60%
- B. 70%
- C. 50%
- D (correct). 80%**

Rationale: NEC Table 310.15(C)(1) requires an adjustment factor of 80% when 4–6 current-carrying conductors are bundled or installed in the same conduit, as heat cannot dissipate as readily.

7. NEC Table 1 in Chapter 9 specifies the maximum conduit fill percentage for a single conductor as:

- A. 40%
- B. 80%
- C (correct). 53%**
- D. 31%

Rationale: NEC Chapter 9 Table 1 specifies that a single conductor may fill up to 53% of the conduit's total cross-sectional area. Two conductors maximum is 31%, and three or more conductors is 40%.

8. Per NEC 300.15, a box or conduit body is generally required wherever a conductor is spliced or a device is installed. Which of the following is an exception that does not require a box?

- A. Splices in a device box already containing a receptacle
- B. Splices in NM cable run through a finished wall
- C. Wire nut connections in a conduit run
- D (correct). Splices made inside a wireway or cable tray section**

Rationale: NEC 300.15(B) permits splices in wireway sections, cable trays, and similar enclosures without a separate box. Splices in open wiring on insulators are also excepted under 300.15(F).

Code: NEC 300.15

9. According to NEC 250.119, an equipment grounding conductor must be identified by which color when it is an insulated conductor?

- A. Bare conductor only — insulated EGCs are not permitted
- B (correct). Continuous green, or green with one or more yellow stripes**
- C. Continuous white or gray
- D. Any color other than white, gray, or green

Rationale: NEC 250.119 requires insulated equipment grounding conductors to be identified by a continuous green color or green with one or more yellow stripes. This ensures clear identification from other conductors.

10. NEC Article 517 covers health care facilities. In a patient care area (general care), the branch circuits serving patient bed locations must be connected to which type of system?

- A. A dedicated isolated power system only
- B. Standard branch circuits with no special requirements
- C. The life safety branch of the essential electrical system

D (correct). The normal system or equipment system of the essential electrical system

Rationale: NEC 517.18 requires that branch circuits serving patient bed locations in general care areas be connected to the normal system or the equipment system of the essential electrical system, ensuring continued power during an outage.

11. NEC 230.23 specifies minimum conductor size for service drop conductors. What is the minimum size copper conductor permitted for a service drop?

A (correct). 8 AWG

- B. 10 AWG
- C. 12 AWG
- D. 14 AWG

Rationale: NEC 230.23(B) requires service drop conductors to be not smaller than 8 AWG copper (or 6 AWG aluminum) to ensure adequate mechanical strength.

Code: NEC 230.23

12. According to NEC 220.56, the demand factor for commercial kitchen equipment on a single branch circuit or feeder is based on the number of units. For 5 or more pieces of equipment, the demand factor is:

A (correct). 65% demand factor

- B. 100% — no demand factor for commercial kitchen equipment
- C. 50% demand factor
- D. 80% demand factor

Rationale: NEC Table 220.56 specifies commercial kitchen equipment demand factors. For 5 or more pieces of equipment, a 65% demand factor applies to the total connected load.

13. NEC 250.4 describes the general requirements for grounding and bonding. The primary purpose of grounding electrical systems is to:

- A. Enable GFCI devices to detect ground fault currents
- B. Reduce electrical energy consumption by lowering resistance
- C. Provide a return path for fault current to protect equipment

D (correct). Limit voltage from lightning, line surges, and stabilize voltage to earth

Rationale: NEC 250.4(A) states that grounding electrical systems limits the voltage imposed by lightning, line surges, and unintentional contact with higher-voltage lines, and stabilizes voltage to earth during normal operation.

14. According to NEC 314.28, pull boxes for conductors 4 AWG or larger in a straight pull must have a length of at least:

- A. 4 times the trade size of the largest raceway entering the box
 - B. 12 times the trade size of the largest raceway entering the box
 - C. 6 times the trade size of the largest raceway entering the box
- D (correct). 8 times the trade size of the largest raceway entering the box**

Rationale: NEC 314.28(A)(1) requires that for straight pulls, the box must be at least 8 times the trade size of the largest raceway entering the box.

15. According to NEC 358.10, EMT is permitted for use in which of the following environments?

A (correct). Exposed, concealed, dry, damp, and wet locations when listed, and in concrete

- B. Only in commercial buildings — not permitted in residential
- C. Dry locations only — not permitted in wet or damp areas
- D. Only concealed installations — not permitted exposed

Rationale: NEC 358.10 permits EMT in both exposed and concealed locations, including dry, damp, and wet locations when listed for the purpose, and in concrete when listed for that use.

16. NEC 90.4 grants authority to the "authority having jurisdiction" (AHJ) to:

- A (correct). Waive specific requirements or permit alternatives when equivalent safety is achieved
- B. Amend the NEC to include local requirements
- C. Override OSHA standards when they conflict with the NEC
- D. Issue licenses to electrical contractors

Rationale: NEC 90.4 grants the AHJ the authority to waive specific requirements or permit alternative methods when it is assured that equivalent safety objectives are achieved. The AHJ also approves equipment and materials.

17. NEC 250.24(A)(5) requires that the neutral conductor at a service be bonded to the equipment grounding conductor and grounding electrode conductor at which location?

- A. At the grounding electrode, not inside any panel
- B. At the first disconnect downstream of the meter
- C. At every panel and subpanel throughout the system
- D (correct). At the service equipment (main panel) only

Rationale: The neutral-to-ground bond (main bonding jumper) is made only at the service equipment (main panel). Bonding neutral to ground at subpanels or downstream is prohibited, as it creates parallel neutral paths.

18. According to NEC 240.4, conductors must be protected against overcurrent in accordance with their:

- A (correct). Their ampacity as specified in NEC 310.15
- B. The rating of the service entrance equipment
- C. The next larger standard overcurrent device size
- D. The connected load divided by the supply voltage

Rationale: NEC 240.4 requires conductors to be protected against overcurrent in accordance with their ampacity as specified in NEC 310.15. Overcurrent devices must not exceed conductor ampacity unless specific exceptions apply.

19. Per NEC 250.28, the main bonding jumper connecting the neutral to the equipment grounding conductor at service equipment must be:

- A (correct). A wire, bus, screw, or similar conductor connecting neutral to EGC at service equipment
- B. A ground rod driven adjacent to the service panel
- C. The grounding electrode conductor itself
- D. The equipment grounding bus inside the panel

Rationale: NEC 250.28 requires the main bonding jumper to be a wire, bus, screw, or similar conductor that connects the equipment grounding conductor to the grounded service conductor (neutral) at the service equipment.

20. Under NEC Article 210, a 20A branch circuit may serve how many outlet receptacles (each at 1.5A load) before exceeding 80% of circuit capacity for continuous loads?

- A (correct). 10 outlets
- B. 16 outlets
- C. 8 outlets
- D. 13 outlets

Rationale: NEC 210.19(A) limits continuous loads on a branch circuit to 80% of rating (16A for a 20A circuit). At 1.5A per outlet: 16A / 1.5A = 10 outlets maximum.
Code: NEC 210.19

21. According to NEC 430.6(A), the full-load current (FLC) values used for conductor sizing and overcurrent protection of motors must be taken from:

- A. The AHJ's approved motor schedules
- B. The manufacturer's published data sheets
- C. The motor nameplate full-load current rating
- D (correct). NEC Tables 430.247–430.250 (not the motor nameplate)

Rationale: NEC 430.6(A)(1) requires that for conductor and overcurrent device sizing, the FLC values

from NEC Tables 430.247–430.250 be used, NOT the nameplate current. Nameplate current is used only for overload protection sizing.

22. Per NEC 220.61, the neutral load for a service is calculated as:

- A. 70% of the total phase load
- B. 100% of the total calculated load
- C. The sum of all single-phase loads on the neutral
- D (correct). Maximum unbalance between any ungrounded conductor and the neutral**

Rationale: NEC 220.61 requires the neutral load to be calculated as the maximum unbalance between any two ungrounded conductors and the neutral. This is the maximum net calculated load between the neutral and any one ungrounded conductor.

23. NEC Article 394 covers concealed knob-and-tube (CK&T) wiring. CK&T wiring is permitted in new construction under which condition?

- A (correct). In extensions of existing installations where the existing wiring is in good condition**
- B. In attic spaces of one-family dwellings only
- C. When approved by the authority having jurisdiction for new residential construction
- D. When insulation is installed first to protect the conductors

Rationale: NEC 394.10 permits concealed knob-and-tube wiring only in extensions of existing installations and in limited applications — it is not permitted for new construction in general. Extensions are permitted only where the existing wiring is in good condition.
Code: NEC 394.10

24. According to NEC 240.4(B), when the ampacity of a conductor does not match a standard overcurrent device rating, the next larger standard rating may be used if the conductor ampacity is over:

- A. For any conductor when no exact standard size matches
- B (correct). When conductor ampacity exceeds 800 amperes**
- C. When the AHJ approves the installation in writing
- D. Only for conductors 2 AWG and larger

Rationale: NEC 240.4(B) permits the use of the next larger standard overcurrent device when the conductor ampacity does not correspond to a standard rating, provided the ampacity exceeds 800 amperes and the conductor is not part of a multi-outlet branch circuit supplying receptacles for cord-and-plug-connected portable loads.

25. Per NEC 505.7, in Zone 0 hazardous locations (equivalent to Class I Division 1 highest risk), which protection technique is specifically required?

- A. Purged and pressurized enclosures (Ex p)
- B. Increased safety (Ex e) equipment
- C (correct). Intrinsically safe (Ex ia) protection only**
- D. Explosion-proof (Ex d) enclosures

Rationale: Zone 0 locations contain a continuous or long-duration explosive atmosphere. NEC 505.7(A) permits only intrinsically safe protection (Ex ia) for equipment in Zone 0, as it is the only technique safe enough for continuous hazard presence.

26. NEC 410.30 requires luminaires installed in clothes closets to maintain a minimum clearance from storage areas. For a surface-mounted incandescent luminaire, this clearance is:

- A (correct). 12 inches from the nearest point of storage space**
- B. 6 inches from the nearest point of storage space
- C. 3 inches from the nearest point of storage space
- D. 18 inches from the nearest point of storage space

Rationale: NEC 410.30(C) requires surface-mounted incandescent or LED luminaires with a completely enclosed lamp in clothes closets to maintain at least 12 inches from the nearest point of storage space.

27. NEC Article 500 classifies hazardous locations based on the type of hazardous material and the likelihood of its presence. A Class I location contains:

- A. Radioactive materials requiring shielding
- B (correct). Flammable gases or vapors in sufficient quantities to produce explosive mixtures**
- C. Combustible dust that can be ignited by electrical sparks
- D. Ignitable fibers or flyings that may be present

Rationale: Class I hazardous locations contain flammable gases or vapors in sufficient quantities to produce explosive or ignitable mixtures. Class II involves combustible dust, and Class III involves ignitable fibers.

28. According to NEC 200.6, a grounded conductor (neutral) of size 6 AWG or smaller must be identified by:

- A. Black insulation with white tape at each termination
- B. Continuous green outer finish or bare conductor
- C (correct). Continuous white or gray outer finish, or three continuous white/gray stripes**
- D. Any color other than black, red, or orange

Rationale: NEC 200.6(A) requires grounded conductors 6 AWG or smaller to be identified by a continuous white or gray outer finish, or by three continuous white or gray stripes.

29. Per NEC 210.19(A)(1), branch circuit conductors must have an ampacity not less than the noncontinuous load plus what percentage of the continuous load?

- A (correct). 100% noncontinuous load plus 125% of continuous load**
- B. 80% of continuous load plus 100% of noncontinuous load
- C. 100% of all loads with no adjustment required
- D. 125% of all loads whether continuous or not

Rationale: NEC 210.19(A)(1) requires branch circuit conductors to have an ampacity of not less than 100% of the noncontinuous load plus 125% of the continuous load to account for heat buildup in the conductors.

30. Per NEC 430.32(A)(1), overload protection for a motor with a service factor of 1.15 or greater must trip at no more than what percentage of the motor's full-load current?

- A. 115% of the motor full-load current nameplate rating
- B. 140% of the motor full-load current nameplate rating
- C (correct). 125% of the motor full-load current nameplate rating**
- D. 100% of the motor full-load current nameplate rating

Rationale: NEC 430.32(A)(1) permits overload devices for motors with a service factor of 1.15 or more or a temperature rise of 40°C or less to be selected at no more than 125% of the motor full-load current nameplate rating.

31. According to NEC 501.15, conduit seals are required in Class I Division 1 locations within how many inches of an enclosure containing an arcing device?

- A (correct). 18 inches of enclosures containing arcing or sparking devices**
- B. 24 inches of enclosures containing arcing or sparking devices
- C. 36 inches of enclosures containing arcing or sparking devices
- D. 12 inches of enclosures containing arcing or sparking devices

Rationale: NEC 501.15(A)(1) requires conduit seals to be installed within 18 inches of enclosures containing arcing or sparking devices (such as motors, switches, or circuit breakers) in Class I Division 1 locations.

32. Per NEC 358.30, EMT (Electrical Metallic Tubing) must be securely fastened within how many feet of each outlet box or fitting?

- A. 12 inches of each outlet box or fitting
- B (correct). 3 feet of each outlet box or fitting**
- C. 18 inches of each outlet box or fitting
- D. 6 feet of each outlet box or fitting

Rationale: NEC 358.30(A) requires EMT to be securely fastened within 3 feet of each outlet box, junction box, or other conduit termination, and at intervals not exceeding 10 feet.

33. Under Texas law (16 TAC 73), what is the required supervision ratio for a journeyman electrician supervised by a master electrician on a job site?

- A. One master electrician may supervise up to 2 journeymen on site
- B (correct). One master electrician may supervise up to 4 journeymen on site**
- C. Each journeyman must be supervised one-on-one by a master
- D. One master electrician may supervise an unlimited number of journeymen

Rationale: Under Texas Administrative Code 16 TAC 73, a master electrician may supervise up to 4 journeyman electricians at a time on a job site where the master is physically present.

34. A 240V, single-phase motor has a nameplate full-load current of 30 amperes. Per NEC 430.52 and Table 430.52, the maximum inverse time circuit breaker size for this motor is:

- A. 30 amperes (equal to FLC)
- B. 60 amperes (30A × 200%)
- C. 100 amperes (30A × 333%)
- D (correct). 75 amperes (30A × 250% = 75A — use standard size not exceeding)**

Rationale: NEC 430.52 Table specifies maximum overcurrent protection for motors. For a single-phase AC motor using an inverse time circuit breaker, the maximum is 250% of the full-load current. $30A \times 250\% = 75A$. The next standard size not exceeding 80A would be 70A or 80A per 430.52(C)(1).

35. Per NEC 220.53, the demand factor for four or more fixed appliances (other than ranges, dryers, A/C, or heating) on the same service is:

- A (correct). 75% of the total nameplate rating**
- B. 100% of the total nameplate rating
- C. 50% of the total nameplate rating
- D. 80% of the total nameplate rating

Rationale: NEC 220.53 permits a demand factor of 75% to be applied to the nameplate rating of four or more fixed appliances — other than electric ranges, clothes dryers, space-heating, or air conditioning — on the same service or feeder.

36. Per NEC 230.46, service entrance conductors must be spliced or connected only using approved methods. Connections in service entrance cable must be made using:

- A. Splices are prohibited anywhere in service entrance conductors
- B. Soldered connections protected with heat-shrink tubing
- C (correct). Listed pressure connectors or other approved methods inside service equipment**
- D. Wire nuts rated for service entrance use in any accessible location

Rationale: NEC 230.46 requires that splices in service entrance conductors be made using listed means such as listed pressure connectors or other approved methods inside service equipment enclosures or approved boxes.

37. A 1,500 square foot single-family dwelling has a 12 kW range, two small appliance circuits, and one laundry circuit. What is the calculated general lighting load (before demand factors)?

- A. 4,500 VA (general lighting only)
- B (correct). 9,000 VA (4,500 + 3,000 + 1,500)**
- C. 7,500 VA
- D. 12,000 VA (including range at nameplate)

Rationale: General lighting load = $1,500 \text{ sq ft} \times 3 \text{ VA/sq ft} = 4,500 \text{ VA}$. Small appliance circuits = $2 \times 1,500 \text{ VA} = 3,000 \text{ VA}$. Laundry circuit = 1,500 VA. Total before demand = 9,000 VA.

38. Per NEC 220.12, the general lighting load for a dwelling unit is calculated at a unit load of:

- A (correct). 3 VA per square foot**
- B. 5 VA per square foot
- C. 1 VA per square foot
- D. 2 VA per square foot

Rationale: NEC 220.12 Table 220.12 specifies a general lighting load of 3 VA per square foot for dwelling units. This is used as the basis for standard load calculations.

39. NEC 300.15 generally requires a box or conduit body wherever a conductor is:

- A (correct). At each splice point, outlet, switch, junction, or pull point
- B. At intervals not exceeding 10 feet in any wiring method
- C. Only where conductors change direction more than 90 degrees
- D. Only at each outlet — splices may be made inside conduit

Rationale: NEC 300.15 requires a box or conduit body at each conductor splice point, outlet, switch point, junction, or pull point — unless otherwise permitted for specific wiring methods.

40. Per NEC 90.2, the NEC does NOT apply to which of the following installations?

- A. Temporary power for construction sites
- B. Industrial machinery in manufacturing facilities
- C. Solar photovoltaic systems on commercial buildings
- D (correct). Utility substation and transmission/distribution systems under utility control

Rationale: NEC 90.2(B) exempts installations under the exclusive control of electric utilities, including utility substations, generation equipment, and transmission/distribution networks from NEC requirements.

41. Per NEC 334.30, Type NM cable must be stapled, strapped, or otherwise secured within how many inches of each box?

- A (correct). 12 inches of each cabinet, box, or fitting
- B. 18 inches of each cabinet, box, or fitting
- C. 24 inches of each cabinet, box, or fitting
- D. 6 inches of each cabinet, box, or fitting

Rationale: NEC 334.30(A) requires NM cable to be secured within 12 inches of each cabinet, box, or fitting, and at intervals not exceeding 4.5 feet.

42. According to NEC 110.14, what is the required tightening torque for electrical connections?

- A (correct). Torque to manufacturer's specifications per listing or labeling instructions
- B. No torque requirements — NEC only requires connections be secure
- C. Hand-tight plus one quarter turn for all connections
- D. 50 in-lbs for all connections 10 AWG and smaller

Rationale: Per NEC 110.14(D), electrical connections must be made using listed pressure connectors or other approved means, and torqued to manufacturer's specifications when provided. Proper torque ensures reliable connections and prevents overheating.

43. According to NEC Article 100, what is an "overcurrent"?

- A. Only the current that flows during a short circuit
- B. Current that flows in the wrong direction in a circuit
- C. Any current over 20 amperes in a branch circuit
- D (correct). Any current exceeding the rated current of equipment or ampacity of a conductor

Rationale: Overcurrent is any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault per NEC Article 100.

44. According to NEC 406.4, replacement receptacles in locations requiring GFCI protection must be:

- A. An equipment grounding conductor must be installed first
- B. A ground fault circuit interrupter is only required in wet locations
- C (correct). A GFCI-type receptacle must be installed even without an EGC
- D. The original non-grounding receptacle may be reused with a note

Rationale: NEC 406.4(D) requires that when a non-grounding-type receptacle is replaced in a location requiring GFCI protection, a GFCI-type receptacle must be installed, even if no equipment grounding conductor is present.

45. According to NEC 250.66(A), the minimum size grounding electrode conductor (GEC) for a service with #3/0 AWG copper service entrance conductors is:

- A. 8 AWG copper
- B (correct). 4 AWG copper**
- C. 2 AWG copper
- D. 6 AWG copper

Rationale: NEC 250.66 Table specifies GEC sizing based on the largest service entrance conductor. For 3/0 AWG copper service conductors, the minimum GEC is 4 AWG copper.

46. Per NEC 250.102(C), the supply-side bonding jumper for a service must be sized according to:

- A. The same size as the largest phase conductor
- B (correct). NEC Table 250.66 based on service entrance conductor size**
- C. The overcurrent device rating protecting the service
- D. NEC Table 250.122 based on the service ampere rating

Rationale: NEC 250.102(C) requires the supply-side bonding jumper to be sized per NEC Table 250.66 based on the size of the service entrance conductors, not based on the overcurrent device rating.

47. Per NEC 300.5, what is the minimum burial depth for a branch circuit rated 120V or less, installed in rigid metal conduit (RMC), in a residential driveway?

- A. 12 inches
- B (correct). 6 inches**
- C. 24 inches
- D. 18 inches

Rationale: NEC 300.5 Table specifies burial depths. RMC installed under a residential driveway requires a minimum cover of 6 inches regardless of voltage.

48. Per NEC 330.30, Type MC cable must be supported and secured at intervals not exceeding:

- A. 4.5 feet, and within 12 inches of every box
- B (correct). 6 feet, and within 12 inches of every box or fitting**
- C. 3 feet, and within 6 inches of every box or fitting
- D. 10 feet, and within 3 feet of every box or fitting

Rationale: NEC 330.30(B) requires Type MC cable to be supported and secured at intervals not exceeding 6 feet, and within 12 inches of every box, cabinet, or fitting.

49. NEC 230.24(B) requires overhead service conductors to maintain a minimum clearance of how many feet above a flat roof where the voltage does not exceed 300V?

- A. 12 feet
- B (correct). 8 feet**
- C. 10 feet
- D. 3 feet

Rationale: NEC 230.24(B)(1) requires overhead service conductors to maintain a minimum clearance of 8 feet above a flat roof with a slope of 4/12 or less when voltage does not exceed 300V between conductors.

50. Per NEC 210.52, all kitchen countertop receptacles must be GFCI protected. Which NEC article covers this requirement?

- A. NEC 406.4
- B. NEC 210.52
- C. NEC 300.11
- D (correct). NEC 210.8**

Rationale: NEC 210.8 contains the GFCI protection requirements. NEC 210.52 covers receptacle placement requirements for dwelling units, including that countertop receptacles must comply with 210.8 for GFCI protection.

51. Per NEC 110.12, electrical equipment must be installed in a:

- A (correct). Neat and workmanlike manner
- B. Plenum-rated space regardless of location
- C. Concealed location whenever possible
- D. Metal enclosure with tamper-resistant hardware

Rationale: NEC 110.12 requires that electrical equipment be installed in a neat and workmanlike manner. Exposed wiring must be supported and protected according to applicable NEC articles.

52. NEC 700.12 requires emergency systems to be capable of supplying power within how many seconds of normal power failure?

- A (correct). 10 seconds after normal power failure
- B. 30 seconds after normal power failure
- C. 5 seconds after normal power failure
- D. 60 seconds after normal power failure

Rationale: NEC 700.12 requires emergency systems to supply power within 10 seconds of normal power interruption. These systems serve loads such as emergency lighting and exit signs in public assembly buildings.

53. According to NEC Article 100, which of the following best defines "ampacity"?

- A. The short-circuit current capacity of a conductor
- B. The voltage a conductor can withstand without insulation breakdown
- C (correct). The maximum current a conductor can carry continuously without exceeding its temperature rating
- D. The resistance of a conductor per unit length at 20°C

Rationale: NEC Article 100 defines ampacity as the maximum current in amperes a conductor can carry continuously under conditions of use without exceeding its temperature rating.

Code: NEC Article 100

54. According to NEC 300.17, what governs the number and size of conductors permitted in a raceway?

- A. No more than 10 conductors regardless of size
- B. Only the AHJ has authority to determine fill limits
- C (correct). The applicable NEC fill tables based on wiring method and conductor type
- D. 50% of the conduit cross-sectional area for all wiring methods

Rationale: NEC 300.17 states that the number and size of conductors in any raceway shall not be more than will permit heat dissipation and ready installation or withdrawal without damage to conductors or their insulation. Specific fill tables in applicable articles govern this.

55. Per NEC Article 100, a "dwelling unit" is defined as:

- A. A structure with at least two bedrooms and one bathroom
- B. Any occupancy classified as residential by the local building code
- C (correct). A single unit with complete independent living facilities including sleeping, cooking, and sanitation
- D. Any building used primarily for residential occupancy

Rationale: A dwelling unit is a single unit providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation.

56. The NEC requires that all conductors be assumed to be copper unless specifically noted otherwise. Where is this stated?

- A. NEC 100 definitions — aluminum must always be specifically labeled
- B (correct). NEC 310.14 — copper is the default conductor material when not specified
- C. NEC 240.6 — standard conductor materials for overcurrent devices
- D. NEC 90.2 — copper required for all building wiring

Rationale: NEC 310.14 states that aluminum conductors shall be identified and that copper is the default assumed conductor material when not specified. Exam questions typically state

"assume copper unless noted."

57. According to NEC 250.53(A)(3), a ground rod electrode must be driven to a minimum depth of:

- A. 10 feet
- B. 4 feet
- C. 6 feet
- D (correct). 8 feet**

Rationale: NEC 250.53(A)(3) requires ground rod electrodes to be driven to a minimum depth of 8 feet into the earth. If rock bottom is encountered, the rod may be driven at a 45-degree angle or buried horizontally.

58. According to NEC 230.79, the minimum ampere rating for a service disconnect for a one-family dwelling is:

- A. 150 amperes, 3-wire
- B (correct). 100 amperes, 3-wire**
- C. 200 amperes, 3-wire
- D. 60 amperes, 2-wire

Rationale: NEC 230.79(C) requires that the service disconnecting means for a one-family dwelling have a rating of not less than 100 amperes, 3-wire.

59. Per NEC 336.10, Type TC (Tray Cable) is permitted to be used in:

A (correct). Cable trays, raceways, outdoors on a messenger wire, and Class I Division 2 locations

- B. Direct burial in wet soil as a substitute for USE cable
- C. Any location where NM cable is permitted
- D. Class I Division 1 locations without additional protection

Rationale: NEC 336.10 permits Type TC cable to be used in cable trays, raceways, outdoors where supported by a messenger wire, and in Class I Division 2 hazardous locations where specifically listed for that use.

60. Per NEC 250.104(A), metal water piping within a building must be bonded to the electrical system. The bonding conductor must be sized per:

- A (correct). NEC Table 250.122 based on the circuit breaker or fuse protecting the supply circuit**
- B. NEC Table 250.66 based on the service entrance conductor size
- C. Always a minimum of 6 AWG copper regardless of circuit size
- D. The same size as the grounding electrode conductor

Rationale: NEC 250.104(A) requires interior metal water piping to be bonded and sizes the bonding conductor per NEC Table 250.122 based on the rating of the circuit breaker or fuse protecting the circuit supplying the building.

61. Per NEC 314.16, the maximum fill for a standard 4-inch square box (21 cubic inch) with 14 AWG conductors is how many conductors?

- A. 14 conductors
- B. 7 conductors
- C (correct). 10 conductors (21 cu in ÷ 2.0 cu in per #14 AWG = 10)**
- D. 12 conductors

Rationale: NEC 314.16(B) assigns a volume of 2 cubic inches per #14 AWG conductor. A 21 cubic inch box can contain a maximum of 10 #14 AWG conductors ($21 \div 2.0 = 10.5$, rounded down to 10).

62. NEC 352.30 requires PVC conduit (Schedule 40) to be supported within how many feet of each outlet box or conduit body?

- A. 6 feet of each outlet box or conduit termination
- B. 5 feet of each outlet box or conduit termination
- C (correct). 3 feet of each outlet box or conduit termination**

D. 12 inches of each outlet box or conduit termination

Rationale: NEC 352.30(A) requires PVC conduit to be supported within 3 feet of each outlet box, junction box, or other termination and at intervals not exceeding 3 feet for 1/2 inch through 1 inch, and at greater intervals for larger sizes per the NEC table.

63. NEC 230.70 requires the service disconnecting means to be installed:

- A. At the center of the building for equal circuit length distribution
- B. Adjacent to the electric utility meter, always outdoors
- C. In a locked mechanical room accessible only to licensed electricians

D (correct). Outside the building or nearest the point of service entrance, inside

Rationale: NEC 230.70(A)(1) requires the service disconnect to be installed at a readily accessible location either outside the building or nearest the point of entrance of the service conductors, inside the building.

64. NEC 110.14 requires that conductor terminations be made at devices listed for the temperature rating of the conductor. If a 75°C-rated conductor terminates on a 60°C-rated terminal, the conductor ampacity must be based on:

- A. The 90°C column since the conductor is rated 90°C
- B. The 75°C column of Table 310.16
- C. The average of the conductor and terminal ratings

D (correct). The 60°C column — the lowest rating of any connected termination

Rationale: NEC 110.14(C) requires that conductor ampacity be limited by the lowest temperature rating of any connected termination, conductor, or device — in this case 60°C.

Code: NEC 110.14

65. NEC 220.52 requires that two small appliance branch circuits be included in the load calculation for a dwelling. Each circuit must be calculated at:

- A. 2,000 VA per circuit
- B. 750 VA per circuit
- C. 1,000 VA per circuit

D (correct). 1,500 VA per circuit

Rationale: NEC 220.52(A) requires that two or more 20-ampere small appliance branch circuits be included in the dwelling load calculation at 1,500 VA per circuit.

66. NEC 240.83(E) requires circuit breakers used as switches in 120V and 277V fluorescent lighting circuits to be marked:

- A. "HACR" when used in heating, air conditioning, or refrigeration equipment
- B. "AF" when used in arc fault circuit protection
- C. "GFI" when providing ground fault protection

D (correct). "SWD" (Switching Duty) when used as a switch in fluorescent lighting circuits

Rationale: NEC 240.83(E) requires circuit breakers used as switches in 120V or 277V fluorescent lighting circuits to be marked "SWD" (Switching Duty) or "HID" for high-intensity discharge lighting.

67. NEC 210.8(A) requires GFCI protection for receptacles in which locations in dwelling units?

- A (correct). Bathrooms, garages, outdoors, crawl spaces, unfinished basements, kitchen countertops, and wet locations**
- B. Only bathrooms and kitchen countertops within 6 feet of a sink
- C. All receptacles throughout the entire dwelling unit
- D. Only exterior and garage locations

Rationale: NEC 210.8(A) requires GFCI protection for receptacles in bathrooms, garages, outdoors, crawl spaces, unfinished basements, kitchen countertops within 6 feet of a sink, boathouses, bathtubs/shower stalls, laundry areas, and indoor damp or wet locations.

68. Per NEC 300.4, where must cables be protected when passing through holes in wood framing members less than 1.25 inches from the nearest edge?

- A (correct). A steel plate or bushing at least 1/16 inch thick**
- B. No protection required if the hole is drilled cleanly
- C. A plastic nail plate of any thickness
- D. Additional layers of NM cable sheathing

Rationale: NEC 300.4(A)(1) requires that cables passing through holes in wood framing members where the edge of the hole is less than 1-1/4 inches from the nearest edge of the wood must be protected by a steel plate or bushing at least 1/16 inch thick.

69. Per NEC Article 100, what is the difference between "grounded" and "grounding"?

- A (correct). "Grounded" = connected to earth; "Grounding" = the act of establishing that connection**
- B. "Grounding" is only required for service equipment
- C. Both terms mean the same thing and are interchangeable
- D. "Grounded" means energized; "Grounding" means de-energized

Rationale: "Grounded" means connected to ground or to a conductive body that extends the ground connection. "Grounding" refers to the act of establishing that connection to ground.

70. According to Texas Occupations Code Chapter 1305, a journeyman electrician in Texas is licensed by:

- A. Texas Workforce Commission
- B. Texas Department of Insurance (TDI)
- C. Texas State Board of Plumbing Examiners
- D (correct). Texas Department of Licensing and Regulation (TDLR)**

Rationale: In Texas, electrician licensing is administered by the Texas Department of Licensing and Regulation (TDLR) under the authority of Chapter 1305 of the Texas Occupations Code.

71. According to NEC 220.14(J), each sign and outline lighting outlet must be calculated at a minimum of:

- A (correct). 1,200 VA**
- B. 600 VA
- C. 2,400 VA
- D. 1,500 VA

Rationale: NEC 220.14(J) requires that each sign and outline lighting outlet be calculated at a minimum of 1,200 VA for the purpose of load calculations.

72. NEC 240.21 establishes tap conductor rules. A 10-foot tap rule allows smaller conductors if they:

- A. Are protected by a fuse at the tap point equal to conductor ampacity
- B. Are installed in conduit and terminate in a disconnect within 10 feet
- C. Are the same size as the feeder conductors they tap from
- D (correct). Have ampacity at least 1/10 of the feeder OCP rating and be enclosed in raceway**

Rationale: NEC 240.21(B)(1) permits 10-foot taps without overcurrent protection at the tap point if the tap conductors have an ampacity of at least 1/10 of the rating of the overcurrent device protecting the feeder conductors, and are enclosed in raceway.

73. According to NEC 220.55 and Table 220.55, when calculating the demand load for electric ranges, the demand factor for a single household range rated not over 12 kW is:

- A (correct). 8 kW maximum demand (Column C)**
- B. 10 kW
- C. 12 kW (full nameplate rating, no reduction)
- D. 6 kW

Rationale: NEC Table 220.55 Column C specifies that a single household electric range rated not over 12 kW has a maximum demand of 8 kW for service and feeder calculations.

74. Per NEC 225.18, what is the minimum vertical clearance required for service-entrance conductors crossing a residential driveway?

- A. 8 feet
- B. 18 feet
- C (correct). 12 feet**
- D. 10 feet

Rationale: NEC 225.18 requires overhead service conductors to maintain a minimum clearance of 12 feet above residential driveways and other areas subject to pedestrian or vehicular traffic only.

75. Per NEC 690.12, rapid shutdown of PV systems on buildings requires that PV system conductors within the array boundary be reduced to what voltage within 30 seconds of rapid shutdown initiation?

- A. 120V or less within 30 seconds
- B (correct). 80V or less within 30 seconds**
- C. 30V or less within 60 seconds
- D. 0V within 30 seconds

Rationale: NEC 690.12(B)(2) requires that for rooftop PV arrays, the conductors within the array boundary be reduced to 80V or less within 30 seconds of rapid shutdown initiation.

76. According to NEC 376.22, the maximum fill percentage for wireways (wiring troughs) is:

- A (correct). 20% of the interior cross-sectional area**
- B. 53% for a single conductor, 40% for multiple
- C. 80% of the interior cross-sectional area
- D. 40% of the interior cross-sectional area

Rationale: NEC 376.22 limits the total cross-sectional area of conductors in a wireway to 20% of the interior cross-sectional area of the wireway at any cross section.

77. According to NEC 250.122, what is the minimum size equipment grounding conductor (EGC) required for a circuit protected by a 60-ampere overcurrent device?

- A. 8 AWG copper
- B. 6 AWG copper
- C. 12 AWG copper
- D (correct). 10 AWG copper**

Rationale: NEC 250.122 Table requires a minimum 10 AWG copper EGC for circuits protected by a 60-ampere overcurrent device.

78. According to NEC 230.42, the minimum ampacity of service entrance conductors must be sufficient to carry:

- A. Equal to the nameplate rating of the service disconnect
- B. 125% of the largest motor load plus 100% of other loads
- C. No less than 200 amperes for all residential services
- D (correct). Sufficient to carry the calculated load served**

Rationale: NEC 230.42(A) requires service entrance conductors to have sufficient ampacity to carry the load served and to have a rating not less than specified in that section. For one-family dwellings, minimum 100A service is required.

79. NEC Article 334 covers Type NM cable. In which of the following locations is NM cable NOT permitted?

- A (correct). Commercial buildings more than three floors above grade**
- B. Attic spaces accessible only through a scuttle hole
- C. One-family dwellings of any height
- D. Concealed in dry locations in residential construction

Rationale: NEC 334.12 prohibits Type NM cable in commercial buildings more than three floors above grade, in buildings of Types I or II construction, and where exposed to corrosive fumes or vapors.

80. NEC 240.4(D) limits the maximum overcurrent protection for 14 AWG copper conductors to:

- A. 25 amperes
- B. 30 amperes
- C (correct). 15 amperes**
- D. 20 amperes

Rationale: NEC 240.4(D) establishes small conductor rules limiting overcurrent protection: 14 AWG copper = 15A maximum, 12 AWG copper = 20A maximum, 10 AWG copper = 30A maximum, regardless of conductor ampacity.

81. NEC 215.2(A)(1) requires that feeder conductors have an ampacity not less than what percentage of the noncontinuous load plus what percentage of the continuous load?

- A. 125% of all loads whether continuous or not
- B. 80% of noncontinuous load plus 100% of continuous load
- C. 100% of all loads with no continuous load adjustment
- D (correct). 100% of noncontinuous load plus 125% of continuous load**

Rationale: NEC 215.2(A)(1) requires feeder conductors to have an ampacity not less than 100% of the noncontinuous load plus 125% of the continuous load (loads expected to continue for 3 hours or more).

82. Per NEC 220.42, the demand factor applied to the first 3,000 VA of general lighting load in a dwelling is:

- A (correct). 100% (no reduction)**
- B. 35%
- C. 50%
- D. 75%

Rationale: NEC Table 220.42 specifies demand factors for general lighting loads. The first 3,000 VA of dwelling lighting load is calculated at 100% (no demand reduction). Amounts over 3,000 VA up to 120,000 VA are calculated at 35%.

83. According to NEC Article 100, what is the definition of a "branch circuit"?

- A. Any conductor carrying current to a load
- B. The conductors between the main breaker and a subpanel
- C (correct). The circuit conductors between the final overcurrent device and the outlet(s)**
- D. The conductors between the utility transformer and the service panel

Rationale: A branch circuit is defined in NEC Article 100 as the circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).

84. Per NEC 250.53(A)(2) Exception, if a single ground rod does not achieve a resistance of 25 ohms or less to ground, what must be done?

- A. Replace the rod with a metal underground water pipe
- B. No additional action needed — 25 ohms is a target, not a requirement
- C. Drive the rod deeper until resistance is achieved
- D (correct). Install one additional electrode at least 6 feet from the first**

Rationale: If a single ground rod has a resistance greater than 25 ohms, NEC 250.53(A)(2) Exception requires the installation of one additional electrode to supplement it. The two electrodes must be at least 6 feet apart.

85. According to NEC 110.3(B), what must be done with listed or labeled equipment?

- A. Tested by the AHJ before installation
- B (correct). Installed in accordance with listing or labeling instructions**
- C. Used only in wet locations to avoid corrosion
- D. Approved by the manufacturer on a case-by-case basis

Rationale: NEC 110.3(B) requires that listed or labeled equipment be installed and used in accordance with any instructions included in the listing or labeling. Ignoring manufacturer instructions violates the NEC.

