Instructions: **Fee $15**

1. Print these pages.
2. Circle the correct answers and transfer them to the answer sheet.
3. Page down to the last page for the verification forms and mailing instructions.
4. Use the included information as your reference materials.
5. 30 questions are listed in a straight order mini-section format throughout the complete quiz.

Course: 18827 2017 NEC Changes 5

This course is valid for these credentials:

Credential Description	Cred Code	Credit Hours
Registered/Beginner Electrician	BE	1.0
Commercial Electrical Inspector	CEI	1.0
Industrial Journeyman Electrician	IJE	1.0
Journeyman Electrician	JE	1.0
Master Electrician	ME	1.0
Residential Journeyman Electrician	RJE	1.0
Residential Master Electrician	RME	1.0
UDC-Electrical Inspector	UEI	1.0

2017 NEC Changes 5

702.12(C) Power Inlets Rated at 100 Amperes or Greater, for Portable Generators

2014 NEC Requirement. No provisions existed in Article 702 for interlocked disconnecting means or listing requirements of power inlets for the connection of a generator source of an optional standby system.

2017 NEC Change. New language was added requiring optional standby equipment containing power inlets rated 100 amperes or more for the connection of a generator source to be listed for the intended use and be equipped with an interlocked disconnecting means. Two exceptions have been added after this new language to address instances where the inlet has been rated as a disconnecting means and for supervised industrial installations where permanent space has been identified for the portable generator to be located within line of sight of the power inlets.

Article 705, Part IV Microgrid Systems

2014 NEC Requirement. Article 705 did not address the installation of microgrid systems, intentionally islanded systems, or stand-alone systems as interconnected electric power production sources.

2017 NEC Change. A new Part IV was added to Article 705 titled, "Microgrid Systems." Microgrid systems are sometimes referred to as "intentionally islanded systems" and "stand-alone systems." Microgrids are a way to add resiliency against loss of power in premises wiring systems.

Article 706 Energy Storage Systems

2014 NEC Requirement. No article about energy storage systems existed. Rules for energy storage systems were discussed in Articles 480, 690, 692, and 694.

2017 NEC Change. A new Article 706 titled, "Energy Storage Systems," was added to the *NEC* pertaining to all permanently installed energy storage systems (ESS).

708.10(A)(2) Receptacle Identification

2014 NEC Requirement. Cover plates for the receptacles, or the receptacles themselves, in COPS facilities are required to have a distinctive color or marking so as to be readily identifiable from other non-COPS receptacles. An exception states that receptacle marking and identification of the COPS system receptacles are not required at a designated critical operations area (DCOA) that is a stand-alone building.

2017 NEC Change. In addition to the distinctive color or marking requirement for COPS receptacles, all nonlocking-type, 125-volt, 15- and 20-ampere receptacles supplied from the COPS are now required to have an illuminated face or an indicator light to indicate that there is power to the receptacle.

Article 710 Stand-Alone Systems

2014 NEC Requirement. Requirements for stand-alone systems existed in Articles 690, 692 and 694, but not in one central location.
2017 NEC Change. The requirements of stand-alone systems were brought to one location and a new Article 710, Stand-Alone Systems, was created for the 2017 *NEC*.

Article 712 Direct Current Microgrids

2014 NEC Requirement. DC microgrids were not addressed specifically in the 2014 *NEC*.
2017 NEC Change. A new Article 712 for dc microgrids was added for a power distribution system consisting of more than one interconnected dc power sources, supplying dc- dc converters(s), dc loads(s), and/ or ac loads(s) powered by dc-ac inverters(s).

1. New language was added requiring optional standby equipment containing power inlets rated _____ for the connection of a generator source to be listed for the intended use and be equipped with an interlocked disconnecting means.
    a. 100 amperes
    b. more than 100 amperes
    c. both a & b
    d. none of the above
2. Two exceptions have been added after this new language to address instances where the inlet has been rated as a disconnecting means and for supervised industrial installations where permanent space has been _____ for the portable generator to be located within line of sight of the power inlets.
    a. listed
    b. marked
    c. identified
    d. approved
3. A new Part IV was added to Article 705 titled, "Microgrid Systems." Microgrid systems are sometimes referred to as "_____."
    a. intentionally islanded systems
    b. stand-alone systems
    c. both a & b
    d. none of the above
4. Microgrids are a way to add _____ against loss of power in premises wiring systems.
    a. hardy
    b. resiliency
    c. buoyancy
    d none of the above
5. A new Article 706 titled, "Energy Storage Systems," was added to the *NEC* pertaining to all _____ installed energy storage systems (ESS).
    a. temporary
    b. permanently
    c. persistently
    d. none of the above
6. In addition to the distinctive color or marking requirement for COPS receptacles, all nonlocking-type, 125-volt, 15- and 20-ampere receptacles supplied from the COPS are now required to have an _____ to indicate that there is power to the receptacle.
    a. illuminated face
    b. indicator light
    c. marking
    d. both a & b
7. The requirements of stand-alone systems were brought to one location and a ____ Article 710, Stand-Alone Systems, was created for the 2017 *NEC*.
    a. revised
    b. relocated
    c. new
    d. none of the above

8. A new Article 712 for dc microgrids was _____ for a power distribution system consisting of more than one interconnected dc power sources, supplying dc- dc converters(s), dc loads(s), and/ or ac loads(s) powered by dc-ac inverters(s).

a. revised
b. relocated
c. added
d. none of the above

725.3(M) and (N) Other Articles (Class 1, Class 2, and Class 3 Remote-Control, Signaling, and Power-Limited Circuits)

2014 NEC Requirement. Cable routing assemblies and communications raceways are both defined in Article 100. Both were addressed in Article 725 at 725.133 for the installation of conductors and equipment, 725.139 for installation of conductors of different circuits in the same cable routing assembly, 725.179 for listing and marking of Class 2, Class 3, and Type PLTC cables in communications raceways and cable routing assemblies, and Table 725.154 for the applications of listed Class 2, Class 3, and PLTC cables in buildings. Permission to apply other articles for the installation of cable routing assemblies and communications raceways was not granted at 725.3.

2017 NEC Change. New 725.3(M) and (N) were added for "Other Articles" to provide guidance in the selection, listing and installation requirements for cable routing assemblies and communication raceways used for Class 2, Class 3 and PLTC cables.

725.135(K)(6), (L)(G) and (M)(G) Installation of Class 2, Class 3, and PLTC Cables

2014 NEC Requirement. Type CMUC under carpet communications wires and cables were permitted to be installed under carpet.

2017 NEC Change. New *Code* language was introduced at 725.135(K), (L), and (M) to clearly indicate that Type CMUC under carpet communications wires and cables can be installed under modular flooring and planks, as well as under carpet.

725.144, Table 725.144 Transmission of Power and Data. (Class 1, Class 2, and Class 3 Remote-Control, Signaling, and Power-Limited Circuits)

2014 NEC Requirement. Table 11(A) and Table11(B) in Chapter 9 addresses power and current limitations on Class 2 and Class 3 circuits. These tables are referenced at 725.121. No references are found in the 2014 *NEC* for Type LP cables.

2017 NEC Change. New provisions were added at 725.144 and Table 725.144 pertaining to remote powering over local area networking (LAN) cable. Additional information was introduced concerning new Type LP cable.

727.4(5) Ex. to (5) Uses Permitted. (Instrumentation Tray Cable: Type ITC)

2014 NEC Requirement. An exception exists at 336.10(7) for power and control tray cable permitting Type TC-ER cable to transition between cable trays and between cable trays and utilization equipment or devices for a distance not to exceed 1.8 m (6 ft) without continuous support (where not subject to physical damage). Under this new exception, TC-ER cable must be mechanically supported where exiting the cable tray to ensure that the minimum bending radius is not exceeded. This exception did not apply to instrumentation tray cable (Type ITC-ER).

2017 NEC Change. The same exception that exists for power and control tray cable (Type TC-ER) at 336.10(7) has been added at 727.4(5) for instrumentation tray cable (Type ITC-ER).

760.176(G) and 760.179(1) Listing and Marking of NPLFA Cables and Listing and Marking of PLFA Cables and Insulated Continuous Line Type Fire Detectors

2014 NEC Requirement. Temperature ratings and conductor size markings were not required for the jacket of fire alarm circuits.

2017 NEC Change. New temperature rating marking requirements were added for fire alarm circuits requiring the jacket of NPLFA and PLFA cables that have a temperature rating exceeding 60°C (140°F) to be marked with the appropriate temperature rating. The jacket of these fire alarm cables must also be marked with the conductor size as well.

770.44 Overhead (Aerial) Optical Fiber Cables

2014 NEC Requirement. Part II of Article 770 did not contain information pertaining to optical fiber cables installed overhead to a building or structure. Section 840-44 for premises-powered optical fiber-based

broadband communications systems contained information applying to overhead outside plant optical fiber cables, but there was no such information in Article 770.
2017 NEC Change. A new 770-44 was added under Part II of Article 770 titled, "Overhead (Aerial) Optical Fiber Cables." This section contains needed information for the installation of overhead (aerial) optical fiber cables to buildings directly for Article 770.

9. New 725.3(M) and (N) were added for "Other Articles" to provide guidance in the selection, listing and installation requirements for cable routing assemblies and communication raceways used for _____.
   a. Class 2
   b. Class 3
   c. PLTC cables
   d. all of the above
10. New *Code* language was introduced at 725.135(K), (L), and (M) to clearly indicate that Type CMUC under carpet communications wires and cables can be installed under _____.
   a. modular flooring
   b. modular planks
   c. carpet
   d. all of the above
11. New provisions were added at 725.144 and Table 725.144 pertaining to remote powering over local area networking (LAN) cable. Additional information was introduced concerning new Type ____ cable.
   a. PL
   b. LP
   c. both a & b
   d. none of the above
12. The same exception that exists for power and control tray cable (Type TC-ER) at 336.10(7) has been _____ at 727.4(5) for instrumentation tray cable (Type ITC-ER).
   a. revised
   b. relocated
   c. added
   d. none of the above
13. New temperature rating marking requirements were added for fire alarm circuits requiring the jacket of _____ cables that have a temperature rating exceeding 60°C (140°F) to be marked with the appropriate temperature rating.
   a. NPLFA
   b. PLFA
   c. both a & b
   d. none of the above
14. The jacket of these fire alarm cables must also be _____ with the conductor size as well.
   a. listed
   b. marked
   c. identified
   d. approved
15. A new 770-44 was added under Part II of Article 770 titled, "Overhead (Aerial) Optical Fiber Cables." This section contains needed information for the installation of _____ optical fiber cables to buildings directly for Article 770.
   a. overhead
   b. aerial
   c. both a & b
   d. none of the above

770.48(A) and (B) Optical Fiber Cables Entering Building
2014 NEC Requirement. Unlisted conductive and nonconductive outside plant optical fiber cables are permitted to be installed in building spaces where the length of the cable within the building, measured from its point of entrance, does not exceed 15 m (50 ft) and the cable enters the building from the outside and is terminated in an

enclosure. Unlisted nonconductive outside plant optical fiber cables are permitted to enter a building from the outside only while installed in four specific raceway wiring methods.
2017 NEC Change. The point of entrance is now permitted to be extended from the penetration of the external wall or floor slab by continuously enclosing the entrance optical fiber cables in RMC or IMC to the point of emergence. *Code* language was also added to clarify that unlisted nonconductive outside plant optical fiber cables installed in PVC or EMT cannot be installed in risers, ducts used for environmental air, plenums used for environmental air, and other spaces used for environmental air.

770.49 Metallic Entrance Conduit Grounding

2014 NEC Requirement. Rigid metal conduit (RMC) or intermediate metal conduit (IMC) containing optical fiber entrance cable had to be connected by a bonding conductor or grounding electrode conductor to a grounding electrode in accordance with 770.1oo(B).
2017 NEC Change. The reference to RMC and IMC was removed and replaced with "metallic conduit" as all metallic conduits containing optical fiber entrance cables should require a bonding connection to a grounding electrode (not just RMC and IMC).

770.100(B)(3)(2) Lightning Protection Systems Conductors

2014 NEC Requirement. Revised language was added to clarify that lightning protection system conductors, (not just air terminal conductors), are not to be used as part
2017 NEC Change. The term *air terminal conductors (lightning-md conductors)* was replaced with the broader term *lightning protection system conductors* to clarify that no lightning protection system conductors should not be used as a part of the grounding electrode conductor or as a grounding electrode for optical fiber systems.

810.15 Grounding of Radio and TV Equipment

2014 NEC Requirement. Masts and metal structures supporting radio and television antennas were required to be grounded using a bonding conductor or grounding electrode conductor as described at 810.21.
2017 NEC Change. Grounding of masts and metal supporting structures for radio and television antennas can be eliminated when the antenna and its related supporting mast or structure are within a zone of protection defined by a 46 m (150ft) radius "rolling sphere" described in NFPA 780-2014, *Standard for the Installation of Lightning Protection Systems.*

840.2 Network Terminals

2014 NEC Requirement. The scope of Article 840 indicated that the article covers premises-powered optical fiber-based broadband communications systems that provide any combination of voice, video, data, and interactive services through an optical network terminal (ONT). The term, *Optical Network Terminal (ONT)* was defined at 840.2.
2017 NEC Change. The scope of Article 840 now advises that the article covers premises-powered broadband communications systems that consist of an optical fiber, twisted pair, or coaxial cable to the premises supplying a broadband signal to a network terminal. The term *Network Terminal* is defined at 840.2 and replaces the term, *Optical Network Terminal (ONT).*

840.48 Unlisted Wires and Cables Entering Building

2014 NEC Requirement. For unlisted premises-powered broadband communications system cables entering a building, compliance with *770-4B* was required.
2017 NEC Change. Premises-powered broadband communications system wires and cables will now be required to comply with *770-4B* for unlisted optical fiber cables entering buildings, 800-48 for unlisted communications wires and unlisted multi pair communications cables entering buildings, and 820-48 for unlisted coaxial cables entering buildings.

16. The point of entrance is now permitted to be extended from the penetration of the external wall or floor slab by continuously enclosing the entrance optical fiber cables in _____ to the point of emergence.
    a. RMC
    b. IMC
    c. EMT
    d. both a & b

17. *Code* language was also added to clarify that unlisted nonconductive outside plant optical fiber cables installed in _____ cannot be installed in risers, ducts used for environmental air, plenums used for environmental air, and other spaces used for environmental air.
    a. IMC

b. PVC
c. EMT
d. both b & c

18. The reference to RMC and IMC was removed and replaced with "metallic conduit" as all metallic conduits containing optical fiber entrance cables should require a _____ connection to a grounding electrode (not just RMC and IMC).

a. grounding
b. bonding
c. both a & b
d. none of the above

19. The term *air terminal conductors (lightning-md conductors)* was replaced with the broader term *lightning protection system conductors* to clarify that no lightning protection system conductors should not be used as a part of the _____ for optical fiber systems.

a. grounding electrode conductor
b. grounding electrode
c. both a & b
d. none of the above

20. Grounding of masts and metal supporting structures for ____ antennas can be eliminated when the antenna and its related supporting mast or structure are within a zone of protection defined by a 46 m (150ft) radius "rolling sphere" described in NFPA 780-2014, *Standard for the Installation of Lightning Protection Systems.*

a. radio
b. television
c. both a & b
d. none of the above

21. The scope of Article 840 now advises that the article covers premises-powered broadband communications systems that consist of a _____cable to the premises supplying a broadband signal to a network terminal.

a. optical fiber
b. twisted pair
c. coaxial
d. all of the above

22. The term Network Terminal is defined at 840.2 and replaces the term, _____.

a. Optical Network Terminal
b ONT
c. both a & b
d. none of the above

23. Premises-powered broadband communications system wires and cables will now be required to comply with 770-4B for _____ optical fiber cables entering buildings, 800-48 for unlisted communications wires and unlisted multi pair communications cables entering buildings, and 820-48 for unlisted coaxial cables entering buildings.

a. listed
b. unlisted
c. identified
d. marked

840.160 Powering Circuits

2014 NEC Requirement. There were no provisions in Article 840 for communication cables delivering power exceeding 60 watts.

2017 NEC Change. New requirements were added at 840.160 giving permission for communication cables to carry circuits for powering communications equipment. This section goes on to indicate that where the power supplied over a communications cable is greater than 60 watts, communication cables and the power circuit must comply with new 725.144 where communications cables are used in place of Class 2 and Class 3 cables.

Chapter 9 Tables Chapter 9, Notes to Tables, Note 9

2014 NEC Requirement. Assemblies of single insulated conductors without an overall covering were not addressed in the notes to the Chapter 9 tables.

2017 NEC Change. New text was added to Note 9 of the Chapter 9 tables to clearly specify that assemblies of single insulated conductors without an overall covering are not to be considered a cable when determining conduit or tubing fill area. The conduit or tubing fill for the assemblies is to be calculated based upon the individual conductors.

Informative Annex D Example 03 Store Building

2014 NEC Requirement. In the Informative Annex D3 example for a store building, the actual connected lighting load is calculated at "125% of the actual connected lighting load (8500 VA x 1.25 = 10,625 VA) and compared to 125% of the load from Table 220.12.

2017 NEC Change. The "125%" for the actual connected lighting load has been removed as continuous loads are calculated at 125% in the "Minimum Size Feeder (or Service) Overcurrent Protection."

Informative Annex D, Example 07 Sizing of Service Conductors for Dwelling(s)

2014 NEC Requirement. Informative Annex Example D7 gave an example for sizing dwelling unit service conductors using the 83 percent allowable ampacity value adjustment from 310.15(B)(7). The example did not show any adjustment or temperature correction factors.

2017 NEC Change. Informative Annex Example D7 was revised to give two examples for sizing dwelling unit service conductors. The previous D7 is identified as an example with no required adjustment or correction factors, and a new example was added to illustrate the method used when temperature correction factors are involved. The new example calculates the size for dwelling unit service conductors with the allowed 310.15(8)(7) eighty three percent adjustment along with a temperature correction factor from Table 310.15(B)(2)(a).

Informative Annex D, Example 08 Motor Circuit Conductors, Overload Protection, and Short-Circuit and Ground-Fault Protection

2014 NEC Requirement. Example D8 might have led users of the *Code* to the assumption that only one type of protective device was used for feeder short-circuit and groundfault protection.

2017 NEC Change. Example D8 has been revised for the "Feeder Short-Circuit and Ground Fault Protection" portion to show (a) an example using non-time delay fuse and (b) an example using inverse time circuit breaker.

24. New requirements were _____ at 840.160 giving permission for communication cables to carry circuits for powering communications equipment.
    a. relocated
    b. revised
    c. added
    d. deleted

25. This section goes on to indicate that where the power supplied over a communications cable is greater than 60 watts, communication cables and the power circuit must comply with new 725.144 where communications cables are used in place of Class ___ cables.
    a. 1
    b. 2
    c. 3
    d. both b & c

26. New text was added to Note 9 of the Chapter 9 tables to clearly specify that assemblies of single insulated conductors without an overall covering are not to be considered a cable when determining _____ fill area.
    a. conduit
    b. tubing
    c. both a & b
    d. none of the above

27. The conduit or tubing fill for the assemblies is to be calculated based upon the _____ conductors.
    a. group of
    b. outer
    c. individual
    d. multi

28. The "125%" for the actual connected lighting load has been removed as continuous loads are calculated at 125% in the "_____ Overcurrent Protection."
    a. Minimum Size Feeder

b. Minimum Size Service
c. both a & b
d. none of the above

29. The new example calculates the size for dwelling unit service conductors with the allowed 310.15(8)(7) - ____ percent adjustment along with a temperature correction factor from Table 310.15(B)(2)(a).
a. 60
b. 125
c. 80
d. 83

30. Example D8 has been revised for the "Feeder Short-Circuit and Ground Fault Protection" portion to show an example _____.
a. using non-time delay fuse
b. using inverse time circuit breaker
c. both a & b
d. none of the above

2017 NEC Changes 5-Quiz Answer Sheet

1	a b c d	11	a b c d	21	a b c d
2	a b c d	12	a b c d	22	a b c d
3	a b c d	13	a b c d	23	a b c d
4	a b c d	14	a b c d	24	a b c d
5	a b c d	15	a b c d	25	a b c d
6	a b c d	16	a b c d	26	a b c d
7	a b c d	17	a b c d	27	a b c d
8	a b c d	18	a b c d	28	a b c d
9	a b c d	19	a b c d	29	a b c d
10	a b c d	20	a b c d	30	a b c d

To obtain your Continuing Education Credits follow the below instructions

1. Print out first.
2. Fill in all fields applicable. Fee $15.00
3. Include your certification or license number.
4. We'll take care of crediting with the state and mailing back to you the quiz results.

Send by mail

1. Mail just the answer sheet and keep the quiz for your records.
2. Fill out this form below completely.
3. Applicable fees by check payable to our business name: **GaryKlinka.com**
4. Mail to: **GaryKlinka.com** at 1316 Cardinal Circle, Neenah, WI 54956.

Live Support at 920-381-6714 or tmklinka@hotmail.com

----------Educational Course Attendance Verification Form ----------

Attendee's name_____Date_____

Address_____

Credential Number_____Phone#_____

Course Title and Name 2017 NEC Changes 5 Course ID# 18827

List the name of each credential held by attendee_____

_____Credited 1 hrs

Email address_____

Fax#_____Course Fee $15

To be completed by GaryKlinka.com

Attendee passed the course with a greater than 70% score on date_____

Instructor's signature _____