**Republic of the Philippines**
**PROFESSIONAL REGULATION COMMISSION**
**Manila**

**BOARD OF ELECTRICAL ENGINEERING**

**REGISTERED MASTER ELECTRICIAN Licensure Examination**

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PHILIPPINE ELECTRICAL CODE

INSTRUCTION: Select the correct answer for each of the following questions. Mark only one answer for each item by shading the box corresponding on the letter of your choice on the answer sheet provided. STRICTLY, NO ERASURES ALLOWED. Use pencil No. 1 only.

MULTIPLE CHOICES

1. If an individual 30 amp branch circuit feeds a single non-motorized equipment receptacle, then the receptacle amperage must be which of the following:
   **a**. 20 **b. 30** **c.** 40 **d.** None of the above

2. Conductors run in parallel raceways must have equipment grounding conductors which are which of the following:
   **a.** Run in individual raceways
   **b.** Supported every 6 inches
   **c. Run in parallel in each raceway**
   **d.** Protected from excessive temperature

3. A surge arrester of less than 1000 volts nominal shall have a ground connecting conductor which is no smaller than which of the following sizes:
   **a.** 8.0 sq mm **b.** 5.5 sq mm **c.** 3.5 sq mm **d. 2.0 sq mm**

4. When there is more than one nominal voltage system in the building, ungrounded feeder conductors must be which of the following:
   **a.** Connected through a transfer switch
   **b. Separately identified**
   **c.** Run in individual conduits
   **d.** Identified using the same color

5. Single-point grounding is allowed at the source of a separately derived system when which of the following conditions exists:
   **a.** A separate equipment grounding conductor is provided at each building and enclosure
   **b.** The neutral is insulated and isolated from earth, except at one location
   **c.** An equipment grounding conductor is run with the phase conductors
   **d. All of the above**

6. The permitted identification of a size 14.0 sq mm or smaller insulated grounded conductor is which of the following:

**a. A continuous white outer finish**
**b.** Three yellow stripes down the length of a green insulated conductor
**c.** One blue stripe on a gray insulated conductor
**d.** All of the above

7. Branch circuits shall not be derived from autotransformers unless which of the following exist:
**a.** The grounded conductor is protected from access by unauthorized personnel.
**b.** The autotransformer operates at less than 600 volts nominal.
**c. The circuit supplied has a grounded conductor that is electrically connected to a grounded conductor from the system that supplies the autotransformer.**
**d.** All of the above

8. A two-wire AC circuit with two ungrounded conductors is permitted to be tapped from ungrounded conductors of circuits that have which of the following:
**a. Two switching devices**
**b.** An automatic multi-pole switch
**c.** A grounded neutral conductor
**d.** None of the above

9. The minimum size of an equipment grounding conductor used to ground equipment with an automatic over current device rated at 20 amps in the circuit ahead of the piece of equipment is which of the following:
**a.** 2.0 sq mm copper **b. 3.5 sq mm copper**
**c.** 5.5 sq mm copper **d.** 8.0 sq mm copper

10. Electrical systems that are grounded must meet which of the following requirements:
**a.** Be connected to the earth in a way that limits the voltage caused by line surges
**b.** Be connected to the earth in a manner that will stabilize the voltage to the earth during normal operation
**c. Both of the above**
**d.** Either of the above

11. An electric 9 kW range shall have a minimum branch circuit size of which of the following:
**a.** 15 amps **b.** 20 amps **c.** 30 amps **d. 40 amps**

12. In a separately derived system, the TVSS shall be connected in which of the following manners:
**a.** To each ungrounded connector
**b.** Outdoors, in an easily accessible location
**c.** To the corner grounded delta
**d. To the load side of the first overcurrent device**

13. A TVSS device shall not be installed under which of the following conditions:
**a.** On an impedance grounded system
**b.** If the TVSS is less than the maximum continuous phase-to-phase power frequency that exists at the point of application

**c.** On circuits in excess of 600 volts
**d. All of the above**

14. A 125 volt single-phase kitchen counter receptacle must meet which of the following requirements:
    **a.** Have ground-fault interruption protection
    **b.** Be a maximum of 20 amps
    **c.** Be a minimum of 15 amps
    **d. All of the above**

15. A surge arrestor may be installed under which of the following conditions:
    **a.** On an impedance grounded system
    **b. On a service less than 1000 volts with a grounding electrode for the service**
    **c.** Either of the above
    **d.** None of the above

16. An impedance grounded neutral system is permitted to be installed if which of the following conditions is met:
    **a.** If installed to serve a line-to-neutral
    **b.** If installed outside in an easily accessible location
    **c. Ground detectors are installed on the system**
    **d.** None of the above

17. Multi-wire branch circuits are permitted to supply which of the following:
    **a.** Only line-to-line neutral loads
    **b.** Only one piece of utilization equipment
    **c. Both of the above**
    **d.** None of the above

18. The minimum size of an equipment grounding conductor used to ground equipment with an automatic overcurrent device rated at 40 amps in the circuit ahead of the piece of equipment is which of the following:
    **a.** 8.0 sq mm copper **b.** 8.0 sq mm aluminum
    **c.** 5.5 sq mm aluminum **d. 5.5 sq mm copper**

19. The size of the sole connection of a grounding electrode conductor connected to a concrete-encased electrode shall not be required to be which of the following:
    **a. Larger than 2.0 sq mm copper**
    **b.** Connected to an electrode encased by at least 50 mm of concrete
    **c.** Both of the above
    **d.** None of the above

20. For a 30 amp receptacle connected to a 30 amp branch circuit supplying two or more outlets, the total cord-and-plug load may not exceed which of the following sizes:
    **a. 24 amps** **b.** 16 amps **c.** 15 amps **d.** 12 amps

21. An equipment grounding conductor that is run with circuit conductors is permitted to be which of the following:
    **a. A solid copper busbar**

**b.** Any flexible metal conduit
**c.** Any liquid tight conduit
**d.** All of the above

22. Circuits over 120 volts but not exceeding 277 volts between conductors shall be permitted to supply power to which of the following:
**a.** The auxiliary equipment of electric-discharge lamps mounted in permanently installed fixtures
**b. Luminaries equipped with mogul-base screw shell lamp holders**
**c.** Screw shell type lamp holders
**d.** None of the above

23. The minimum size copper circuit wire for a 20 amp branch circuit conductor is which of the following:
**a.** 8.0 sq mm copper
**b.** 5.5 sq mm copper
c. 3.5 sq mm copper
**d. 2.0 sq mm copper**

24. Restricted-access, adjustable-trip circuit breakers must meet which of the following requirements:
**a.** Have a removable and sealable cover over the adjusting means
**b.** Be located behind bolted equipment covers
**c.** Be accessible only to a qualified person by means of a locked door
**d. All of the above**

25. The laundry area in a single-family dwelling unit must have which of the following:
**a.** A minimum of one 20 amp and one 220 amp receptacle
**b. At least one receptacle**
**c.** At least one receptacle installed within 3 feet of the washing machine location
**d.** A minimum of two GFCI receptacles

26. If a feeder conductor carries the total load supplied by the service conductors with an ampacity of 50 amps, then which of the following standards must be met:
**a.** The feeder ampacity must be greater than the service conductor ampacity
**b. The feeder ampacity must be less than the service conductor ampacity**
**c.** The feeder ampacity must be 30 amps
**d.** None of the above

27. Where more than one building exists on the same property under single management, additional feeders or branch circuits are permitted to supply which of the following:
**a.** Optional standby systems
**b.** Fire pumps
**c.** Parallel power production systems
**d. All of the above**

28. The use of 5-wire feeders is which of the following:
**a.** Prohibited
**b.** Restricted to installations over 600 volts nominal
**c.** Requires that the overcurrent device protection be 100% of the continuous load

**d. Permitted to use a common neutral**

29. DC power systems located on the premises must include which of the following:
    **a. A grounding connection at the power source**
    **b.** A grounding electrode conductor which is at least #10 AWG
    **c.** A grounding ring
    **d.** All of the above

30. **35.** The non current-carrying metal parts of equipment shall be considered effectively grounded by use of which of the following methods:
    **a.** If it is secured to the structural metal frame of a building
    **b.** By use of a separate grounded circuit conductor, running in a separate raceway
    **c.** Either of the above
    **d. None of the above**

31. An electrode that is permitted as a grounding means is which of the following:
    **a.** A metal underground water pipe
    **b.** A plate electrode
    **c.** A grounding ring
    **d. All of the above**

32. The grounded conductor for a single-phase 3-wire AC premises wiring system shall be which of the following:
    **a.** A grounding electrode
    **b. The neutral conductor**
    **c.** The common conductor
    **d.** Either A or B

33. The circuit breakers used for overcurrent protection of 3-phase circuits must have a minimum of three overcurrent relay elements that meet which of the following requirements:
    **a. Are operated from three current transformers**
    **b.** Have a neutral which is regrounded on the load side of the circuit
    **c.** Have a series rating of 125% of the total circuit load
    **d.** None of the above

34. A fuse must be connected in a manner that meets which of the following requirements:
    **a. On an overcurrent relay element**
    **b.** In series with each ungrounded conductor
    **c.** On the secondary side of a transformer
    **d.** Either B or C

35. Each set of conductors that feeds separate loads of a transformer secondary shall be connected in which of the following methods:
    **a.** With an overcurrent device on the multioutlet line of the branch circuit
    **b.** In series
    **c. Without overcurrent protection at the secondary**
    **d.** None of the above

36. A single-point grounded neutral system may include which of the following:
    **a.** A grounding electrode
    **b.** A bonding jumper that connects the equipment grounding conductor to a grounding electrode conductor
    **c.** A grounding electrode conductor that connects the grounding electrode to the system neutral
    **d. All of the above**

37. Service equipment electrical continuity shall be ensured by which of the following:
    **a.** Bonding equipment to the neutral conductor
    **b. Use of bonding type bushings**
    **c.** Both of the above
    **d.** Either of the above

38. If the use of multiple grounding connections results in objectionable current, which of the following alterations is permitted:
    **a.** Change the location of the grounding connections
    **b.** Discontinue one or more, but not all, of the grounding connections
    **c.** Either of the above
    **d. Both of the above**

39. A feeder overcurrent device that is not readily available shall be installed in which of the following manners:
    **a.** Branch circuit overcurrent devices must be installed on the load side
    **b.** Branch circuit overcurrent devices shall have a lower ampacity rating than the feeder overcurrent device
    **c.** Branch circuit overcurrent devices must be installed in a readily accessible location
    **d. All of the above**

40. Open conductors that are not service entrance cables shall not be installed less than which of the following:
    **a. 3,100 mm from grade level**
    **b.** 2,900 mm below grade level
    **c. 2,**500 mm below grade level
    **d. 1,**300 mm from grade level

41. Ground-loop currents flow if the neutral-to-ground connections are made in which of the following ways:
    **a.** On the feed side of separately derived systems
    **b. On the load side of service equipment or separately derived systems**
    **c.** In front of the overcurrent protection device
    **d.** All of the above

42. The metal disconnecting means at a remote building, supplied by a feeder with an equipment grounding conductor, is required to be which of the following:
    **a.** Connected on the service load side of the feeder
    **b.** Buried not less than 3 feet under the ground
    **c. Grounded to a grounding electrode**
    **d.** None of the above

43. Circuit conductors that supply power conversion equipment included as part of an adjustable-speed drive system must have an ampacity of which of the following:
    **a.** At least 125 percent of the motor's full-load current
    **b. Not less than 125 percent of the rated input to the power conversion equipment**
    **c.** Not less than 50 percent of the maximum ampacity listed on the equipment nameplate
    **d.** All of the above

44. The disconnection means for a 400 volt motor circuit must have an ampere rating of which of the following:
    **a.** At least 125 percent of the motor's full-load current
    **b. Not less than 115 percent of the full-load current rating of the motor**
    **c.** 120 amps
    **d.** Equal to or greater than that the ampacity listed on the motor equipment

45. A 15 amp receptacle that is installed in a wet location must meet which of the following installation requirements:
    **a.** Be protected from rain or water runoff
    **b.** Have an attachment plug cap inserted
    **c. Have an enclosure that is weatherproof**
    **d.** All of the above

46. Receptacles are considered grounded by which of the following methods:
    **a. When the grounding contacts are connected to the equipment grounding conductor of the circuit that supplies the receptacle**
    **b.** If the receptacle ground wire is terminated under a metal screw
    **c.** When wired to a cord connector
    **d.** When the grounding contacts have been effectively grounded

47. Installations for the electrical heating of a pipeline must:
    **a.** Be protected from physical damage
    **b.** Include caution signs posted at frequent intervals along the pipeline
    **c.** Be identified as being suitable for the chemical, thermal and physical environment of the installation
    **d. All of the above**

48. An industrial control panel supply conductor shall have an ampacity of which of the following:
    **a.** No less than 125% of the full-load current rating of all resistance heating loads and no more than 125% of all combined continuous loads
    **b. No less than 125% of the full-load current rating of all resistance heating loads plus 125% of the full-load current rating of all other connected motors based on their duty cycle if they are all in operation at the same time**
    **c.** No less than 125% of the full-load of two or more components of a systematic assembly
    **d.** Not to exceed the ampacity listed for all resistance heating equipment and connected motor nameplates

49. In order to guard exposed live motor parts and controllers operating at 50 volts or higher from accidental contact, which of the following methods must be used:
    **a.** Equipment is installed in a room that is only accessible by a qualified person
    **b.** Equipment is installed on a balcony that is elevated enough to prohibit access by unqualified people
    **c.** Equipment is installed or mounted at least 8 feet above floor level
    **d. All of the above**

50. A when a transformer is used to create a three-phase, four-wire distribution system from a three phase, three-wire ungrounded system, the transformer must meet which of the following installation requirements:
    **a.** The transformer must not be switched
    **b.** The transformer must be directly connected to the ungrounded phase conductors
    **c.** The transformer shall not be provided with overcurrent protection that is independent from the main switch and common-trip overcurrent protection for a three-phase, four-wire system
    **d. All of the above**