1. Fixed wiring methods shall be as provided for the following except for.
   a. audio signal processing
   b. amplification
   c. reproduction equipment
   d. canopy lighting system

2. According to the code, only such electric wiring, raceways, and cables used directly in connection with the elevator or dumbwaiter, including wiring for signals, for communication with the car, for lighting, heating, air conditioning, and ventilating the elevator car, for fire detecting systems, for pit sump pumps, and for heating, lighting, and ventilating the hoistway, shall be permitted inside the following location except for
   a. Hoistway
   b. Plenum
   c. machine rooms and machinery spaces
   d. control rooms and control spaces

3. Communication, radio, and television coaxial cables shall be permitted at a height of not less than _____ above swimming and wading pools, diving structures, and observation stands, towers, or platforms.
   a. 8.0 m **b. 3.0 m** c. 1.0 m d. 0.5 m

4. A raceway marked _____ is suitable for use in ducts
   a. plenum b. plemun c. plema d. Plumen

5. Circuits used only for the operation of fire alarm, other protective signaling systems, or the supply to fire pump equipment _____to be connected on the supply side of the service overcurrent device where separately provided with overcurrent protection
   a**. shall be permitted** b. shall not be permitted
   c. not stated in the code d. not required by the Code

6. According to the table of operating voltage in the code. The minimum conductor size for copper conductor for 2000 v is
   a. 8.0 sq mm b. **2.0 sq mm** c. 3.5 sq mm d. 5.5 sq mm

7. According to the table of operating voltage in the code. The minimum conductor size for copper conductor for 8000 v is
   a. **8.0 sq mm** b. 2.0 sq mm c. 3.5 sq mm d. 5.5 sq mm

8. According to the table of operating voltage in the code. The minimum conductor size for copper conductor for 15,000 v using AWG system is.
   a. 2 b. 12 c. 1 d. 0

9. Determine the minimum-size service conductors to supply a 100 A lighting and appliance load plus three squirrel-cage induction motors rated 460 volts, 3 phase, 40°C, full-voltage starting one 100-hp rated at 124 A at full load and two 25-hp motors rated at 34 A at full load on a 480-volt, 3-phase system.
   a. 223 A b. 155 A **c. 323 A** d. 292 A

10. Determine the maximum rating of the service overcurrent protective device that will supply a 100 A lighting and appliance load plus three squirrel-cage induction motors rated 460 volts, 3 phase, 40°C, full-voltage starting one 100-hp rated at 124 A at full load and two 25-hp motors rated at 34 A at full load on a 480-volt, 3-phase system.
    a. 453 A b. **518 A** **c.** 523 A d. 392 A

11. The following are the standard ampere ratings for fuses and inverse time circuit breakers except for.
    a. 125 b. 150 c. 175 **d. 95 A**

12. The inverse time factor of a DC motor is
    a.250 % b. 175 % **c. 150 %** d. 140 %

13. 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 or ____ percent for full-load currents greater than 100 amperes.
    a. 400, 300 b. 250, 175 c. 300, 400 d. 175, 250

14. Either a circuit breaker with inverse time characteristics or a dual-element (time-delay) fuse may serve as the following except for.
    a. overload protection
    b. as the branch-circuit short-circuit
    c. series fault protection
    d. ground-fault protection.

15. Where the service drop is secured to the mast, a guy wire may be installed to support the mast and provide adequate mechanical strength to support the service drop_____ are not permitted to be attached to the service mast.
    a. Communications conductors
    b. cable TV
    c. telephone service
    d. all of the above

16. Actual voltage is likely to be many times the 10,000 volts calculated, because extremely low (below normal) values were assumed for both resistance to ground and current. Most insulation systems, however, are not designed to withstand even 10,000 volts. Even if the insulation system does withstand a 10,000-volt surge, it is likely to be damaged and breakdown of the insulation system will result in sparking. The same situation would exist if the current surge were on the CATV cable or on a telephone line. The only difference would be the voltage involved, which would depend on the individual resistance to ground of the grounding electrodes. What will be the solution for this problem?
    a. bond the two grounding electrode systems together
    b. create a phantom circuit
    c. there will be no solution, the problem is embedded in the system
    d. install additional line trap

17. The code _____the use of a raceway as a means of support for nonelectric equipment, such as suspended ceilings, water pipes, nonelectric signs, and the like, which could cause a mechanical failure of the raceway.
    a. allows **b. prohibits**
    c. does not mentioned d. does not detail

18. Optical fiber cables and conductors for operating devices, operation and motion control, power, signaling, fire alarm, lighting, heating, and air-conditioning circuits of 600 volts or less shall be permitted to be run in the same traveling cable or raceway system if all conductors are insulated for the maximum voltage applied to any conductor within the cables or raceway system and if all live parts of the equipment are insulated from ground for this maximum voltage. Such a traveling cable or raceway shall also be permitted to include shielded conductors and/or one or more coaxial cables, if such conductors are insulated for the

maximum voltage applied to any conductor within the cable or raceway system. Conductors shall be permitted to be covered with suitable shielding for the following except.

a. Telephone
b. Audio
c. Video
d. Low frequency communications circuits.

19. In an insulation resistance test, an applied voltage ranging from _____ for systems of 600 volts or less supplied from a source of constant potential, is applied across the insulation.
a. 100 to 5000 V b. 1000 to 100 kV c. 10 to 1000 V d. 1 kV to 10 MV

20. Locations of lamps for outdoor lighting shall be below all_____ except
a. energized conductors
b. messenger support
c. transformers
d. other electric utilization

21. Determine the minimum standard size of overcurrent protective device and the minimum standard conductor size for the following circuit:
25 amperes of continuous load
60°C overcurrent device terminal rating
Type THWN conductors
Four current-carrying copper conductors in a raceway
a. 35 A, 8.0 sq mm, THHN **b. 35, 8.0 sq mm THWN**
c. 30 A, 8.0 sq mm, THHN d. 30, 8.0 sq mm THWN

22. Determine the maximum voltage drop in a 240-volt, 2-wire heating circuit that supplies a load. The circuit size is 8 sq mm, Type THHN copper, and the one-way circuit length is 30 m.
a. 2.2 % **b. 1.106 %** c. 3.52% d.5.781%

23. The coefficient of expansion for steel electrical metallic tubing, intermediate metal conduit, and rigid conduit is.
a. 1.17×10^{-6} b. 1.77×10^{-6} c. 2.31×10^{6} **d. 11.70×10^{-6}**

24. The principal determinants of operating temperature are as follows except for.
a. Ambient temperature
b. Heat generated internally in the conductor as the result of load current flow
c. The rate at which generated heat dissipates into the conduit
d. Adjacent load-carrying conductors

25. Where the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are stacked or bundled longer than _____ without maintaining spacing and are not installed in raceways, the allowable ampacity of each conductor shall be reduced
a. 300 **b. 600** c. 100 d. 500

26. If the utility specifies that the service point is at the point of attachment of the service drop to the house, then the service-drop conductors are not considered service conductors because
a. the service drop is not on the premises wiring side of the service point
b. the service drop is also the service point
c. the service point is usually not located at the house
d. the service point is overhead

27. If the service point is specified as “at the pole” by the utility, then the service-drop conductors are considered
a. service conductor

b. service head
c. service mast
d. service point

28. For a 3-phase, 4-wire delta system with the center of one leg grounded, there are two voltages to ground. For example, on a 240-volt system, two legs would each have 120 volts to ground and the third, or "high" leg, would have _____ volts to ground.
a. 120 b. 240 **c. 208** d. 360

29. According to the code, which of the following is incorrect?
a. where an ungrounded system is utilized, the voltage to ground is the greatest voltage between the given conductor and any other conductor of the circuit
b. The voltage to ground for a 480-volt ungrounded delta system is 480 volts.
c. **In corner-grounded delta systems, the grounded conductor is the neutral conductor**.
d. Continuous white or gray coloring is used to identify the grounded conductor

30. Where one system uses white for the grounded conductor, the second system must
a. Use a different color or marking such as gray or white with a stripe.
b. Use the same color
c. Use an identifying mark
d. Use other types of conductor

31. In practice, to compensate for voltage drops in a long circuit.
a. larger conductors with a higher ampacity are commonly used
b. the conductors are rerouted in such a way as to decrease the length of the conductor
c. Use aluminum conductor
d. Use metallic conduit

32. Which of the following load that can be connected to 20 A Branch Circuit.
a. Four loads, consisting of 4A continuous duty
b. 18 A non continuous load and 2 A load non continuous load
c. 16 A continuous load and 4 A load non continuous load
d. One 20 A continuous load

33. An applied voltage of 10 percent below rating can result in a decrease of fluorescent light output by.
a. 10 % b. 20% **c. 15%** d. 5%

34. With an applied voltage of 10 percent below rating, the running current would increase _____percent, and the operating temperature would increase by _____percent. At the same time, torque would be reduced by _____percent.
a. 11, 12, 19 b. 10,11, 12 c. 19, 12, 11 d. 10,10,10

35. A 3-phase, 4-wire (208Y/120-volt, 480Y/277-volt) system is often used to supply both lighting and motor loads, if the maximum possible unbalanced load is 500 amperes, the neutral would have to be large enough to carry
a. 350 A b. 500 A **c. 410 A** d. 700 A

36. In a Three phase four wire system, compose of lighting and motor load, demand factor of 70 percent is permitted for that portion of the neutral load in excess of _____ amperes.
a. 100 **b. 200** c. 300 d. 400

37. What is the total loading of a double duplex receptacle?
a. 180 b. 4 x 90 c. 360 **d. 2 x 180**

38. Determine the feeder capacity needed for a 120/240-volt fastened-in-place appliance load in a dwelling unit for the following:

Appliance	Rating	Load
Water heater	4000 W, 240 V	4000 VA
Kitchen disposal	1/2 hp, 120 V	1176 VA
Dishwasher	1200 W, 120 V	1200 VA
Furnace motor	1/4 hp, 120 V	696 VA
Attic fan	1/4 hp, 120 V	696 VA
Water pump	1/2 hp, 240 V	1176 VA

a. 8944 VA **b. 6708 VA** c. 10789 VA d. 4000 VA

39. Which of the following statement is incorrect?
    a. It is impractical or impossible to install one service for an industrial plant with sufficient capacity for any and all future loads.
    b. It is impractical to run extremely long feeders.
    c. The expansion of buildings, shopping centers, and industrial plants often necessitates the addition of one or more services.
    d. It is impractical to use high voltage

40. Three 3-phase circuits in the same raceway, protected by overcurrent devices rated 30, 60, and 100 amperes, what shall be the size of equipment grounding conductor.
    a. 30 A b. 60 A **c. 100 A** d. 190 A

41. Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts is called.
    a. encased b. hidden c. accessible **d. enclosed**

42. Determine the minimum standard size overcurrent protective device for a feeder circuit with the following characteristics:
    3-phase, 4-wire feeder (full-size neutral)
    125-ampere noncontinuous load
    200-ampere continuous load
    75°C overcurrent device terminal rating
    Type THWN insulated conductors
    Four current-carrying conductors in a raceway
    A major portion of the load is nonlinear
    a. 375 A **b. 400 A** c. 350 A d.425 A

43. Conductors on poles shall have a separation of not less than _____ where not placed on racks or brackets.
    a. **300 mm** b. 500 mm c. 1000 mm d. 150 mm

44. Conductors supported on poles shall provide a horizontal climbing space not less than the following:
    I. Power conductors below communications conductors — 750 mm
    II. Power conductors alone or above communications conductors: 300 volts or less — 600 mm
    III. Power conductors alone or above communications conductors: Over 300 volts — 750 mm
    a. I and II only **b. I, II and III** c. I and III only d. III only

45. Additional services shall be permitted for different
    a. Voltages, frequencies, or phases, or for different uses, such as for different rate schedules.
    b. Frequencies, Short Circuit MVA, Interrupting Capacity
    c. Types of Loading, Application
    d. No of Phase and duty cycle

46. Alternating-current circuits of less than 50 volts shall be grounded under any of the following conditions except for.
    a. Where supplied by transformers, if the transformer supply system exceeds 150 volts to ground
    b. Where supplied by transformers, if the transformer supply system is ungrounded
    c. Where installed as overhead conductors outside of buildings
    d. The load of a circuit is for communication system

47. A Cable containing 45 conductors has a correction factor of
    a. 80 % **b. 35 %** c. 40 % d. 70 %

48. As used in the Code, the heat transfers capability through a substance by conduction. It is the reciprocal of thermal conductivity and is designated Rho and expressed in the units °C-cm/watt.
    a. Thermal Ampacity **b. Thermal Resistivity**
    c. Thermal Capacity d. Thermionics resistivity

49. Line and ground connecting conductors shall not be smaller than 14 AWG copper or 12 AWG aluminum. The arrester grounding conductor shall be connected to one of the following except for.
    a. Grounded service conductor
    b. **Grounding electrode conductor of 25 ohms or higher**
    c. Grounding electrode for the service
    d. Equipment grounding terminal in the service equipment

50. Any wiring on the supply side (serving utility side) of the service point is known as.
    a. service point **b. service entrance**
    c. service lateral d. service drop