

# FAST TRAX<sup>®</sup> 2023 Answer Key

## UNIT 17: INDUSTRIAL LOCATIONS

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### UNIT 17 COMPETENCY TEST

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1. Terminals of motors and controllers shall be suitably marked or colored where necessary to indicate \_\_\_\_\_.
  - a. **NEC<sup>®</sup> Reference:** 430.9(A)
  - b. **Answer:** the proper connections
  
2. Capacitors containing more than \_\_\_\_\_ gallons of flammable liquid shall be enclosed in vaults or outdoor fenced enclosures complying with Article 110, Part III.
  - a. **NEC<sup>®</sup> Reference:** 460.3(A)
  - b. **Answer:** 3
  
3. Cable tray systems shall not be used in \_\_\_\_\_ or where subject to severe physical damage.
  - I. hoistways
  - II. hazardous locations
  - III. corrosive areas
  - a) I only    b) I and II only    c) I and III only    d) I, II, and III
  - a. **NEC<sup>®</sup> Reference:** 392.12
  - b. **Answer:** a) I only
  
4. Wires that are used as crane (or hoist) contact conductors shall be secured at the ends by means of approved strain insulators and shall be mounted on approved insulators so that the extreme limit of displacement of the wire does not bring the latter within less than \_\_\_\_\_ in. from the surface wired over.
  - a. **NEC<sup>®</sup> Reference:** 610.21(B)
  - b. **Answer:** 1½

5. Multispeed motors shall be marked with the code letter designating the locked-rotor kilovolt-ampere (kVA) per horsepower (hp) for the highest speed at which the motor \_\_\_\_\_.
- NEC® Reference:** 430.7(B)(1)
  - Answer:** can be started
6. The walls and roofs of transformer vaults shall be constructed of materials that have approved structural strength for the conditions with a minimum fire resistance of \_\_\_\_\_.
- NEC® Reference:** 450.42
  - Answer:** 3 hours
7. The two to six service disconnecting means shall be permitted to consist of:
- not more than six sets of circuit breakers mounted in a single enclosure
  - not more than six panelboards with a main service disconnecting means in each panelboard enclosure
- I only    b) II only    c) both I and II    d) neither I nor II
  - NEC® Reference:** 230.71(B)
  - Answer:** b) II only
8. The residual voltage of capacitor rated 1000 volts or less shall be reduced to \_\_\_\_\_, nominal, or less, within \_\_\_\_\_ after the capacitor is disconnected from the source of supply.
- NEC® Reference:** 460.6(A)
  - Answer:** 50 volts, 1 minute
9. The disconnecting means for motor circuits rated 1000 volts, nominal, or less, shall have an ampacity rating not less than \_\_\_\_\_ of the full-load current rating of the motor.
- NEC® Reference:** 430.110(A)
  - Answer:** 115%
10. Steel cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above \_\_\_\_\_.
- NEC® Reference:** Table 392.60(B), Footnote to table
  - Answer:** 600 amperes
11. Where no branch-circuit short-circuit and ground-fault protective device is provided with industrial machinery, the rating or setting of the overcurrent protective device shall be based on \_\_\_\_\_, as applicable.
- NEC® Reference:** 670.4(C)
  - Answer:** 430.52 and 430.53

12. Branch-circuit conductors supplying one or more units of electroplating equipment shall have an ampacity of not less than \_\_\_\_\_ of the total connected load.
- NEC® Reference:** 669.5
  - Answer:** 125%
13. Vaults containing more than \_\_\_\_\_ transformer capacity shall be provided with a drain or other means that will carry off any accumulation of oil or water in the vault unless local conditions make this impracticable.
- NEC® Reference:** 450.46
  - Answer:** 100 kVA
14. Conductors that supply one or more arc welders shall be protected by an overcurrent device rated or set at not more than \_\_\_\_\_ of the conductor ampacity.
- NEC® Reference:** 630.12(B)
  - Answer:** 200%
15. The full-load current of a 25-hp synchronous, 460-volt, 3-phase motor at unity power factor is \_\_\_\_\_.
- NEC® Reference:** Table 430.250
  - Answer:** 26 amperes
16. The ampacity of capacitor circuit conductors, rated 1000 volts or less, shall not be less than \_\_\_\_\_ of the rated current of the capacitor.
- NEC® Reference:** 460.8(A)
  - Answer:** 135%
17. Hoist and monorail hoist and their trolleys that are not used as part of an overhead traveling crane shall not require individual motor overload protection, provided the largest motor does not exceed \_\_\_\_\_ and all motors are under manual control of the operator.
- NEC® Reference:** 610.43(D)
  - Answer:** 7½ hp
18. A door sill or curb that is of an approved height that will confine the oil from the largest transformer within a transformer vault shall be provided, and in no case shall the height be less than \_\_\_\_\_ in.
- NEC® Reference:** 450.43(B)
  - Answer:** 4

19. Branch-circuit conductors that supply a single motor used in a continuous duty application shall have an ampacity of not less than \_\_\_\_\_ of the motor full-load current rating as determined by 430.6(A)(1), or not less than specified in 430.22(A) through (G).
- NEC® Reference:** 430.22
  - Answer:** 125%
20. A(n) \_\_\_\_\_ is a power-driven machine (or a group of machines working together in a coordinated manner), not portable by hand while working, that is used to process material by cutting; forming; pressure; electrical, thermal, or optical techniques; lamination; or a combination of these processes. It can include associated equipment used to transfer material or tooling, including fixtures, to assemble/disassemble, to inspect or test, or to package.
- NEC® Reference:** Article 100 (Machinery, Industrial)
  - Answer:** industrial machine
21. Cable trays containing welding cables shall have a permanent sign attached to the cable tray at intervals not greater than \_\_\_\_\_ ft.
- NEC® Reference:** 630.42(C)
  - Answer:** 20
22. For raceways terminating at cable trays in supervised industrial facilities, a listed \_\_\_\_\_ or adapter shall be used to securely fasten the raceway to the cable tray system.
- NEC® Reference:** 392.18(G)
  - Answer:** cable tray clamp
23. Where the motor-control circuit transformer rated primary current is less than 2 amperes, an overcurrent device rated or set at not more than \_\_\_\_\_ of the rated primary current shall be permitted in the primary circuit.
- NEC® Reference:** 430.72(C)(4)
  - Answer:** 500%
24. For cranes and hoists, the dimension of the working space in the direction of access to live parts that are likely to require examination, adjustment, servicing, or maintenance while energized shall be a minimum of \_\_\_\_\_ ft.
- NEC® Reference:** 610.57
  - Answer:** 2½

25. All transformer vault ventilation openings to the indoors shall be provided with automatic closing fire dampers that operate in response to a vault fire. Such dampers shall possess a standard fire rating of not less than \_\_\_\_\_.
- NEC® Reference:** 450.45(E)
  - Answer:** 1½ hours
26. The ampacity of the supply conductors for a resistance welder that can be operated at different times, at different values of primary current, or duty cycle shall not be less than \_\_\_\_\_ of the rated primary current for manually operated nonautomatic welders.
- NEC® Reference:** 630.31(A)(1)
  - Answer:** 50%
27. Cable trays shall be permitted to extend \_\_\_\_\_ through partitions and walls, or \_\_\_\_\_ through platforms and floors in wet or dry locations where the installations, complete with installed cables, are made in accordance with the requirements of 300.21.
- NEC® Reference:** 392.18(D)
  - Answer:** transversely, vertically
28. Conductors for a motor used in a short-time, intermittent, periodic, or varying duty application shall have an ampacity of not less than the percentages of the motor nameplate current ratings shown in \_\_\_\_\_, unless the authority having jurisdiction grants special permission for conductors of lower ampacity.
- NEC® Reference:** 430.22(E)
  - Answer:** Table 430.22(E)
29. Each doorway leading into a transformer vault from the building interior shall be provided with a tight-fitting door that has a minimum fire rating of \_\_\_\_\_.
- NEC® Reference:** 450.43(A)
  - Answer:** 3 hours
30. \_\_\_\_\_ shall be placed in all service-entrance motor-control centers to isolate service busbars and terminals from the remainder of the motor control center.
- NEC® Reference:** 430.97(E)
  - Answer:** Barriers

31. Crane, hoist, and monorail hoist motor branch circuits shall be protected by fuses or inverse-time circuit breakers that have a rating in accordance with \_\_\_\_\_.
- c. **NEC® Reference:** 610.42(A)
  - d. **Answer:** Table 430.52(C)(1)
32. For a nonautomatically started motor, the overload protection shall be permitted to be shunted or cut out of the circuit during the starting period of the motor if the device by which the overload protection is shunted or cut out shall not be left in the starting position and if fuses or inverse-time circuit breakers rated or set at not over \_\_\_\_\_ of the full-load current of the motor are located in the circuit so as to be operative during the starting period of the motor.
- a. **NEC® Reference:** 430.35(A)
  - b. **Answer:** 400%
33. The discharge circuit of a capacitor bank rated 1000 volts or less shall not be connected in which way(s)?
- I. Permanently connected to the terminals
  - II. Automatic means of connecting it to the terminals
  - III. Manual means of connecting the discharge circuit
- a) I or II only    b) I or III only    c) III only    d) I, II, or III
  - a. **NEC® Reference:** 460.6(B)
  - b. **Answer:** c) III only
34. Each motor controller shall be capable of starting and stopping the motor it controls and shall be capable of interrupting the \_\_\_\_\_ of the motor.
- a. **NEC® Reference:** 430.82(A)
  - b. **Answer:** locked-rotor current
35. When a grounding terminal bar is required to be installed in a dry-type transformer enclosure, the terminal bar shall be bonded to the enclosure in accordance with 250.12 and shall not be installed on or over any \_\_\_\_\_ of the enclosure.
- a. **NEC® Reference:** 450.10(A)
  - b. **Answer:** vented portion
36. Tap conductors longer than 25 ft will be installed in a high-bay manufacturing building. The tap shall be made no less than \_\_\_\_\_ ft from the floor.
- a. **NEC® Reference:** 240.21(B)(4)(9)
  - b. **Answer:** 30

37. Service conductors will be connected in parallel and installed in two separate raceways. The ungrounded supply conductors in each of the two raceways will be 250-kcmil copper. A single supply-side bonding jumper will be installed to bond the two raceways. What minimum size copper conductor is required?
- NEC® Reference:** 250.102(C)(2) and Table 250.102(C)(1)
  - Answer:** 1/0
38. Circuit conductors other than service conductors shall not be installed in the same \_\_\_\_\_ as the service conductors.
- NEC® Reference:** 230.7
  - Answer:** raceway, cable, handhole enclosure, or underground box
39. Feeder conductors will be connected in parallel and installed in two separate raceways. The ungrounded feeder conductors in each of the two raceways will be 500-kcmil copper. The overcurrent device protecting these feeder conductors will be an 800-ampere circuit breaker. Wire-type equipment grounding conductor will be installed in each of the two raceways. What minimum size copper equipment grounding conductor will be required in each raceway?
- NEC® Reference:** 250.122(F)(1)(b) and Table 250.122
  - Answer:** 1/0
40. The service supplying power to a small industrial facility will consist of four disconnect switches. The disconnect switches will be separate enclosures with a main service disconnecting means in each enclosure. Each disconnect switch will be rated 225 amperes and the ungrounded service conductors supplying power to each disconnect switch will be 4/0 copper. A common grounding electrode conductor will be installed and a grounding electrode conductor tap will be installed from each disconnect switch to the common grounding electrode conductor. What size grounding electrode conductor tap is required from each disconnect switch to the common grounding electrode conductor?
- NEC® Reference:** 250.64(D)(1) and Table 250.66
  - Answer:** 2 AWG