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Name:_____ Class:_____ Date:_____

Chapter 2 The Unit Substation

1. The step-down transformers, metering, and switching equipment necessary to supply the low voltage loads to the customer are housed in a ____.
   a. unit substation b. grounding bus
   c. terminal d. secondary bus

   ANSWER: a
   POINTS: 1
   REFERENCES: Introduction

2. A device called a ____ provides a reliable method of terminating a high-voltage cable.
   a. lighting arrester b. pothead
   c. grounding bus d. secondary bus

   ANSWER: b
   POINTS: 1
   REFERENCES: The High-Voltage Section

3. Lightning arresters are designed to provide a(n) ____ path to ground for any surge currents such as those resulting from a lightning strike.
   a. high impedance b. low-impedance
   c. indirect d. intermittent

   ANSWER: b
   POINTS: 1
   REFERENCES: The High-Voltage Section

4. High-voltage fuses are available with either an N or a(n) ____ rating.
   a. B b. C
   c. D d. E

   ANSWER: d
   POINTS: 1
   REFERENCES: The High-Voltage Section

5. The ____ of a transformer is the winding that is connected to a voltage source.
   a. ammeter b. secondary
   c. primary d. short circuit

   ANSWER: c
   POINTS: 1
   REFERENCES: Overcurrent Protection

Chapter 2 The Unit Substation

6. A 600-volt to 200-volt transformer would become a 600-volt to ____-volt transformer if the connections were reversed.
   a. 100 b. 300
   c. 1200 d. 1800

   ANSWER: d
   POINTS: 1
   REFERENCES: Overcurrent Protection

7. The decimal impedance in a transformer is found by determining the ratio of the source voltage as compared to the rated voltage of the ____ winding.
   a. high-voltage b. variable-voltage
   c. low-voltage d. short circuit

   ANSWER: a
   POINTS: 1
   REFERENCES: Overcurrent Protection

8. If the primary current is less than two amperes for a transformer rated at 600 volts or less, the short-circuit protective device can be set at not more than ____ percent of this value.
   a. 100 b. 200
   c. 300 d. 400

   ANSWER: c
   POINTS: 1
   REFERENCES: Determining Transformer Fuse Size

9. ____ is the process of selecting protective devices so that there is a minimum of power interruption in case of a fault or overload.
   a. Transformation b. Masking
   c. Coordination d. Correlation

   ANSWER: c
   POINTS: 1
   REFERENCES: Determining Transformer Fuse Size

10. After the incoming voltage is reduced to the desired value, it is taken by ____ into the low-voltage section.
    a. busbars b. grounding buses
    c. terminals d. secondary buses

    ANSWER: a
    POINTS: 1
    REFERENCES: The Low-Voltage Section

Chapter 2 The Unit Substation

11. An alternative to grounding the secondary is to let it ____; that is, the secondary remains ungrounded.
    a. sink b. float
    c. surface d. exit

    ANSWER: b
    POINTS: 1
    REFERENCES: The Low-Voltage Section

12. Connections between the current and potential transformers in the high-voltage section of the unit substation and the autotransformer and meter sockets in the cabinet are made with size 12 ____ wire.
    a. Music Wire Gauge b. US Steel Wire Gauge
    c. W&M Wire Gauge d. American Wire Gauge

    ANSWER: d
    POINTS: 1
    REFERENCES: The High-Voltage Metering Equipment

13. The autotransformer is designed to provide voltage components to the potential coils of the reactive meter. These voltage components are ____ degrees out of phase with the line voltage.
    a. 45 b. 90
    c. 180 d. 270

    ANSWER: b
    POINTS: 1
    REFERENCES: The High-Voltage Metering Equipment

14. The rates charged by the power company for the energy used are based on the readings of the meter registers and the ____ indicators.
    a. maximum demand b. short circuit
    c. terminal d. ampere

    ANSWER: a
    POINTS: 1
    REFERENCES: The High-Voltage Metering Equipment

15. Rate reductions are made by the power company when the metering measurements are taken on the ____ side of the transformer.
    a. high-voltage b. variable-voltage
    c. low-voltage d. secondary bus

    ANSWER: a
    POINTS: 1
    REFERENCES: The High-Voltage Metering Equipment

16. What is the procedure for terminating an incoming high-voltage cable?

ANSWER: To connect the incoming lead-covered cable at the pothead, the cable is opened and the conductors are bared for several inches. The wiping sleeve of the pothead is cut off until the opening is the correct size to receive the cable. The cable is then inserted until the lead sheath is inside the sleeve. The following steps are then completed in the order given: (1) the cable conductors are connected to the terminals at the end of the porcelain insulators; (2) the lead cable is wiped (soldered) to the wiping sleeve; and (3) the pothead is filled with a protective and insulating compound (usually made from an asphalt or resin base).

POINTS: 1

REFERENCES: The High-Voltage Section

17. How do you select a fuse with the correct continuous current rating to provide transformer protection?

ANSWER: The selection of the fuse with the correct continuous current rating to provide transformer protection is based on the following recommendations:

- select a fuse with the lowest rating that has a minimum melting time of 0.1 second at 12 times the continuous current rating of the transformer;
- select a fuse with a continuous current rating of 1.6 times the continuous current rating of the transformer;
- select a fuse that complies with NEC Article 450.

POINTS: 1

REFERENCES: The High-Voltage Section

18. What should you be wary of when coordinating high-voltage fusings?

ANSWER: Coordination studies require that the time-current characteristic of the different protective devices be compared and that the selection of the proper devices be made accordingly. Problems in the coordination of high-voltage fusing occur most frequently when:

1. circuit breakers are used as secondary protective devices, and
2. a single main protective device is installed on the secondary side of the transformer.

POINTS: 1

REFERENCES: Determining Transformer Fuse Size

19. What role do taps play?

ANSWER: Although voltage systems are generally classified by a voltage value, such as a 2300-volt or a 4160-volt system, this exact value is rarely the voltage provided at the transformer. To compensate for this probable voltage difference, taps are built into the transformer. These taps are usually provided at 21/2- percent increments above and below the standard rated voltage. For example, taps on a 4160/480-volt transformer may provide for voltages of 3952, 4056, 4160, 4264, and 4368 volts. Connections at the proper voltage levels will provide the desired 480 volts on the secondary.

POINTS: 1

REFERENCES: The Transformer Section

20. Discuss the role and location of the grounding bus.

ANSWER: The majority of the connections to ground are made in the low-voltage section. However, the electrician should be aware that a grounding bus usually runs the entire length of the unit substation. This bus provides the means for a positive ground connection between the compartments, as well as a convenient place to make other ground connections. Two types of grounding connections are of special interest. The system grounding connection is used to connect a phase or the neutral of the transformer secondary to ground. This grounding electrode conductor is sized according to NEC 250.66 and Table 250.66. The second grounding connection of special interest is the connection of all the incoming metal raceways to the grounding system.

POINTS: 1

REFERENCES: The Low-Voltage Section