PDH Academy

Final Exam

AC Electrical 101+

Part II: Concepts & Three-Phase Electricity

1. Which of the following is (are) NOT a property of three-phase energy distribution systems.
- a. fewer and smaller conductors than multiple single phase
- b. induction motors do not require additional starting windings
- c. motors generate a pulsating torque
- d. three-phase currents tend to cancel each other

2. Which of the following is technically not a phasor?
- a. I
- b. V
- c. VI
- d. Z

3. Which of the following represents the "high" or positive polarity?
- a. arrow tail
- b. convention
- c. positive sign
- d. second letter of double subscript

4. If the maximum sinusoidal voltage is 167.7, what is the rms voltage?
- a. 115 V
- b. 120 V
- c. 220 V
- d. 240 V

5. What part of the following formula represents the rotating portion of the quantity?

$$v(t) = \text{Re}\left(\left(\frac{169.7\text{V}}{\sqrt{2}}\right)e^{j30^\circ}e^{j\omega t}\right)$$
- a. $e^{j\omega t}$
- b. e^{j30°
- c. Im
- d. Re

6. A three-phase 208 V (rms) system supplies heating elements connected in a wye configuration. What is the resistance of each element if the total balanced load is 3 kW?
- a. 4.42 Ω
- b. 14.42 Ω
- c. 144.00 Ω
- d. 1440.00 Ω

7. A three-phase system has a balanced delta load of 5000 kW at 84% power factor. If the line voltage is 4160 V (rms), what is the line current?

- a. 826 A
- b. 941 A
- c. 1000 A
- d. 1426 A

8. A 120 V (per phase, rms) three-phase system has a balanced load consisting of three 10 Ω resistances. What total power is dissipated if the connection is a delta configuration?

- a. 12 W
- b. 36 W
- c. 1440 W
- d. 4320 W

9. A 120 V (per phase, rms) three-phase system has a balanced load consisting of three 10 Ω resistances. What total power is dissipated if the connection is a wye configuration?

- a. 12 W
- b. 36 W
- c. 1440 W
- d. 4320 W

10. A balanced delta load consists of three 20 Ω∠25° impedances. The 60 Hz line voltage is 208 V (rms). What is the phase current?

- a. 10.4 A∠+25°
- b. 10.4 A∠-25°
- c. 6.4 A∠-25°
- d. 12.8 A∠-25°

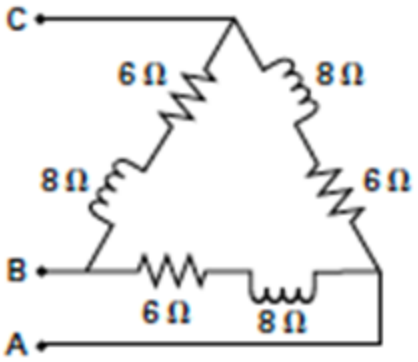
11. A balanced delta load consists of three 20 Ω∠25° impedances. The 60 Hz line voltage is 208 V (rms). What is the magnitude of line current?

- a. 3
- b. 10 A
- c. 18 A
- d. 54 A

12. A balanced delta load consists of three 20 Ω∠25° impedances. The 60 Hz line voltage is 208 V (rms). What is the magnitude of the phase voltage?

- a. 60 V
- b. 120 V
- c. 208 V
- d. 240 V

13. Three identical impedances are connected in delta across a three-phase system with 240 V (rms) line voltages in an ABC sequence. What is the approximate phase impedance angle?



○ a. 26°
○ b. 36°
○ c. 53°
○ d. 106°

14. A three-phase, 460 V, 100 hp motor has an efficiency of 94% and a power factor of 90%. What is the line current?
○ a. 94 A
○ b. 111 A
○ c. 192 A
○ d. 225 A

15. The per unit of a parameter is the _____ value divided by the _____ value.
○ a. actual / base
○ b. actual / percent
○ c. base / actual
○ d. base / percent

16. Which of the following is one of the usual bases in a per unit system?
○ a. apparent power
○ b. impedance
○ c. line current
○ d. real power

17. A three-phase transformer is rated at 225 kVA with a primary-side voltage of 480 V. The per-unit current in the transformer is 0.4 pu. What is most nearly the actual current?
○ a. 90 A
○ b. 110 A
○ c. 190 A
○ d. 270 A

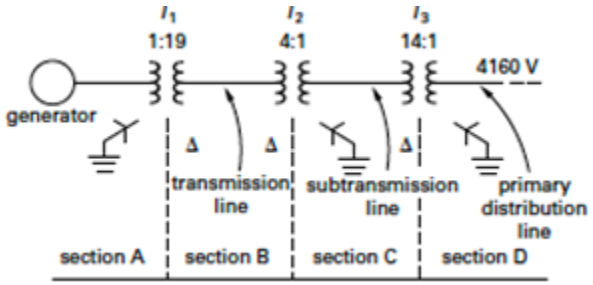
18. A transformer on the high-voltage side has a voltage of 480 V, an apparent power of 1500 VA, and an impedance of $j50\ \Omega$ on the primary side. The turns ratio is 4. What is most nearly the per-unit impedance on the secondary side? [Use the high-voltage side as the base.]
○ a. 0.05 pu
○ b. 0.3 pu
○ c. 0.5 pu
○ d. 50 pu

19. A 240 V (rms) three-phase system drawing 1200 kVA is supplied by a 2400 V (primary-side) transformer bank. Each transformer is connected in a wye-delta (primary-secondary) configuration. What is the approximate ratio of

transformation?

- a. 0.2
- b. 2
- c. 6
- d. 7

20. Consider the one-line diagram of a three-phase distribution system. What is most nearly the generator base voltage?



- a. 505 V
- b. 4092 V
- c. 7080 V
- d. 12,250 V