# Final Exam
Continuing Education Course #543
Electrical Fault Analysis

1. What is the name of an unwanted connection between a line and ground?
- a. fault
- b. ground path
- c. shortened path
- d. symmetrical condition

2. Short-circuit faults are called _____ faults while open-circuit faults are called _____ faults.
- a. ground / shunt
- b. series / shunt
- c. shunt / series
- d. shunt / ground

3. What is the most likely type of fault?
- a. low impedance ground
- b. single line to ground
- c. three phase bolted fault
- d. two phase short

4. What is the first phase of a fault called?
- a. transient
- b. short initiation
- c. steady-state
- d. subtransient

5. A three-phase 11.5 kV generator drives a 500 kW, 0.866 lagging power factor load. What is most nearly the steady-state line current?
- a. 24 A
- b. 25 A
- c. 29 A
- d. 50 A

6. A three-phase 11.5 kV generator drives a 500 kW, 0.866 lagging power factor load. The generator must supply more than the real power of the motor. It must account for the reactive power as well (supply and absorb). What is the apparent power of the generator supplying the 500 kW motor?
- a. 414 kVA
- b. 433 kVA
- c. 500 kVA
- d. 577 kVA

7. A transmission line with 8% reactance on a 200 MW base connects two substations. At the first substation the voltage is 1.03 pu∠5°, and at the second the voltage is 0.98 pu∠-2.5°. What is the power flowing out of the first substation?

Hint: Find the current, then the apparent power (in rectangular form) using the conjugate of the current, then the real power.

- a. 330 MW
- b. 1500 MW
- c. 2330 MW
- d. 2390 MW

8. Assume the apparent power $S$ is $1.5 + j0.751$ pu. The base is 200 MVAR. What is the reactive power, $Q$?

- a. 150 MVAR
- b. 200 MVAR
- c. 330 MVAR
- d. 751 MVAR

9. The manufacturer's data for two power distribution generators are shown.

| generator 1 | generator 2 |
|---|---|
| 15 MVA | 20 MVA |
| 12.5 kV | 12.5 kV |
| pf = 0.8 lagging | pf = 0.8 lagging |
| $Z_{pu} = 10\%$ | $Z_{pu} = 12\%$ |

Using generator 2 as the base, what is most nearly the per-unit impedance of generator 1 expressed as percent?

- a. 8%
- b. 11%
- c. 12%
- d. 13%

10. The percent values for a given section of a distribution system are listed as 80%, 20%, 85%, and 125% for voltage, current, impedance, and apparent power, respectively. The base voltage is 12.5 kV. The base current is 50 A. The base impedance is 30 Ω. The base apparent power is 5 MVA. What is most nearly the actual current?

- a. 10 A
- b. 50 A
- c. 200 A
- d. 400 A

11. What type of a fault is symmetrical?

- a. high impedance to ground
- b. single-phase to ground
- c. single-phase short
- d. three-phase short

12. Which asymmetrical phasors sum to zero and rotate counter-clockwise and use the subscript 2?

- a. negative sequence
- b. partial symmetrical

○ c. positive sequence
○ d. zero sequence

13. What is the representation for the following equation?

$(-0.5 + j0.866)\,(-0.5 + j0.866)$

○ a. $1\angle 120°$
○ b. $a$
○ c. $a^2$
○ d. $a^3$

14. A transformer has the following base values taken from the nameplate.

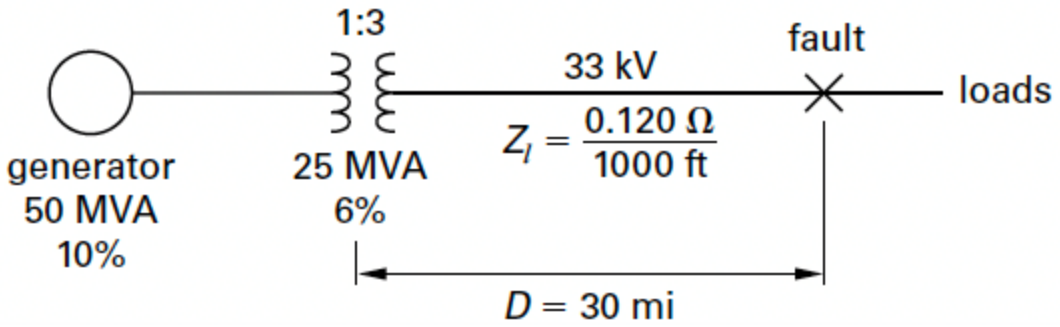
$S_{base}$: 6 MVA
$V_{base}$: 6.9 kV
$\%\ Z$: 5%

Assuming an infinite source, what is most nearly the expected short-circuit current for a fault at the terminal of the secondary?

Hint: Use Eq. V, Eq. VII, and Eq. II of Example 7.

○ a. 1 kA
○ b. 5 kA
○ c. 65 kA
○ d. 100 kA

15. A partial power plant installation is placed in service before the remaining portion is complete. A one-line diagram for the installation is shown. Assume an arbitrary Sbase of 100 MVA.




A fault occurs at the location indicated. What is most nearly the magnitude of the short-circuit current?

○ a. 200 A
○ b. 820 A
○ c. 880 A
○ d. 1030 A