

## QUIZ – ANSWER KEY

QUIZ NO: 88

TOPIC: ELECTRICAL ENGINEERING

DATE: 13/07/2022

1. A single phase distributor of 1 km long has resistance and reactance per conductor of  $0.1\Omega$  and  $0.15\Omega$  respectively. If the far end voltage  $V_b=200V$  and current is at 100A at 0.8 lag. At the midpoint a current of 100A is tapped at a pf of 0.6 pf with ref to voltage  $V_m$  at mid point. The voltage magnitude at M is \_\_\_\_\_?

[A] 218V

[B] 200V

[C] 232V

[D] 220V

**Answer: A**

**Explanation:** Drop in MB=  $(100L-36.67)(0.1+j0.15)= 18.027L19.44$   
 $V_M= 200+18.027 = 218.027 V.$

2. A single phase motor is connected to 400V, 50Hz supply. The motor draws a current of 31.7A at a power factor 0.7 lag. The capacitance required in parallel with motor to raise the power factor of 0.9 lag (in micro farads) is \_\_\_\_\_

[A] 94.62

[B] 282.81

[C] 108.24

[D] 46.87

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**Answer: A**

**Explanation:** Active power drawn by the motor =  $V I \cos \Phi = 400 \times 31.7 \times 0.7 = 8876 \text{ W}$

Reactive power =  $V I \sin \Phi = 400 \times 31.7 \times \sin(45.57.29) = 9055.3 \text{ VAR}$

New power factor =  $\cos \theta_2 = 0.9$

$\theta_2 = \cos^{-1}(0.9)$

$Q_2 = 8876 \times \tan(25.84) = 4298.855 \text{ VAR}$

Change in reactive power =  $9055.3 - 4298.855 = 4756.4 \text{ VAR}$

$Q_c = V^2 / X_c = V^2 \times 2\pi f C$

$C = 4756.4 / (400^2 \times 2\pi \times 50) = 94.62 \mu\text{F}$ .

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3. A three phase transformer has a nameplate rating of 30 MVA, 230Y/69Y kV with a leakage -reactance of 10% and the transformer connection is wye-wye. Choosing a base of 30MVA and 230 kV on high voltage side, the transformer reactance referred to the high voltage side will be \_\_\_\_\_(in ohms) ?

[A] 176.33  $\Omega$

[B] 17.67  $\Omega$

[C] 158.7  $\Omega$

[D] 15.87  $\Omega$

**Answer: A**

**Explanation:**  $Z_b = kV^2 / MVA_{b(3-ph)} = 230^2 / 30 = 1763.33 \Omega$   
 $X \Omega = X_{pu} * X_{b(HV)} = 0.1 * 1763.33 = 176.33 \Omega.$

4. A three phase transformer has a nameplate rating of 30 MVA, 230Y/69Y kV with a leakage -reactance of 10% and the transformer connection is wye-wye. Choosing a base of 30MVA and 230 kV on high voltage side, the reactance of transformer in per units is \_\_\_\_\_

[A] 0.1

[B] 0.3

[C] 0.03

[D] 1.5

**Answer: A**

**Explanation:** The pu value of a transformer does not change.

5. A 200 bus power system has 160 PQ bus. For achieving a load flow solution by N-R in polar coordinates, the minimum number of simultaneous equation to be solved is \_\_\_\_\_

[A] 359

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[B] 334

[C] 357

[D] 345

**Answer: A**


**Explanation:** Total buses = 200

PQ buses = 160

PV buses =  $200 - 160 = 40$

Slack bus = 1

Total number of equation =  $(40 - 1) * 1 + (160 * 2) = 359$ .

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6. A protection system engineer is planning to provide the complete protection, he can achieve this by \_\_\_\_\_ ?

- [A] a two phase fault relays and three earth fault relays
- [B] a two phase fault relays and two earth fault relays
- [C] two phase fault relays and three earth fault relays
- [D] three phase fault relays and two earth fault relays

**Answer: D**

**Explanation:** For the complete protection of the power system, one can use 3 phase fault relays and two earth fault relays so that to cover the entire zone of operation.

7. The area under the load curve represents \_\_\_\_\_ ?

- [A] maximum demand
- [B] load factor
- [C] the average load on power system
- [D] number of units generated

**Answer: D**

**Explanation:** Load curve is obtained by plotting fluctuating load by keeping load on y axis and time in x axis. The area under the load curve represents the total number of units generated in a particular time.

8. If all the sequence voltages at the fault point in a power system are equal, then fault is \_\_\_\_\_ ?

- [A] LLG fault
- [B] Line to Line fault
- [C] Three phase to ground fault

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[D] LG fault

**Answer: A**



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9. Voltage regulation in the power system is \_\_\_\_\_?

- [A] dip in voltage at sending end
- [B] rise in voltage at sending end
- [C] rise in voltage at receiving end
- [D] dip in voltage at receiving end

**Answer: C**

**Explanation:** VR is rise in voltage at receiving end for a transmission line.

10. Which of the following is not neglected during formation of reactance diagram from impedance diagram ?

- [A] Shunt component of Transformers
- [B] Static loads
- [C] Resistance of various power system components
- [D] Reactance of alternators

**Answer: A**

**Explanation:** Reactance diagram is drawn by the help of symmetrical network of various power system components by neglecting resistance of various components, static loads like induction motors and shunt component of Transformers.

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