

Ministry of Higher Education and Scientific Research
Al-Mustaqbal University
College of Engineering & Technology
Medical Instrumentation Techniques Engineering Department
Electrical Technology
Third Class



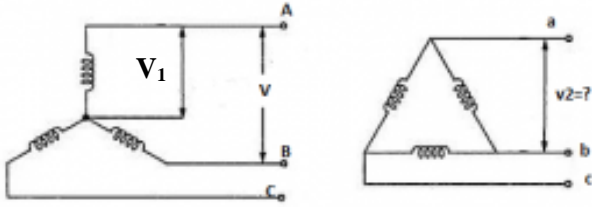
Weeks 7 & 8

Three Phase Transformers

Tutorial

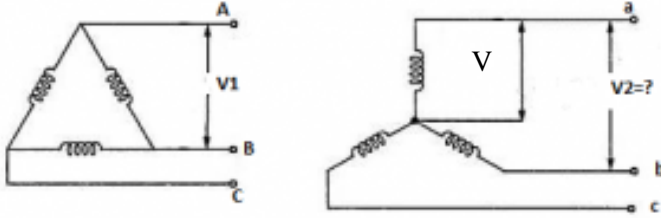
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1- The voltage V_1 can be determined as?



- a. $1.73 \cdot V$.
 - b. $V/1.73$.
 - c. V .
 - d. $3 \cdot V$.
2. Three-phase step-up transformer installed at the power house, just before the commencement of transmission line, have?
- a. Star-star.
 - b. Star-Delta.
 - c. Delta-Delta.
 - d. Delta-Star.
3. Which of the following combination of 3-phase transformers can be successfully operated in parallel?
- a. Δ -Y and Δ -Y.
 - b. Y-Y and Δ -Y.
 - c. Δ - Δ and Δ -Y.
 - d. Y- Δ and Δ - Δ .

4. For the given circuit below, the voltage across the terminal 'a' and 'b' is?



- a. $1.73 \cdot V$.
- b. $V/1.73$.
- c. V .
- d. $3 \cdot V$.

5. The secondary voltage of $k \frac{V}{\sqrt{3}}$, where v is the primary line voltage, is obtained in ?

- a. Star/delta.
- b. Delta/star.
- c. Delta/delta.
- d. Star/star.

6. Which connections have the line transformation ratios that depends on k only?

- a. Star/star and delta/delta.
- b. Star/delta and delta/star.
- c. Star/zig-zag star and delta/zig-zag star.
- d. Star/star, delta/delta and star/delta, delta/star.

7. Which of the following connection of transformer will give the highest secondary voltage?

- a. Delta primary, delta secondary.

- b. Delta primary, star secondary.
- c. Star primary, star secondary.
- d. Star primary, delta secondary .

8. A three phase Transformer , transformer load current is 140A and secondary voltage is 440 V rating of transformer is ?

- a. 107 KVA.
- b. 156 KVA .
- c. 209 KVA.
- d. 254 KVA .

9. For a star connected three phase AC circuit ———

- a. Phase voltage is equal to line voltage and phase current is three times the line current.
- b. Phase voltage is square root three times line voltage and phase current is equal to line current.
- c. Phase voltage is equal to line voltage and line current is equal to phase current.
- d. None of the above.

10. In a three phase, delta connection ———

- a. line current is equal to phase current.
- b. Line voltage is equal to phase voltage.
- c. Line voltage and line current is zero.
- d. None of the above.

11. In star-star connection of three phase transformer, if V_L is the line voltage and I_L is the line current then phase voltage and phase current is given by:

- a. $V_L / \sqrt{3}$, I_L .
- b. V_L , I_L .
- c. $\sqrt{3}V_L$, $I_L / \sqrt{3}$.
- d. V_L , $I_L / \sqrt{3}$.

12. If K is the transformation ratio, then the secondary phase voltage of delta-delta connected three phase transformer will be:

- a. $1 / K$ times the primary phase voltage.
- b. Equal to the primary phase voltage.
- c. $1 / K^2$ times the primary phase voltage.
- d. K times the primary phase voltage.

13. 3-phase transformers compare to 1-phase transformers _____

- a. More economical.
- b. Easy in construction.
- c. Easy to construct.
- d. Easy to handle.

14. Three phase transformer compare to a bank of 3 single phase transformers is _____

- a. Cheaper.
- b. Costlier.
- c. More in space.
- d. Can't be determined.

15. In delta-star connected three phase transformers, if the primary line current is I then the secondary line current is obtained as :

- a. $\sqrt{3}I/k$.
- b. I/k .
- c. $I/k\sqrt{3}$.
- d. Ik .

16. In three phase transformers, the connection type in which the relation between line currents of primary and secondary does not include $\sqrt{3}$ is:

- a. Star/star and delta/delta.
- b. Star/delta and delta/star.
- c. Star/zig-zag star and delta/zig-zag star.
- d. Star/star, delta/delta and star/delta, delta/star.

17. A delta-star transformer has a turn ratio of 9:1. If the primary line voltage is 3600 V then the secondary line voltage is:

- a. 324 V.
- b. 692.8 V.
- c. 500 V.
- d. 700 V.

18. A Y-connected secondary has a phase voltage of 277.14 V. The line voltage is:

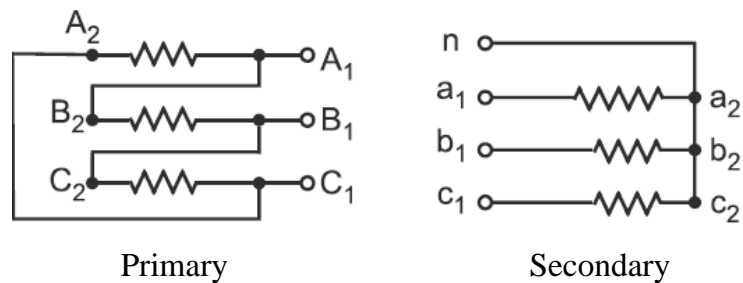
- a. 160 V.
- b. 277.14 V.
- c. 480 V.

d. 554.28 V.

19. A star-delta transformer has a primary phase voltage of 7200 V and secondary voltage of 480 V. What is the turn ratio?

- a. 8.66 : 1.
- b. 9: 66.
- c. 10: 15.
- d. 15: 1.

20. The type of connection in figure below is :



- a. Star/delta.
- b. Delta/star.
- c. Delta/delta.
- d. Star/star.

Ans 1-b, 2-d, 3-a, 4-a, 5-a, 6-a, 7-d, 8-a, 9-b, 10-b, 11-a, 12-d, 13-a, 14-a, 15-c, 16-a, 17-b, 18-c, 19-a, 20-b.

Problems

1- A three-phase delta-star transformer is connected to an 11 kV supply with $N_1/N_2=11$ and draws 6 A current. Determine:

- a. line voltage at the secondary side,
- b. The line current in the secondary coil.

Ans:- ($V_{L2}=1732\text{ V}$, $I_{L2}= 38\text{ A}$)

2- A three-phase star-delta transformer is connected to an 11 kV supply with $N_1/N_2=11$ and draws 6 A current. Determine:

- a. line voltage at the secondary side,
- b. The line current in the secondary coil.

Ans:- ($V_{L2}=577.35\text{ V}$, $I_{L2}= 114.32\text{ A}$)

3- A three-phase step down transformer is connected to 6600 volt mains and takes a current of 24 amperes. Calculate the secondary line voltage, line current and output power for the following connections:

(i)Delta-delta (ii) Star-star (iii) Delta-star (iv) Star-delta.

The ratio of turns is 12:1. Neglect losses.

Ans:- (i) ($V_{L2}=550\text{ V}$, $I_{L2}= 288\text{ A}$, Output = 274.36 kVA)

(ii) ($V_{L2}=550\text{ V}$, $I_{L2}= 288\text{ A}$, Output = 274.36 kVA)

(iii) ($V_{L2}=952.63\text{ V}$, $I_{L2}= 166.27\text{ A}$, Output = 274.36 kVA)

(iii) ($V_{L2}=317.54\text{ V}$, $I_{L2}= 498.83\text{ A}$, Output = 274.36 kVA)