

TENNESSEE VALLEY LINEMAN RODEO
APPRENTICE WRITTEN TEST
2024 STUDY GUIDE

Chief Judge: Barry L. Smith, Gibson Electric

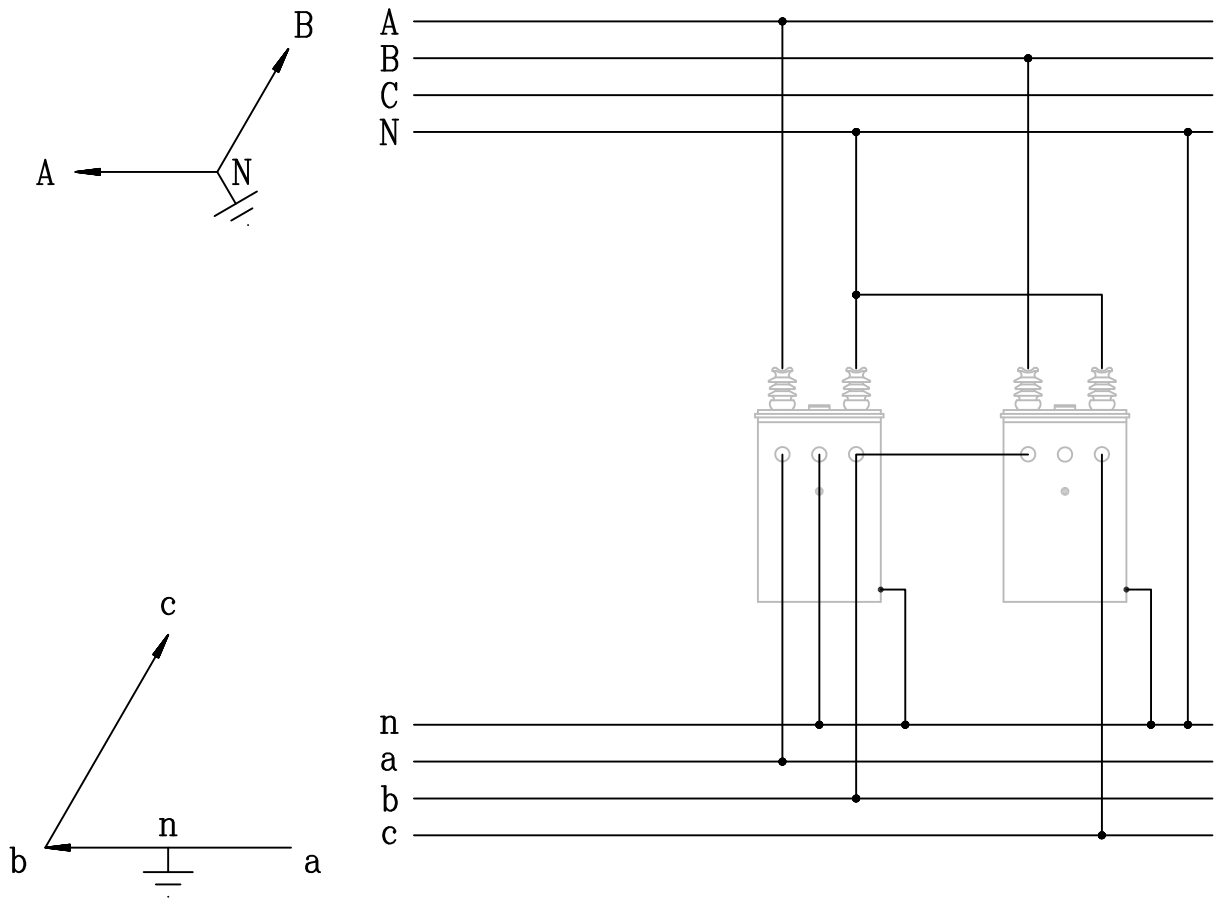
There will be a minimum of 30 and a maximum of 50 questions. The questions will be based on:

- General Knowledge
- Basic Math
- The 2023 APPA Safety Manual, 17th Edition (Orange Book)
 - Definitions; pages 16-20
 - General Rules, Sections 101 – 116.2; pages 25-48
 - Grounding, Sections 514 – 514.4; pages 271-278
 - Substations, Sections 512 – 512.9; pages 250-260
- Basic Transformer Banking
 - Open Wye – Open Delta
 - Wye – Delta
 - Wye – Wye

The Basic Math questions are simple calculations so you will not need a calculator.

You will not need your score book for the test but YOU WILL NEED YOUR APPRENTICE NUMBER.

Drop dead time will be 20 minutes. All apprentices and judges will remain in the testing area for the 20 minute duration of the test.

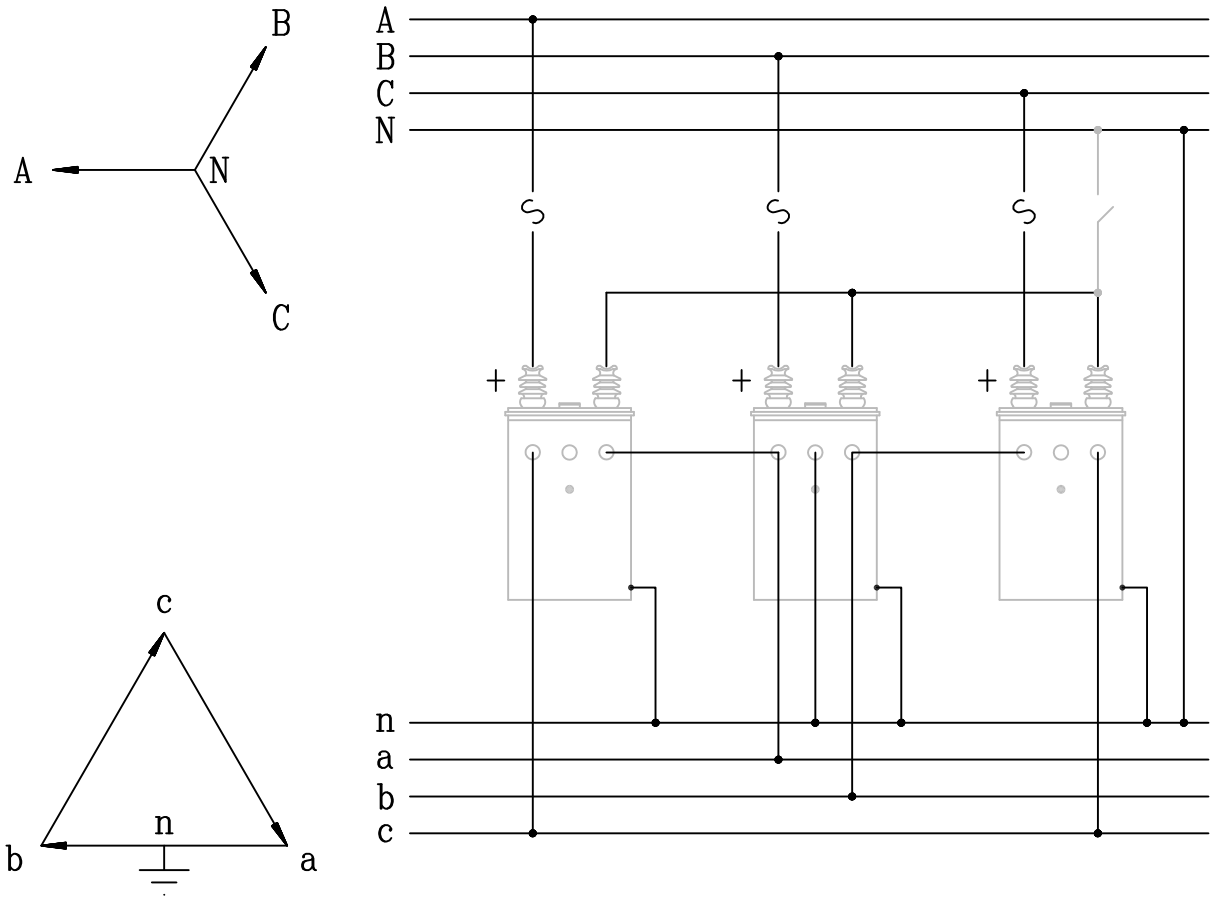


- 1 - This connection is useful when there is a large amount of 1-phase load and a small amount of 3-phase load.
- 2 - CSP transformers may be used for this connection.
- 3 - The lighting transformer is normally larger than the power transformer. There is no limitations on the ratio of the two sizes used.
- 3 - The lighting transformer should be sized to carry 100% of the 1-phase load and 58% of the 3-phase load. The power transformer is sized to carry 58% of the 3-phase load.
- 4 - The primary neutral bus must be grounded.
- 5 - The primary and secondary neutrals must be bonded together.
- 6 - The X2 ground strap on the power transformer must be removed.
- 7 - The lighting transformer should be connected to the leading phase to reduce flicker (A leads B, B leads C, and C leads A).
- 8 - The lighting transformer should be energized first and de-energized last.

Secondary voltages:

a-n	120 volts	240 volts
b-n	120 volts	240 volts
c-n	208 volts	416 volts
a-b	240 volts	480 volts
b-c	240 volts	480 volts
c-a	240 volts	480 volts

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OPEN WYE - OPEN DELTA		MG-6	
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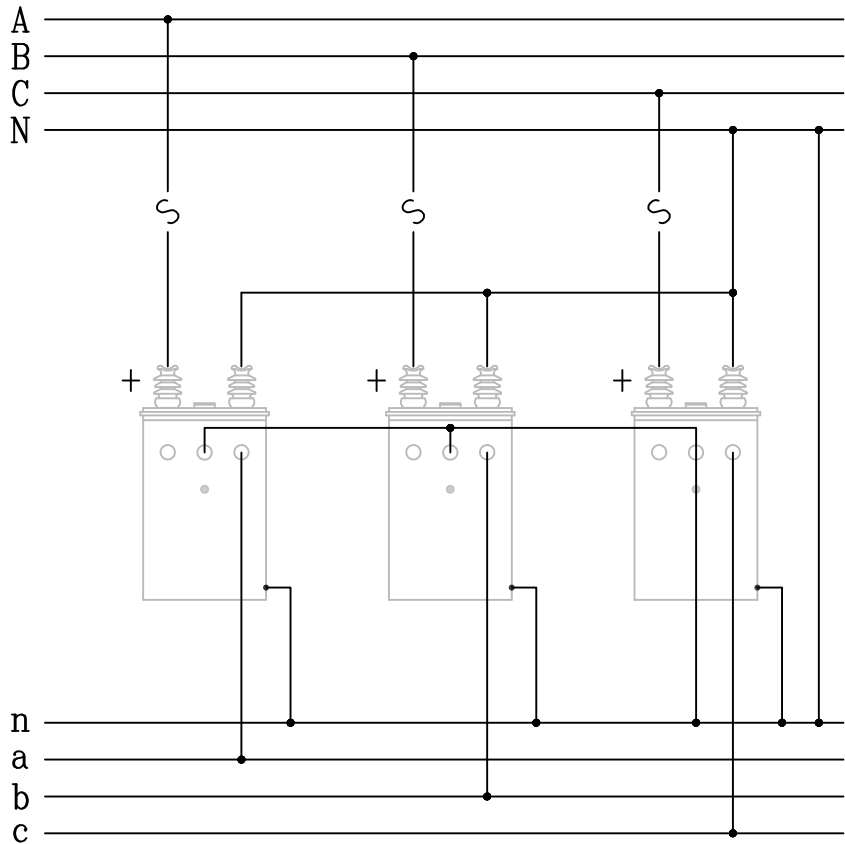
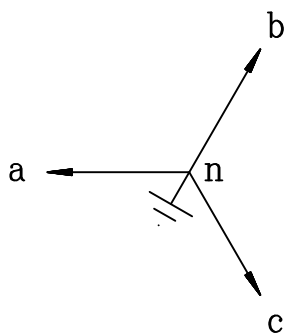
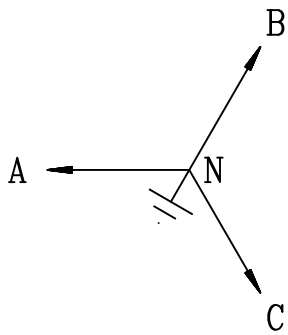


- 1 - This connection will serve a combination of 1-phase and 3-phase loads.
- 2 - The transformers must have the same turns ratio but not necessarily the same impedance.
- 3 - The lighting transformer is generally larger than the power transformers since it serves 2/3 of the 1-phase load and 1/3 of the 3-phase load. Each power transformer serves 1/3 of the 1-phase load and 1/3 of the 3-phase load.
- 4 - The lighting transformer should never be more than twice the size of the power transformers.
- 5 - If installed, the X2 ground strap on the power transformers must be removed.
- 6 - The primary neutral bus must be floated to avoid creating a grounding bank and nuisance fuse blowing for issues unrelated to the bank.
- 7 - Ferroresonance can occur when energizing or de-energizing the bank, particularly at 25kV and/or with smaller kVA banks. To avoid ferroresonance, a fourth cutout with a solid blade may be used to temporarily ground the primary neutral bus while energizing or de-energizing the bank. If used, the solid blade must be opened once the bank is energized.
- 8 - The lighting transformer should be energized first and de-energized last.

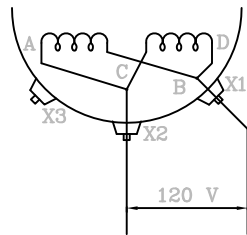
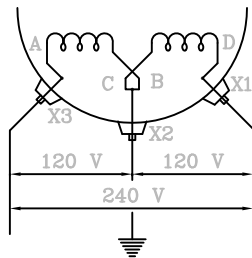
Secondary voltages:

a-n	120 volts	240 volts
b-n	120 volts	240 volts
c-n	208 volts	416 volts
a-b	240 volts	480 volts
b-c	240 volts	480 volts
c-a	240 volts	480 volts

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- 1 - This connection will serve a combination of 1-phase and 3-phase loads.
- 2 - Each transformer will serve all the 1-phase load connected to it and 1/3 of the 3-phase load.
- 3 - Transformers with a rating of 120/240 volts may be used but the secondary windings must be paralleled to get the full kVA rating of the transformer.
- 4 - The primary and secondary neutrals must be bonded together.
- 5 - The secondary neutral bus conductor must be the same size as the phase conductors.



Paralleling Secondary Windings

The transformer nameplate details the connections. Place leads A&C together and B&D together. Remember: Alley Cats and Bad Dogs don't mix.

Secondary voltages:

a-n	120 volts	277 volts
b-n	120 volts	277 volts
c-n	120 volts	277 volts
a-b	208 volts	480 volts
b-c	208 volts	480 volts
c-a	208 volts	480 volts

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WYE - WYE		DWG. No.
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