

Chief Judge: Barry Smith
Email: bsmith@gibsonemc.com

**TENNESSEE VALLEY LINEMAN RODEO
APPRENTICE WRITTEN TEST
2018 STUDY GUIDE**

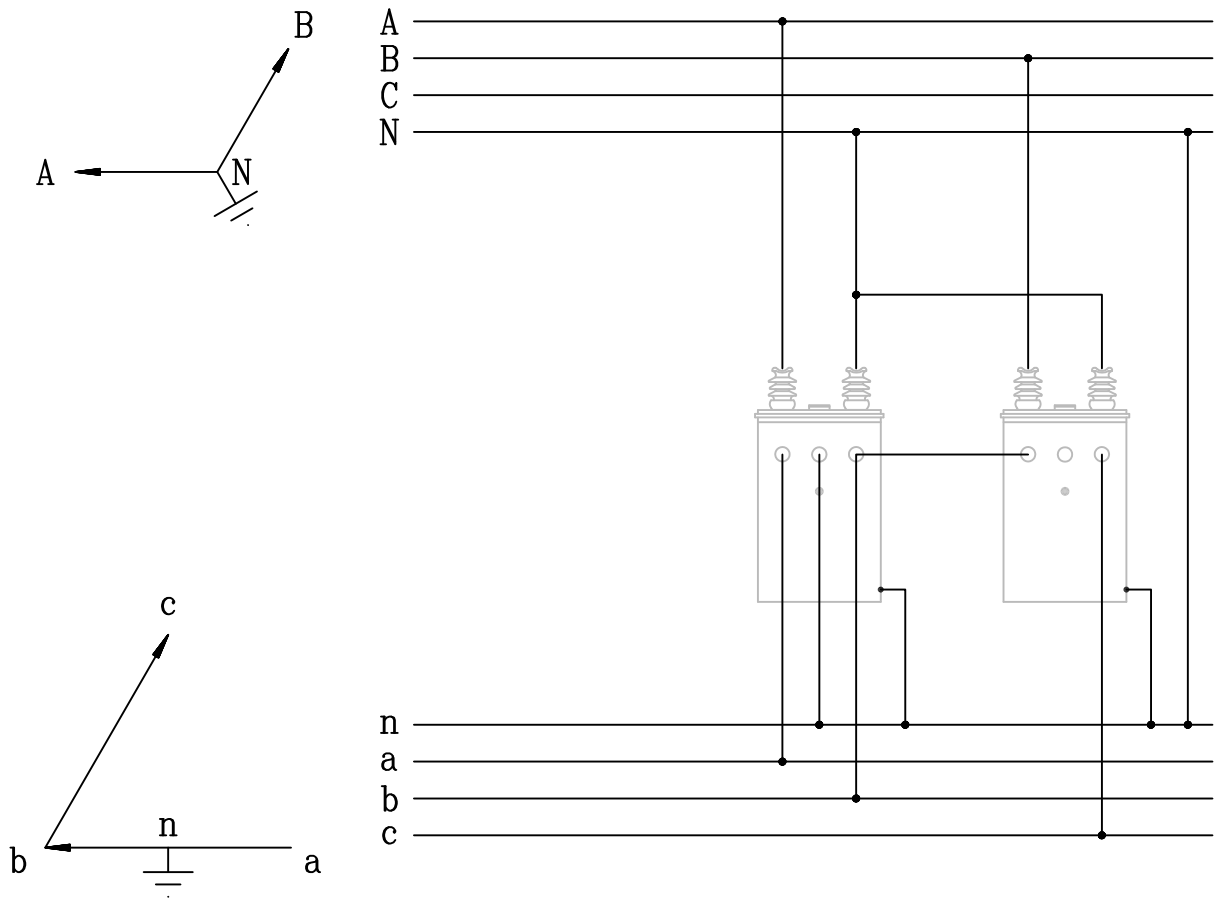
There will be a minimum of 30 and maximum of 50 questions. The questions will be based on:

- General Knowledge
- Basic Math
- Power Equation
- The 2017 APPA Safety Manual 16th Edition (Blue Book)
 - Definitions; pages 8-14
 - Underground Lines & Equipment; 509.1-509.14
- 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 25:00 minutes. All apprentices and judges will remain in the testing area for the 25:00 minute duration of the test.

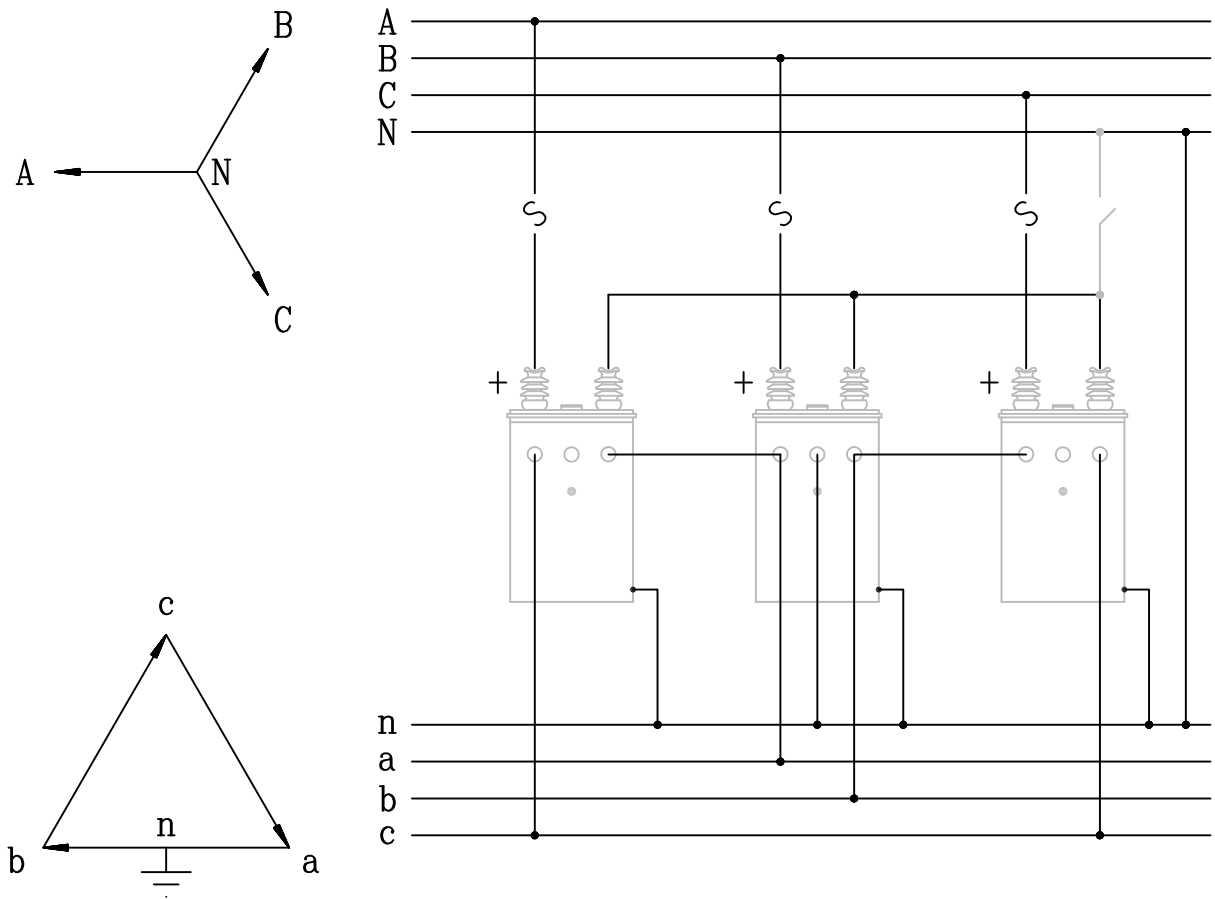


- 1 - This connection is useful when there is a large amount of 1-phase load and a small amount of 3-phase load.
- 2 - CSP transformers may be used for this connection.
- 3 - The lighting transformer is normally larger than the power transformer. There is no limitations on the ratio of the two sizes 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 |

| | | | |
|--|----------|------|--------------------|
| GIBSON ELECTRIC MEMBERSHIP CORPORATION | | | |
| OPEN WYE - OPEN DELTA | | MG-6 | |
| DATE | DRAWN BY | | DESCRIPTION |
| SUMMER 2011 | BLS | | SPEC BOOK REVISION |

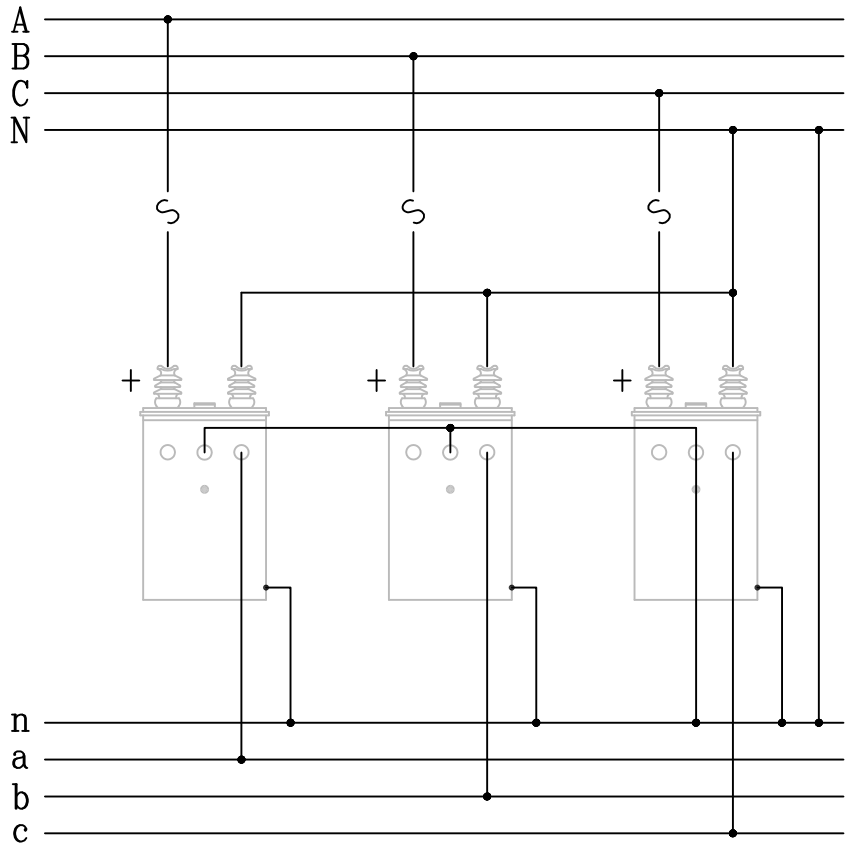
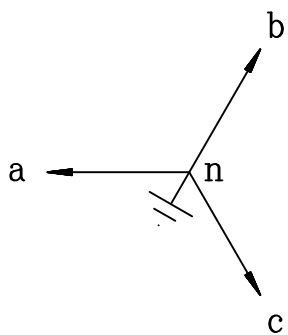
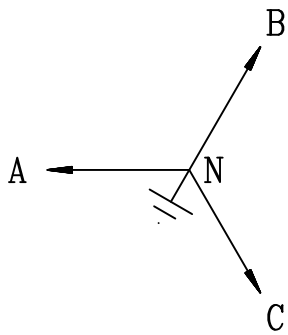


- 1 - This connection will serve a combination of 1-phase and 3-phase loads.
- 2 - The transformers must have the same turns ratio but not necessarily the same impedance.
- 3 - The lighting transformer is generally larger than the power transformers since it serves 2/3 of the 1-phase load and 1/3 of 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.

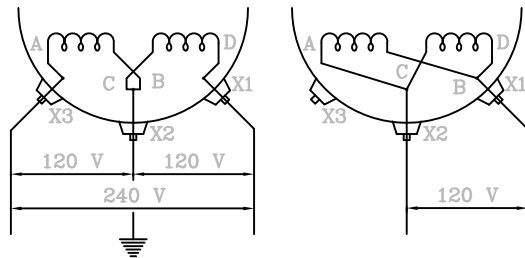
Secondary voltages:

| | | |
|-----|-----------|-----------|
| 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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| WYE - DELTA | | DWG. No. |
| | | MG-7 |
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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. |
| | | MG-10 |
| DATE | DRAWN BY | DESCRIPTION |
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