

2024-2025 FFA/GEMC

Speech/Demonstration Topic

PROBLEM:

The contestant will be expected to thoroughly explain the calculations and installation of three electrical circuits found in a new portable storage building being used as a woodworking shop. UF cable will supply 4-wire service to the storage building feeder circuits from the home's main panel and be located a distance of 50 feet from the home. Circuits in the storage building will include the following. Circuit one is a 120v circuit supplying power for a duplex receptacle supplying power for different portable woodworking tools. Circuit two will supply 120v power for a portable air compressor. Circuit three will supply 240v power to a 1/3 hp electric motor used as an exhaust fan for the storage building as well as 120v power for the lighting load. Circuit conductors will be sized according to the load for each circuit, and protected from physical damage. All electrical connections will be made according to the 2023 NEC and suited for a dusty environment.

Load Calculations: Use Section 18 of the Agriculture Wiring Handbook to calculate load.

- Circuit One - 120 Volt circuit with 1, 20 Amp rated Duplex Receptacle for a Portable Power Tools not exceeding 2400 VA. This load will not be continuous.
- Circuit Two - 120 Volt circuit with 1, 20 Amp rated Duplex Receptacle for a Portable Air Compressor with a load of 1780 VA. This load will not be continuous.
- Circuit Three - 240 Volt 1/3 Hp Electric Motor Wired for Counter Clockwise Rotation. The Exhaust Fan should be calculated as a continuous load. The light load of 2 .10VA LED Lights will be pulled off of one of the 120 Volt legs of the 240 circuit. The lighting load should be calculated as a continuous load.

Materials List:

The following list of materials will either be attached to the demo frame or laid out for the contestants to use as they explain the installation of the circuits.

- 1 - 100 Amp Sub-Panel with bonding strap removed.
- 1 - #8 Soft Drawn Bare Copper Conductor installed
- 1 - 5/8" Grounding Rod attached to display board
- 1 - 5/8" Grounding Clamps
- 1 - 50 Amp Double Pole Breaker
- 2 - 20 Amp GFCI Single Pole Breaker
- 1 - 15 Amp GFCI Double Pole Breaker
- 1 - # 6/3 CU UF Multiwire Cable
- 6 - 12 AWG CU Solid THHN
- 4 - 14 AWG CU Solid THHN
- 2 - 1-Gang Metallic Weather Proof Box Receptacle
- 2 - 2-Gang Square Weather Proof Cover Toggle Switch
- 1 - 2-Gang Square Weather Proof Cover Blank
- 2 - 4" x 1 1/2" Weather Proof Round/Octagonal Box
- 2 - Utility Vapor Light 1-Light 9" Gray Outdoor Wall Light
- 2 - 20 Amp Duplex Receptacles
- 1 - Single Pole Switch
- 1 - Double Pole Switch
- 1 - 1 1/4" Ridge PVC Conduit Schedule 80
- 1 - 1 1/4" Lock Ring
- 1 - 1 1/4" Bushing
- 1 - 1/2" Conduit Body
- 1/2" Rigid PVC Conduit Schedule 40
- 1/2" Lock Ring
- 1/2" Bushing
- 1/2" Liquidtight Flexible nonmetallic Conduit

References:

2023 National Electrical Code
Agricultural Wiring Handbook, 18th Edition

Poster Display Board
Electrical Motor Wiring Diagram/Name Plate

FY 25 EMC Speech Demo

50 Amp, 4 Wire Underground Feeder Circuit to a Portable Storage Building serving as a Woodworking Shop

