DN COLLEGES GROUP

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Pre-competition Activity
Renewable Energy Competition
Task Descriptions

Task A: Solar PV Systems

Maximum time allowed: 45 Minutes

The goal of this activity is for competitors to use the provided equipment to assemble a circuit, measure the current and voltage produced by the solar panel test bench (TP 8012-5 by Festo), and analyse the system's performance. This task will test your understanding of basic electrical measurements, circuit assembly, and the use of a Multimeter for accurate data collection in the context of solar energy systems.

Equipment:

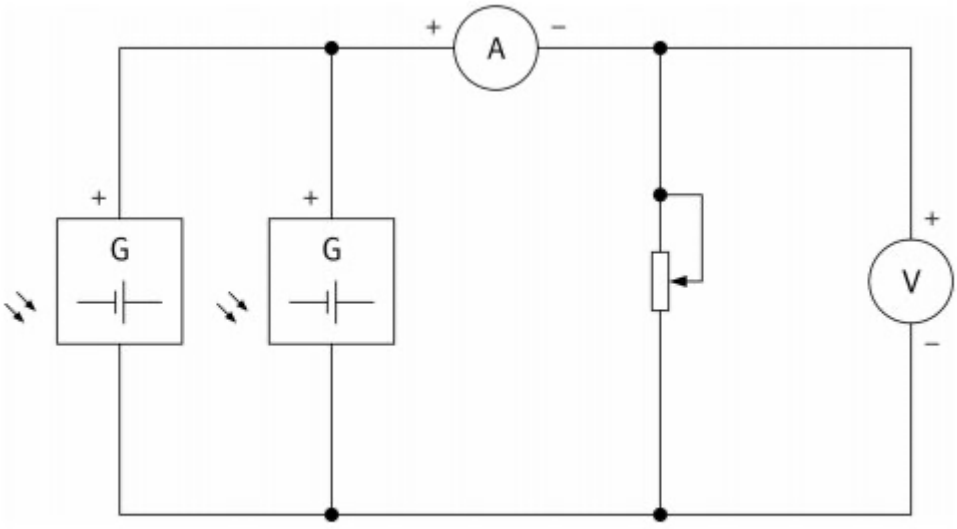
Solar Panel test bench x1 (TP 8012-5 by Festo)

Multimeter x2

Multimeter connection cable set x2

Problem:

Use the equipment listed above to create this circuit, measure current and voltage of the Solar panel test bench.



Task B: Wind Power Systems

Maximum time allowed: 45 Minutes

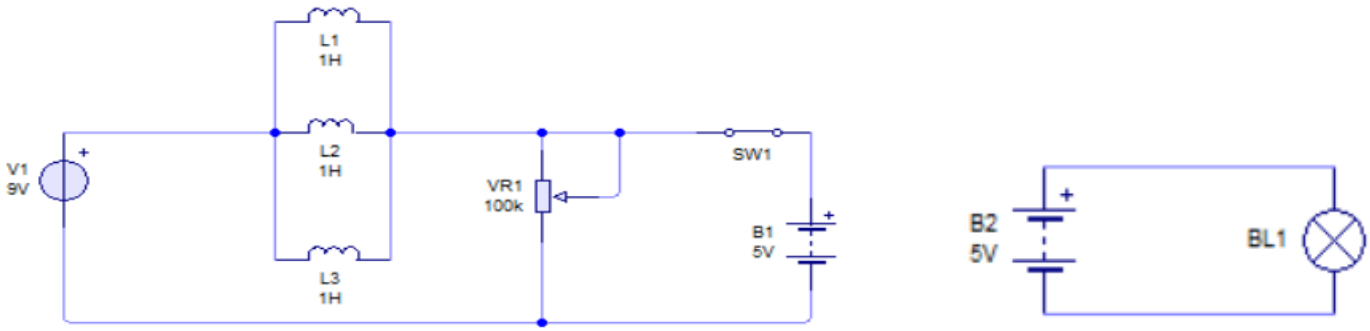
In this task, you will use the provided equipment to create a circuit for charging a 48V lead-acid battery and then use that charged battery to power 48V DC lamps. The objective is to measure the battery voltage before and after charging, ensure the battery is properly charged, and then configure the circuit to power the DC lamps. You will need to utilize a Multimeter to accurately measure voltage and verify the system's operation.

Equipment:

4 Quadrant Power supply and Dynamometer controller, 48V Lead-acid battery pack, DC 48v Lamps, Multimeter

Problem:

Use the equipment listed above to create this circuit.



a) In this scenario, the battery should not be charged. Use a Multimeter to find the correct voltage and then charge the battery. Check again with a Multimeter to ensure the voltage is correct

b) When the battery is charged, create the circuit to power the DC lamps

Task C: Mechanical Trainer

Maximum time allowed: 1:30 hours

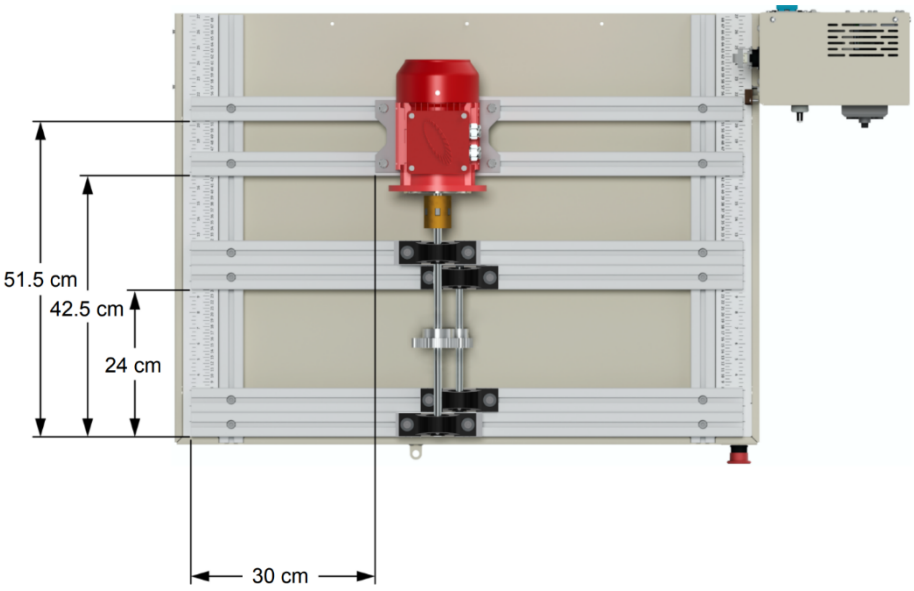
The objective of this task is to assemble a mechanical system using the provided components to build a functional gear and motor setup. Competitors will demonstrate their ability to interpret assembly instructions, use mechanical components, and apply basic mechanical engineering principles to create an operational system. This exercise will also test skills in precision assembly, use of tools, and understanding of mechanical transmission elements like gears, shafts, and couplings.

Equipment:

Motor, M8-1.25 X 25mm screws, M8-1.25 X 75mm screws

Flat washers, T-nuts, Long & short shaft x1 ,40 tooth spur gear & 20 Tooth spur gear

Pillow block bearing x4, Jaw Coupling



Problem:

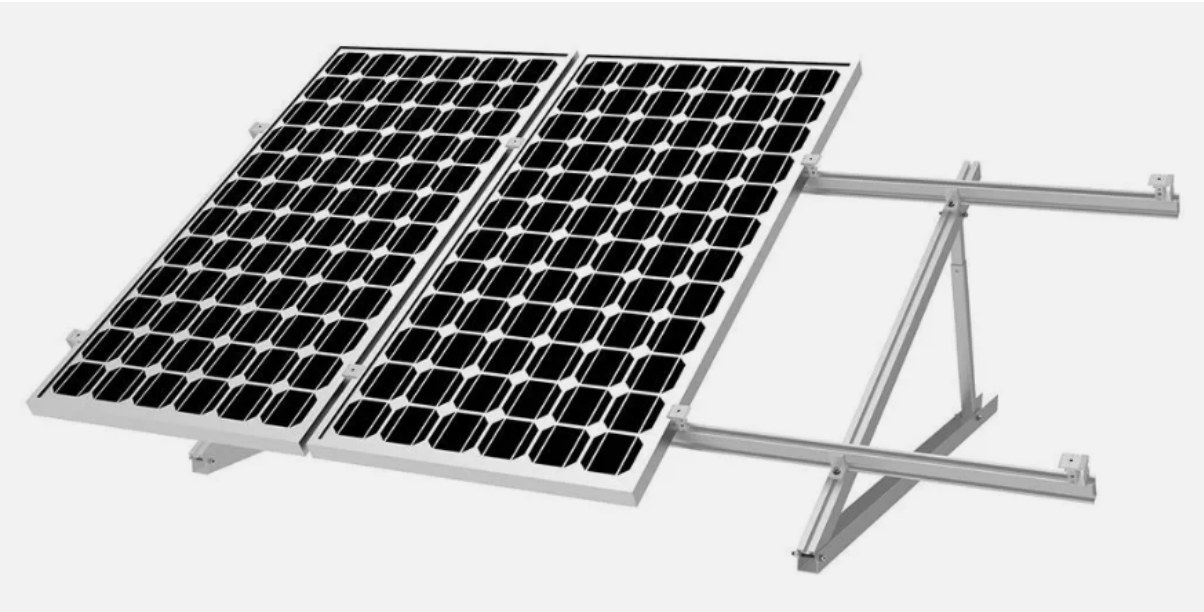
Using the Mechanical trainer by Festo, use the components listed above to build this apparatus. Ensure the dimensions are as accurate as possible. Create this setup and test that it works correctly.

Task D: PV Panel Frame assembly

Maximum time allowed: 30minutes

Equipment:

Panel frame - link



Problem:

This apparatus is a PV Panel frame, which is responsible for positioning the panel at the correct angle. The set up of this frame can often be time consuming and potentially costly in competition circumstances. **Construct this PV Panel frame at an angle of 65˚and 9τ**. Familiarity of this can be beneficial for time in the competition.