**Thermodynamics Lab 5 - Hydrocar Performance Test Planning**

***(Group Submission, 50 points)***

**Names:**  **Lab Day:**

**Instructions:** Complete this worksheet, submit it through Canvas before the start of your next lab. Each **group** should submit **one** worksheet.

**Exercise 1:** What does performance mean to you?

**A)** Charge your vehicles and see how they run. Talk a selfie with your hydrocar and upload selfies along with the submission *(5 pts)*

**B)** What does performance mean to you? Make a list of things that one could test on a hydrogen fuel cell vehicle that would be a measure of its “performance”. Challenge yourselves to brainstorm as many ideas as you can, target 50 ideas! Do not judge ideas during the brainstorming stage *(10 pts)*

**C)** Analyze the ideas that you came up with in Exercise 1 and group them into categories. What do you notice? Do they target components? Systems? Subsystems? Discuss *(5 pts)*

**Exercise 2:** Test plans

Choose 2 to 3 tests from Exercise 1 that you will carry out.

1. What will you measure? (4 pts)
2. How will you measure it? (6 pts)
3. For each test, make an engineering sketch of the apparatus (5 pts)
4. For each test, write a procedure (5 pts), making sure it is detailed enough so that all lab partners are following the exact procedure.
5. Identify possible sources of errors (5 pts) and discuss how you can reduce errors (5 pts).

Make sure that at least one of your tests addresses the concept of energy conversion.

**Exercise 3:** Energy Conversion Calculations

**A)** Solar Panel: Produce an IV curve for the solar panel using 15 different resistors as shown during lab lecture. Make sure your plot is appropriately annotated (axis labels, title, etc) *(10 pts)*

**B)** Hydrogen production: What is the energy (kJ/mol) needed for the electrolysis/fuel cell reaction to occur? *(10 pts)*

**The goal is for your team to develop a test plan, execute it, and report on the results in a lab report. This worksheet is the planning stage. You will have 2 weeks to plan and execute. If you’re done with this worksheet and the plan is approved, your group may begin testing. You are highly encouraged to meet and discuss outside of lab hours on this group submission.**