Principles of Engineering Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Unit 1.3 – Energy Applications – Study Guide Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_

Concepts

1.    Energy comes in various forms.

2.    Energy sources can be classified as nonrenewable, renewable, or inexhaustible.

3.    Energy can come from many sources, but challenges include harnessing, storing, transportation, and the energy source’s ability to be used for work.

4.    Engineers must consider tradeoffs and consequences regarding emerging energy technology.

5.    Thermodynamics is the study of the effects of work, thermo energy, and energy on a system..

6.    Thermo energy can transfer via convection, conduction, or radiation.

7.    Material conductivity, resistance, and energy transfer can be calculated

Performance Objectives

It is expected that students will:

* Demonstrate the correct use of a digital multimeter.
* Test and apply the relationship between voltage, current, and resistance as stated in Ohm’s law.
* Complete calculations for electric circuits.
* Calculate wattage created by a photovoltaic cell and a hydrogen fuel cell.
* Experiment with a solar hydrogen system to produce mechanical power.
* Design, construct, and test recyclable insulation materials.
* Test and apply the relationship between R-values and recyclable insulation.
* Complete calculations for conduction, R-values, and radiation.

Essential Questions

1.    What ethical issues pertain to environmental engineering?

2.    How does thermodynamics relate to energy and power?

3.    What are some everyday examples of the First and Second Laws of Thermodynamics?

4.    What sources of energy are available for use? What are the benefits and drawbacks regarding efficiency, usefulness, and the environment?

5.    What emerging technologies are or may be on the horizon that will provide energy more efficiently?

Vocabulary

Active Solar Energy Collection

Alternative Energy

Ampere

Biomass

Conduction

Convection

Current

Electrical Energy

Electricity

Electromagnetic Energy

Electrolysis

Energy

Entropy

Environmental Protection Agency

First Law of Thermodynamics

Fossil Fuel

Fuel Cell Stack

Heat

Inexhaustible Energy

Kelvin

Line of Best Fit

Ohm

Ohm’s Law

Nonrenewable Energy

Parallel Circuit

Passive Solar Energy Collection

Power Grid

Product Development Lifecycle

Radiation

Renewable Energy

Resistance

R-value

Second Law of Thermodynamics

Series Circuit

Temperature

Thermal Equilibrium

Thermodynamic System

Thermodynamics

U-value

Volt

Voltage

Zeroth Law of Thermodynamics