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

Unit 3.2 – Fluid Power – Study Guide Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_

Concepts

1.    Fluid power systems are categorized as either pneumatic, which utilizes gas, or hydraulic, which utilizes liquid.

2.    Fluid power is possible because in a system of confined fluid, pressure acts equally in all directions.

3.    The most basic components of all fluid power systems include a reservoir or receiver, a pump or compressor, a valve, and a cylinder.

4.    Fluid power systems are designed to transmit force over great distances, multiply an input force, and increase the distance that an output will move.

5.    Laws about the behavior of fluid systems and standard conventions for calculating values within fluid systems aid in the design and understanding of such systems.

6.    Standard schematic symbols and conventions are used to communicate fluid power designs.

Performance Objectives

It is expected that students will:

* Identify devices that utilize fluid power.
* Identify and explain basic components and functions of fluid power devices.
* Differentiate between the characteristics of pneumatic and hydraulic systems.
* Distinguish between hydrodynamic and hydrostatic systems.
* Design, create, and test a hydraulic device.
* Design, create, and test a pneumatic device.
* Calculate values in a fluid power system utilizing Pascal’s Law.
* Distinguish between pressure and absolute pressure.
* Distinguish between temperature and absolute temperature.
* Calculate values in a pneumatic system utilizing the perfect gas laws.
* Calculate flow rate, flow velocity, and mechanical advantage in a hydraulic system.

Essential Questions

1.    What impact does fluid power have on our everyday lives?

2.    Can you identify devices or systems that do not use fluid power that might be improved with the use of fluid power?

3.    What are similarities and differences of mechanical advantage in simple machines and hydraulic systems?

4.    Why are Pascal’s Law, the perfect gas laws, Bernoulli’s Principle, and other similar rules important to engineers and designers of fluid power systems?

Vocabulary

Absolute Pressure

Atmospheric Pressure

Boyle’s Law

Charles’ Law

Check Valve

Compressor

Crank

Cylinder

Directional-Control Valve

Double-Acting Cylinder

Filter

Flow Meter

Flow Rate

Flow Velocity

Flow-Control Valve

Fluid Power

Gay-Lussac’s Law

Hydraulics

Lubricator

Pascal’s Law

Piston

Pneumatics

Pressure

Pressure Regulator

Pressure Relief Valve

Pump

Receiver Tank

Reservoir

Single-Acting Cylinder

Solenoid

Transmission Lines

Valve

Viscosity

Volume