AGEN 151
Applied Hydraulics for Hydropower Generation
Spring 2021

First Examination Study Guide

Prepared By
Dr. Walid H. Shayya

- Have a basic understanding of MS Excel (as covered in the class)
- Understand the advantages and disadvantages of hydropower generation
- Understand the hydropower generation basics
- Understand how the hydrologic cycle affect hydropower generation
- Know the basic components of a small-scale hydropower system
- Know the basic units for length, mass, force, pressure, work, and power in the British Gravitational and SI systems of units
- Understand the concept of water pressure in pipe systems and how it is measured
- Understand the approaches to problem solving as discussed in class
- Know the difference between kinetic, potential, and pressure energies
- Convert between pressure in psi and head in feet (and vice versa)
- Know how to work with pressure and head under static and dynamic conditions
- Understand how to apply the conservation of energy principle (Bernoulli’s equation) in pressurized pipe flow
- Understand the effect of pipe material, pipe diameter, pipe length, and flow velocity on head losses due to friction
- Know the different types of pipes presented in the laboratory, their primary characteristics, common uses, and fitting methods
- Understand the system to follow in naming any given pipe fitting
- Know the names of the standard pipe fittings introduced in the laboratory
- Know the approaches to follow in assembling pipes and fittings of different materials
- Know the common equipment/tools used in assembling pipes and fittings as demonstrated in the laboratory

\[ h_f = h_f + h_{\text{minor}} \]

\[ h_f = \text{function} \left( L, V^{1.55}, \frac{1}{D^{0.87}}, \frac{1}{C^{1.85}} \right) \]

\[ Z_1 + h_f + \frac{V^2}{2g} \pm h_m - \frac{V_2^2}{2g} = h_{\text{minor}} = \frac{K V^2}{2g} \]