

Applied Hydraulics for Hydropower Generation
Spring 2021
Final Examination Study Guide

Prepared By
Dr. Walid H. Shayya

The final exam in AGEN 151 will be held online during our usual laboratory meeting time at 2:00 p.m. on Thursday – 5/20. It will only be on the material covered since the first hourly exam. The final exam will be two parts and you will have up to 80 minutes to complete the test. Both parts will involve multiple-choice and fill-in-the-blank questions with the same setup as the online quizzes and exams (i.e., questions being listed in random order, one at a time, with the available choices for the multiple-choice questions being also listed in random order). Part 1 of the final exam will include 40 questions, each carrying a weight of one point. Part 2 of the final exam will include 12 questions each carrying a weight of 3 points. You will have up to 40 minutes to complete each part of the final (Part 2, however, must be started after completing Part 1). Please note that Part 2 of the exam will involve simple problems to be solved with the answer to be selected from the listed choices or entered using the fill-in-the-blank(s) option. Here is a detailed list of items to keep in mind for the final:

- Understand the two types of turbo-machines and the differences between them.
- Know the broad types of turbines and how these compare.
- Understand the approach followed for establishing power output from turbines given the flow rate (gpm) and the required total head (ft).
- Understand the differences among WHP, BHP, and actual power (electrical) generated from a turbine and how to calculate each.
- List the general types of flow measuring devices covered in class (for both closed pipes and open channels).
- Understand the effect of varying the hydraulic parameters on water flow conditions in open channels.
- Understand the difference between geodetic and plane surveying.
- Understand the importance and the basic requirements of good field notes.
- Know how to convert among different distance and angle measurements units.
- Understand the differences between blunders or mistakes, systematic errors, and random errors, and discuss a source of each type.
- Know the difference between precision and accuracy.
- Understand the accuracy ratio term and how it can be used.
- Understand how to work with map scale.
- Understand how to utilize scale in location and layout surveys.

- Understand what is unique about topographic maps and how to interpret them.
- Understand contour lines and how these provide info on topography.
- Understand how to read contour lines.
- List and discuss the leveling methods covered in the class.
- Understand stationing, when is it used, and how to develop station labels.
- Know the different leveling equipment covered in class.
- Understand differential, profile, and cross-section leveling and when each is used.
- Understand the terms instrument set, BM, TBM, TP, BS, HI, FS, IS, note reductions, balancing of sights, closed circuit, closure error, and arithmetic check as well as when each is used in the development of proper leveling notes.
- Understand the steps involved in differential and profile leveling.
- List the common mistakes that can lead to errors when performing differential and profile leveling.
- Setup and reduce field notes for differential and profile leveling.
- List the standard methods for measuring distances and expected accuracies of those.
- List the purposes of taping accessories and when to use these accessories.
- Know the job of the head and the rear tapeperson.
- List and discuss the procedure for proper distance measuring with a steel tape.
- Discuss "breaking tape" and other methods of measuring distances on steep slopes.
- Understand the common sources of taping errors and how to correct for them.
- Understand how angles are measured in the field.
- Find horizontal angles when given a list of data from a repeating theodolite.
- Know how vertical angles are measured and referenced.
- Know why, when, and how deflection angles are measured.
- Understand how to apply trigonometric functions in the right-angle triangle.
- Define trigonometric leveling and when it is used.
- Understand the steps involved in trigonometric leveling.
- Understand the terms h_i , HI, RR, S, H, and V within the context of trigonometric leveling.
- Know how to solve problems involving trigonometric leveling.
- Understand how to use EDMs and total stations.
- Understand the difference among electronic theodolites and total stations.
- Understand the use of EDM instruments with reflectorless technology.
- Know how to work with open traverses.
- Understand the methods for measuring angles or directions in traverse surveys.
- Define the difference between true and magnetic north.
- Understand magnetic declination and how it changes.
- Establish a direction of a line if given an azimuth.
- Compute the azimuths for lines in an open traverse given pertinent horizontal angles and the direction of one of the lines.