

Study Guide

PhD Comprehensive Examination

MECH 215 - Instrumentation and Measurement

March, 2008

Textbook: Theory and Design for Mechanical Measurements, Third or Fourth Edition, R.S. Figliola, D.E. Beasley, John Wiley and Sons
Assembling an experimental test plan [1.1, 1.2]
Units, unit systems, Measurement glossary [1.3, 1.4, 1.5]
Static and Dynamic Signal Characteristics [2.1, 2.2, 2.3, 2.4, 2.5]
Zero, First and Second Order Systems and Response to step function [3.1, 3.2, 3.3]
Infinite Statistics, Normal Distribution [4.1, 4.2, 4.3]
Finite Statistics, Student Distribution [4.4]
Regression Analysis, Curve Fitting [4.6]
Measuring Temperature – RTDs, Thermistors [8.1, 8.2, 8.3, 8.4,]
Measuring Temperature – Thermocouples, Physical Errors in Temperature Measurements [8.5, 8.7]
Uncertainty Analysis, Propagation of Uncertainty [5.1, 5.2, 5.3, 5.4, 5.5, 5.6]
Strain and Stress Measurements – Introduction [11.1, 11.2]
The Resistance Strain Gauges, Wheatstone Bridge [11.3, 11.4, 11.5, 11.6]
Pressure measurements [9.9, 9.2, 9.3, 9.4, 9.5]
Pressure Measurements in Moving Fluids [9.6, 9.7]
Measurements of fluid velocity - pitot-static tube and thermal anemometry only [9.8]
Measurements of fluid flow rate [10.1–10.5]
Position, displacement, velocity and acceleration (vibrations), torque and load measurements [12.1, 12.2]