

ELEC 5760/6760 Exam 2 Study Guide

I. Topics covered on this exam

- a. Voltage, Current and Optical sensing techniques
- b. MEMS Actuators
- c. MEMS Pressure Sensors, Accelerometers, and Gyroscopes
- d. Temperature and Chemical Sensors

II. Background Material to Know:

- a. Voltage and current sensing examples
- b. Optical sensing terms: interferometer, spectrometer, transmissibility, etc.
- c. Types of MEMS actuators
 - (1) Electrostatic: PPA, CDA, GCA
 - (2) Other: piezoelectric, thermal, SMA, magnetic
- d. Types of MEMS pressure sensors, accelerometers, and gyroscopes
- e. Mechanical shock event
- f. Components/architecture of these devices (ex: membrane & diaphragm in P sensors)
- g. Error sources in MEMS gyroscopes
- h. Terminology associated with these topics (ex: force feedback, accelerometer sensitivity)
- i. Sound levels for hearing loss
- j. Types of temperature and chemical sensors

III. Analysis Material to Know

- a. Problems from Homework #6 – #9
- b. How to convert SI units (g to Kg, etc...)
- c. Using Laplace / Inverse Laplace Transforms
- d. Calculation of a transfer function from a block diagram

V. Equations I will provide

- a. Constants: π , ϵ_0 , G
- b. Lapace Transform table as needed
- c. Equations for PE, KE, static pressure, Bernoulli's equation, actuators, accel/gyro as needed

IV. You need to know equations for:

- a. Relationships between m, c, k, f_n and ζ , Q, ω_n
- b. Unit conversions
- c. Units for: m, k, c, S, ω_n , Ω

V. Things to watch out for:

- a. Units on ALL answers in the correct units
- b. Use constants I give you
- c. Answer all parts of questions
- d. Show calculations
- e. Convert parameters to a common unit before calculating the answer

VI. **Test Is Closed Book, Closed Notes, No Laptop/Notebook PC's**