Study Guide and Assignment 2

These are guides to help you learn the subject and be successful in the future. The objective is not just to pass this class but to learn a skill the you can use in your future job. Therefore, I write these guides to save you time and with the best advise based on past experience. Please make sure you are taking notes and also watching the videos. There are several available on my channel in YouTube at grandajj. I suggest you study the class notes and study guides. If possible redo the basic concepts such as state space form, transfer functions, etc. Not everything said in class will end up in a web page.

I Introduction (Continuation Review of ME171 topics)

- **Introduction to Mechatronics Systems and Components** (Suggestion: Read and go over the slides. Make sure you understand the Free Body Diagram, how to write the differential equations using Newton’s law. Review the generation of the block diagram and the simulation done in class. Can you reproduce it on your own? If you do, you have successfully learned the basics of modeling and simulation).

II Review of Basic Elements of Systems, their Functions and Constitutive Equations

- **Basic elements and their equations, Single and multiports devices** Read and go over the slides, which coincide with lecture and exercises done on the board. You must know what the laws are for the single port elements and for the multiport elements. You must understand the causality concept and the power flow concept.
- Sign conventions, equations of motion
- **Introduction to the Computer Aided Modeling Software CAMPG** (Introductory notes to the automated modeling process)

Reference Materials

- TIME DOMAIN: Single degree of freedom system
  - **SIMULINK Tutorial** (Sample problem solved from scratch to illustrate the block diagram process)
  - **CAMPG Tutorial** (Sample problems using Bond Graph models)
  - MATLAB Tutorial

Homework Assignment.

1. Read Chapter 2. Sections 2.1, 2.2, 2.3, 2.4
2. **Homework**  Please do the following problems  2.9, 2.17, 2.18
Due Date: Thursday, February 15, 2018

Please scan and keep your originals.

**Computer Assignment.**

3. - Computer Assignment.  Electrical Systems
For the following examples.
   a) Derive the differential equations following Kirchhoff’s laws in the time domain.
   b) Apply the Laplace transform and obtain the transfer functions for the indicated outputs.

![Diagram](image.png)

   c) Demonstrate that the equations in state space form and the transfer functions are equivalent to those obtained using the automated method using bond graph models and CAMPG.

Due Date: Tuesday, February 20, 2018

Please turn in a directory by creating and transferring files that contain:

- A PowerPoint or Word Files explaining what you did and the process that you found easier to enter the block diagrams in SIMULINK. You may want to take screen shots of the work and paste them in your document to explain what you did.
- The SIMULINK and Data files.

4.- Directory Name:  **Yourlastname_a_SSSpace_TranFunctions_ME172S18**
Please turn electronically to the path indicated on Voyager

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Do not send your assignments via email, except on emergencies (not just deadlines).

5. Quiz Two quiz Thursday, February 22, 2018