MECH 5312: Exam II Outline

The exam covers Strain (Solecki Chapter 3), Linear Stress-Strain Temperature Relations (Boresi Chapter 3), and Inelastic Material Behavior (Boresi Chapter 4). It also refers to HW 5 through 7. The exam will contain 3 challenge problems worth 90% and extra credit worth 10%; To receive credit ALL WORK needs to be shown following the problem structure outlined below. A single-sided letter size (8.5"x11") formula sheet is allowed but must be turned in with the exam. The formula sheet must be handwritten. The only items you will be allowed to bring to the exam are pencils/pens, eraser, calculator, ruler, and formula sheet. Partial Credit will only be given when the Known's and Unknown's are listed and the FBD and other diagrams is drawn.

Students are expected to be above reproach in all-scholastic activities. Students who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and dismissal from the university. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts (Regents= Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22). Scholastic dishonesty harms the individual, all students, and the integrity of the university; policies on scholastic dishonesty will be strictly enforced.

Outline

Problem types include but are not limited to proofs, direct solution, and open-ended design. There could be more than one problem in each category.

- Displacement to State of Strain to find (principal strain, strain invariants, volume change, deviator)
- 3D Hooke's Law for Isotropic Elastic Materials (Both Lame's and Young's Form)
- Plane Stress and Plane Strain Conditions
- Thermoelasticity
- Mechanics Problem (Force to Stress, $\mathbf{F},\mathbf{M} \rightarrow \boldsymbol{\sigma}$; Stress to Strain $\boldsymbol{\sigma} \rightarrow \boldsymbol{\varepsilon}$; Strain to Displacement $\boldsymbol{\varepsilon} \rightarrow \mathbf{u}$)
- Mechanics Problem (Displacement to Strain $\boldsymbol{\varepsilon} \rightarrow \mathbf{u}$; Strain to Stress $\boldsymbol{\varepsilon} \rightarrow \boldsymbol{\sigma}$; Stress to Force, $\boldsymbol{\sigma} \rightarrow \mathbf{F},\mathbf{M}$)
- Inelasticity Applying Yield Criterion

Study Guide

If you perform the following you should receive a good grade on this exam.

- Read Lecture Notes
- Review/Redo Homework Problems and Solutions
- Review References and Online Resources

Exam Problem Structure

1. <u>Knowns/Unknowns</u>: List the given parameters. List the parameters you must find.
2. <u>Free Body Diagram</u>: (when appropriate) Draw a neat FBD that includes arrows with arrowheads, dimensions, and all the parameters needed to solve the problem.
3. <u>Assumptions</u>: List any assumptions made, and the equations you will need to solve the problem.
4. <u>Steps</u>: Give necessary details so that people can easily follow your calculations. Answers without the steps will not be accepted.

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5. <u>Equations</u>: label each equation with a number (1), (2), (3), etc.
6. <u>Answer</u>: Include units and box your final answers.
7. <u>Neatness</u>: Disorganized, incomplete, and/or copied work will be penalized.

4/6/2018