MAE 160 –Final Exam: Chapters 7, 8, 9, 13, 14

I. Derivations

1. Goodman's equation for fatigue
2. Fatigue behavior of cracked components; total # of cycles as a function of delta K(Paris-Erdogan equation)
3. Sherby-Dorn, Larsen-Miller, and Manson-Haferd equations for creep
4. Basquin and Coffin-Manson relationships for fatigue
5. Theoretical tensile strength
6. Griffith equation
7. Stresses around circular and elliptical holes
8. Weibull statistics
9. Charpy impact test

II. Conceptual Questions

1. Plane strain fracture toughness test
2. Ductile and brittle fracture
3. Toughness through microhardness testing
4. Appearance of a fatigued shaft with three zones
5. Different types of fatigue testing specimens
6. Creep curves for different stresses and temperatures
7. Different mechanisms of creep: dislocation climb creep, dislocation glide creep, and diffusion creep
8. Deformation mechanism maps (Weertman-Ashby)
9. Superalloys: evolution and new methods to increase temperature capability
10. Thermodynamic efficiency of jet engines
11. Superplasticity
12. Palmgren Miner rule
13. Fatigue testing machines

III. Examples from chapters

7.1, 3,4, 5, 6,
8. 1,
9.1, 2, 4,
13.1, 2, 3, 4,
14.1, 2, 3, 4, 5, 6, 7,