PHYS 350: Study Guide for Test #3

Test #3 will cover all of ch, 4 and Ch 5 (mostly sections 1.)

Chapter 4: Engines & Refrigerators

Be able to:
1. Distinguish between actual and ideal (Carnot) efficiency of heat engines.
2. State the difference between heat engines and refrigerators (freezers, air conditioners, etc)
3. To calculate the efficiency of heat engines and the COOP of refrigerators.
4. Describe the Carnot engines and derive the expression for Carnot efficiency using both a **PV** and a **TS** diagram.
5. Explain how a heat pump differs and/or resembles an air conditioners
6. Explain how CFC based freons deplete the ozone layer. What are the consequences of depleting the ozone layer? How this problem been addressed?
7.   Draw PV diagrams for some realistic engines such as the internal combustion engine. Diesel engine, Sterling engine, stream engine, etc.
8. Discuss the historical background behind liquification of gasses and list the scientists or university groups who were pioneers in developing processes for liquifying oxygen, nitrogen, helium, etc,
9. Discuss how atoms can be slowed down using lasers (this is called laser cooling or laser trapping of atoms in theliterature)
10. State second law of thermodynmanics in terms of entropy and using Carnot efficiency

Do problems : 4.2, 4.3, 4.9, 4.13, 4.20, 4.21, 4.22, 4.23

Chapter 5: Chemical Thermodynamics

We mostly dealt with Section 1 of chapter 5.
Be able to:
11. With the help of Fig. 5.2 , write down the expressions :
    H=U+PV, F=U-TS,   G=H-TS, G=F+PV

12. Show that $\Delta G = \Delta H - T \Delta S$ when T is constant

13. Use tables in pages 404 and 405 to look up ΔH, ΔS, and then calculate ΔG for a variety of reactions.

14. Calculate the efficiency of fuel cells and the voltage that can be extracted from them.

15. Calculate ΔG for a lead acid battery and show that each cell can yield 2V

16. Write down the four Maxwell relations using the figure below and the statement :
    "Valid Facts and Theoretical Understanding Helps Solve Great Problems"

17. Do problems: 5.1, 5.2, 5.3, 5.5, 5.10, 5.11, 5.12
    (Most of these problems were done in class and you should have then in you notes)