PHYSICS 1020 – Spring 1997

THINGS TO KNOW FOR 3rd EXAM

(3 March 1997)

- material covered in chapters 6, 7, 8, 9 and 10 of the textbook (except sections 7.4 to 7.7, 9.6, 9.7)
- material covered in lectures 7 to 14 (i.e. 29 Jan. to 24 Feb. 1997)
- material covered in homework sets 6, 7, 8, 9, 10

Specific items to know:

1. *energy, work, power*
   - work – definition of work in physics
   - energy, its relation to work
   - conservation of mechanical energy in the absence of friction
   - influence of friction and air resistance
   - types of energy:
     - kinetic energy: translational, rotational
     - potential energy: gravitational, elastic
     - chemical energy
     - mass energy
     - thermal energy
     - heat
   - power vs energy
   - units of energy (Joule, calorie, Btu, kWh)
   - units of power (Watt)
2. *thermodynamics:*
   - temperature
   - temperature vs thermal energy
   - thermometers and how they work
   - temperature scales: Fahrenheit, Celsius, Kelvin
   - thermal energy = "internal energy"
   - internal energy vs temperature
   - 1st Law of Thermodynamics
   - heat transport (conduction, convection, radiation)
   - heat engines
   - Carnot engine
   - 2nd law of thermodynamics

3. *electric phenomena:*
    - electric charge
    - Coulomb's law
    - electric field
    - electric potential energy and voltage
    - circuits, resistance
    - voltage, current, power
    - power consumption in a circuit
    - unit of power and energy (watt, joule, kWhr)
    - magnetic field
    - electromagnetism
    - force on moving charges and currents
    - magnetic field due to moving charges and currents
    - magnetic flux
    - law of induction
4. *waves:*
    - properties of waves
    - transverse vs longitudinal waves
    - relation between wavelength and frequency
    - superposition, interference
    - sound waves: what are they, pitch vs frequency
5. *electromagnetic radiation*
    - electromagnetic spectrum
      (order by wavelength/frequency : radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, γ rays)
    - what is the medium in which electromagnetic waves propagate?
    - is there evidence for or against the existence of the "ether"?
    - Doppler effect
6. *relativity*
    - Galilean/Newtonian relativity
    - Galilean vs Einstein's relativity
    - what is a reference frame?
    - what is an inertial frame?
    - principles of special relativity
    - constancy of the speed of light
    - Michelson-Morley experiment
    - time dilation