PSC2121 Exam I I Review

HEAT random kinetic energy
ENTROPY measure of disorder
TEMPERATURE SCALES - conversion
°C = (°F-32)×(5/9) °F = °C×(9/5) + 32
Absolute temperature K = °C + 273
KINETIC THEORY matter = moving particles
$KE = \frac{1}{2}mv^2 = 3 \times \frac{1}{2}kT$
k = Boltzman's constant = 1.38×10^{-23} J/K
SPECIFIC HEAT add heat, T increases
$H = mc(T_2-T_1) = mc\Delta T$
STATES of MATTER solid, liquid, gas
CHANGE of STATE
solid ⇔ liquid $H = mL_f$
liquid ⇔ gas $H = mL_v$
THERMAL EXPANSION all gases: $V/V' = T/T'$
solids depend on material: $\Delta L = \alpha L(T_2-T_1) = \alpha L\Delta T$
THERMAL CONDUCTION

ENERGY CONVERSION
1st Law of Thermodynamics - in a closed system
total E including heat is constant
all other forms may be completely converted to heat
1 cal = 4.186 J
2nd Law of Thermodynamics - in a closed system
entropy (randomness) of total system increases
heat engine efficiency = $(T_H-T_C)/T_H$

WAVE disturbance carries energy through medium
WAVE MOTION PULSE or PERIODIC
period T frequency f $T = 1/f$
WAVELENGTH λ
WAVE EQUATION $v = \lambda/T = \lambda f$
$v_{light} = c \approx 3\times10^8$ m/s $v_{sound} \approx 340$ m/s
AMPLITUDE
TYPES TRANSVERSE LONGITUDINAL
DOPPLER EFFECT change in f and λ with moving source
STANDING WAVE boundary conditions
node = no motion antinode = maximum motion
FUNDAMENTAL FREQUENCY

SPEED OF LIGHT constant in vacuum
same for all electromagnetic radiation
in matter $v < c$ index of refraction $n = c/v > 1$

REFLECTION angle of incidence = angle of reflection

REFRACTION bends at interface, depends on n

DIFFRACTION spreads around corners

DISPERSION prism, different f,λ different v

CONVERGING LENS

DIVERGING LENS

ELECTROMAGNETIC SPECTRUM
radio, microwave, IR, visible, UV, X-ray, gamma ray

COLOR $\Rightarrow f,\lambda$ Red-Green-Blue Yellow-Magenta-Cyan