Hw-CHAPTER-19 (Dr. Gondal Phys.102)

First Major T-042

Q 1 A bottle of soft drink is placed in a refrigerator and left there until its temperature drops by 15 K from its original value. What is the corresponding change in temperature on the Fahrenheit scale?A1 27 Fahrenheit degrees.

Q2 An iron ball has a diameter of 6.00 cm and is 0.01 cm larger than the diameter of a brass ring. Both are at a temperature of 20 degrees Celsius. To what temperature should the brass ring be heated so that the ball just passes through the hole?[The coefficient of linear expansion of brass = 1.9*10**(-5) K**-1]
A1 108 degrees Celsius.

Q3 A person wants to cool 0.3-kg of water that is initially at 30 degrees Celsius by adding ice initially at -25 degrees Celsius. How much ice should he add so that the final temperature will be 0 degrees Celsius with all the ice melted? [For ice, use the specific heat = 2.1*10**3 J/ (kg*K), and heat of fusion = 3.3*10**5 J/kg].A1 99 g.

Q4 In a PV diagram, a system of an ideal gas goes through the process shown in Figure 3. How much heat is absorbed after the system goes through this cycle 10 times. [Take P= 1.0 Pa and V= 1.0 m**3].
A1 20 Joules.

First Major T-002

1) In a constant-volume gas thermometer, the pressure is 0.019 atm at 100 degrees Celsius. Find the temperature when the pressure is 0.027 atm. **A:** 257 degrees Celsius.

2) A 100 g of water at 100 degrees Celsius is added to a 20-g aluminum cup containing 50 g of water at 20 degrees Celsius. What is the equilibrium temperature of the system? The specific heat of aluminum is 900 J/(kg*K) and the specific heat of water is 4186 J/(kg*K). **A:** 72 degrees Celsius.

3) A solid aluminum rod, of length 1.60 m and cross-sectional area of 3.14*10**(-4) m**2, has one end in boiling water and the other end in ice. How much ice melts in one minute? [The thermal conductivity of aluminum is 205 Watts/(m*K)and the heat of fusion of water is 3.35*10**5 J/kg.] (neglect any heat loss, by the system, to the surrounding) **A:** 7.2*10**(-4) kg.

4) An iron ball has a diameter of 6.0 cm and is 0.01 mm too large to pass through a hole in a brass ring when both are at a temperature of 30 degrees Celsius. To what temperature should the brass ring be heated so that the ball just passes through the hole? [The coefficient of volume expansion of iron = 3.6*10** (-5) K**-1 and of brass = 5.7*10**(-5) K**-1] **A:** 39 degrees Celsius.

First Major T-001

1). Fahrenheit and Kelvin scales agree at a reading of: **A:** 574.

2). A bridge is made with segments of concrete 50 m long. If the linear expansion coefficient of concrete is 12.0*10**$^{-6}$ (Celsius degree)**$^{-}$l, how much spacing is needed to allow for expansion for an extreme change in temperature of 150 degrees Fahrenheit? (Assume that the linear expansion coefficient is not a temperature dependent). **A: 5** .0 cm .

3). A lead bullet, traveling at 2 m/s, strikes a tree and comes to rest. If half the heat produced is retained by the bullet. The temperature of the bullet will be change by: (Specific heat of lead = 0.125*10**3 J/(kg*Celsius degree) (Assume that all the kinetic energy is converted to heat energy.) **A:** 80 Celsius degree.

First Major T-012

1). How much heat is required to melt ice of mass 500 g at -10 deg C to water at 0 deg C? (specific heat of ice, c, = 2220 J/(kg.K); heat of fusion of ice, Lf, = 333*10*3 J/kg). **A:** 1.78*10**5 J

2) A steel washer (ring) has an inner diameter of 4.000 cm and 012 an outer diameter of 4.500 cm at 20 deg C. To what temperature must the washer be heated to just fit over a rod that is 4.010 cm in diameter? (Coefficient of linear expansinon of steel, alpha, = 11*10**-6 per C deg) **A:** 247 deg C

3) A cylindrical copper rod of length 1.5 m and cross section 6.5 cm**2 is insulated to prevent heat loss through its surface. The ends are maintained at a temperature difference of 100 C deg by having one end in a water-ice mixture and the other in boiling water and steam. How much ice is melted per hour at the cold end? (thermal conductivity of copper, kappa, = 401 W/(m.K); heat of fusion of ice, Lf, = 333*10*3 J/kg) **A:** 188 g

4) Two moles of a monatomic ideal gas at a temperature of 300 K and pressure of 0.20 atm is compressed isothermally (constant temperature) to a pressure of 0.80 atm. Find the work done by the gas. A: -6900 J

5) Body A is at a higher temperature than Body B. When they are placed in contact, heat will flow from A to B **A1** until both have the same temperature, **A2** only if the specific heat of A is larger that that of B **A3** only if the volume of A is larger than that of B ,**A4** only if A has the greater internal energy content **A5** only if the thermal conductivity of A is greater than that of B

First Major T-032

1) Which of the following statements is True: A: If two objects are in thermal equilibrium they must have the **A:** same temperature **2**). A certain metal rod has a length of 10.00 m at 100.00 degree-C and a length of 10.04 m at 773 K. Find its length at zero degree-C. **A:** 9.99 m.

3) In a P-V diagram, a system of an ideal gas goes through the] process shown in figure 2. How much heat is absorbed after the system goes 100 times through the cycle? **A:** 300 J.

4) Consider a copper slab of thickness L and area of 5.0 m**2. If the conduction rate through the copper slab is 1.2*10**6 J/s and the temperature on the left of the slab is 102 degree-C while on the right of the slab it is -12.0 degree-C, what must be the thickness of the slab? [Take the coefficient of thermal conductivity of copper as 400 W/(m K)]. **A:** 19 cm.

5) 300 grams of water at 25 degree-C are added to 100 grams of ice 20 at zero degree-C. The final temperature of the mixture is: **A:** zero degree-C.

First Major T-041

1) It is recommended to use a new temperature scale called Z. On Z scale, the boiling point of water is 65.0 degrees Z and the freezing point is -15.0 degrees Z. To what temperature on the Fahrenheit scale would a temperature of -100 degrees Z correspond? [Note: both scales are linear] **A:** -159 F

2) Fifty grams of ice at zero degrees Celsius is placed in a thermos bottle containing 100 grams of water at 6.0 degrees
Celsius. How many grams of ice will melt? **A:** 7.5 grams.

3) A cylinder with a frictionless piston contains 0.2 kg of water at 100 degrees Celsius. What is the change in internal energy of water when it is converted to steam at 100 degrees Celsius at constant pressure of 1 atm. [Density of steam = 0.6 kg/m**3, water = 10**3 kg/m**3] **A:** 418 kJ.

4) The internal energy of a fixed mass of an ideal gas depends **A:** temperature, but not volume or pressure.