Part I: Choose the right answer:

1- The unit of thermal conductivity might be:

A. cal · cm/(s · C∘)   B. cal/(cm · s · C∘)   C. cal · s/(cm · C∘)   D. cm · s · C∘C/cal

ANS : B

2- The rate of heat flow by conduction through a slab does not depend upon the:

A. temperature difference between opposite faces of the slab   B. thermal conductivity of the slab   c. cross-sectional area of the slab   d. specific heat of the slab

ANS: D

3- A gram of distilled water at 4^oC:

A. will increase slightly in weight when heated to 6^oC B. will decrease slightly in weight when heated to 6^oC C. will increase slightly in volume when heated to 6^oC

ANS: C

D. will decrease slightly in volume when heated to 6^oC

4- We can consider the change of length with temperature is the basic factor for the work of

A. Platinum thermometer   B. thermocouple thermometer   C. a and b   D. non a and b

ANS: D

5- The heat capacity of an object is:

A. the amount of heat energy that raises its temperature by 1^oC

B. the amount of heat energy that changes its state without changing its temperature

C. the amount of heat energy per kilogram that raises its temperature by 1^oC

D. the ratio of its specific heat to that of water

ANS: A

6- The heat flow through 4 compound with the same cross section and different thermal conductivity is mainly depends on

A. The temperature of the first and last one   B. the temperature of every compound   C. specific heat of every compound   D. independent on temperature

ANS: A

7- The rate of heat loss by radiation of the body to the surrounding is manly proportional to

A. Temperature of the body   B. Surface area of the body   C. Thermal conductivity of the body   D. Specific heat of the body

ANS: A

8- The melting point temperature of substance increases as:

A. the volume of the liquid increases.   B. the external pressure increases.
C. the mass of the liquid decrease   D. the density decrease.

ANS: B

9- The rate of emission of radiation for a perfect black body at temperature of 127 k is…

($\sigma = 5.67 \times 10^{-8}$ watt/m^2.k^4).

A. 1.45×10^3 W/m^2 B. 1.45×10^2 W/m^2 C. 5.67×10^3 W/m^2 D. 5.67×10^4 W/m^2

ANS: B

10- Two different metals have the same mass and temperature. Equal quantities of energy are absorbed as heat by each one. Their final temperatures may be different because the samples have different ……

    A. coefficients of expansion   B. densities   <mark>C. heat capacities</mark>   D. thermal conductivities

ANS: C

Part II: answer the following questions

11- What do you know about the specific heat of gases

Ans: the gas has two specific heats, the specific heat at constant volume c_v and the specific heat at constant pressure c_p. The specific heat at constant volume c_v is the quantity of heat required to raise 1gm of the gas through 1°C keeping the volume constant. The specific heat at constant pressure c_p is the quantity of heat required to raise 1gm of the gas through 1°C keeping the pressure constant.

$$C_V = \left[\frac{1}{m}\frac{dQ}{dt}\right]_V$$

And

$$C_P = \left[\frac{1}{m}\frac{dQ}{dt}\right]_P$$

In general, the specific heat at constant pressure is greater then specific heat at constant volume ($c_p > c_v$). A relation for the difference between cp and cv is

$$C_P - C_V = \frac{R}{J}$$

12- The coefficient of linear expansion of steel is 11×10^{-6} per C∘ . A steel ball has a volume of exactly 100 cm3 at 0∘ C. what is the final volume ,when heated to 100∘ C.

ANS: $V = V_0 (1 + \gamma \, \Delta T)$

   V= 100 (1+ 3x11x10^{-6})x100))

= 100.33cm^3

13 - Define all of the following: Water equivalent, Stefan- Boltzmann low and types of heat transfers

ANS:

1- ***Water equivalent of a body is the mass of water in grams which would require the same amount of heat to raise its temperature 1•C as the body when heated through the same temperature***

2- ***the rate of emission of radiation from a black body is directly proportional to the fourth power of its absolute temperature***

3- ***There are three way in which heat is transferred from one place to another. The three ways are by conduction, convection, and radiation. Conduction is the transfer of heat in which thermal energy is transferred from molecule in a material with no perceptible motion of the material. Convection is the transfer of heat by mass motion of the heated material. Radiation is the transfer of thermal energy by electromagnetic waves***