Sheet One

Q1/ What is the difference between the classical and the statistical approaches to thermodynamics?

Q2/ A large fraction of the thermal energy generated in the engine of a car is rejected to the air by the radiator through the circulating water. Should the radiator be analyzed as a closed system or as an open system? Explain.

Q3/ You are trying to understand how a reciprocating air compressor (a piston-cylinder device) works. What system would you use? What type of system is this?

Q4/ Is the weight of a system an extensive or intensive property?

Q5/ Is the state of the air in an isolated room completely specified by the temperature and the pressure? Explain.

Q6/ Consider an alcohol and a mercury thermometer that read exactly 0°C at the ice point and 100°C at the steam point. The distance between the two points is divided into 100 equal parts in both thermometers. Do you think these thermometers will give exactly the same reading at a temperature of, say, 60°C? Explain.

Q7/ Consider two closed systems A and B. System A contains 3000 kJ of thermal energy at 20°C, whereas system B contains 200 kJ of thermal energy at 50°C. Now the systems are brought into contact with each other. Determine the direction of any heat transfer between the two systems.

Q8/ The deep body temperature of a healthy person is 37°C. What is it in kelvins? [redacted] What is the temperature of the heated air at 150°C in °F and R?

The temperature of a system rises by 70°C during a heating process. Express this rise in temperature in kelvins.

Q9/ The flash point of an engine oil is 363°F. What is the absolute flash-point temperature in K and R?

Q10/ The temperature of ambient air in a certain location is measured to be 240°C. Express this temperature in Fahrenheit (°F), Kelvin (K), and Rankine (R) units.

Q11/ The temperature of a system drops by 45°F during a cooling process. Express this drop in temperature in K, R, and °C.

Q12/ Explain why some people experience nose bleeding and some others experience shortness of breath at high elevations.

Q13/ Determine the atmospheric pressure at a location where the barometric reading is 740 mmHg and the gravitational acceleration is $g = 9.805\ m/s^2$. Assume the temperature of mercury to be 10ºC, at which its density is $13{,}570\ kg/m^3$.