Lecture-Based Questionnaire

1. Short one-line answer: Define thermodynamic equilibrium as described in the lecture.

Answer: Thermodynamic equilibrium is when the macroscopic properties of a system have stopped changing.

2. Short one-line answer: What is the primary purpose of the Zeroth Law of Thermodynamics?

Answer: It allows for the global comparison of temperature between two systems that never directly met, by using a third system (like a thermometer).

3. Multiple Choice Question: Which of the following is NOT a reason why the gas thermometer is preferred over liquid thermometers for defining temperature scales, according to the lecture?

a) All dilute gases show consistent linear expansion of the pV product with temperature.
b) Gas thermometers agree not only at fixed calibration points but also all the way in between.
c) They are generally easier to construct and calibrate accurately than liquid thermometers.
d) Their readings extrapolate to a universal absolute zero point for all gases.
Answer: c) They are generally easier to construct and calibrate accurately than liquid thermometers.

4. Short one-line answer: What specific point on the absolute temperature scale is defined by the triple point of water?

Answer: 273.16 Kelvin.

5. Multiple Choice Question: If 5 grams of copper (specific heat = 0.092 cal/g°C) are heated from 20°C to 70°C, how much heat in calories is absorbed by the copper?

a) 46.0 calories

b) 23.0 calories

c) 32.2 calories

d) 6.44 calories

Answer: b) 23.0 calories

6. Short one-line answer: During a phase change, such as ice melting into water, what happens to the temperature of the substance as heat is continuously added?

Answer: The temperature of the substance remains constant until the entire substance has completed the phase change.

7. Multiple Choice Question: Which type of heat transfer involves the actual physical movement of a heated medium from one place to another?

a) Conduction

b) Radiation

c) Convection

d) Transference

Answer: c) Convection

8. Short one-line answer: According to the lecture, what is the numerical value of the conversion factor between Joules and calories, as determined by Joule's experiment?

Answer: 4.2 Joules per calorie.

9. Short one-line answer: At the microscopic level, what is "heat" fundamentally understood to be?

Answer: Heat is the kinetic energy of atoms and molecules in their random motion.

10. Multiple Choice Question: In the context of heat transfer problems, what does the term 'reservoir' typically refer to?

a) A container specifically designed to store thermal energy.

b) A body so large that its temperature remains essentially unchanged despite the transfer of heat to or from it.

c) A device used to measure the specific heat of a material.

d) A closed system that perfectly conserves all forms of energy.

Answer: b) A body so large that its temperature remains essentially unchanged despite the transfer of heat to or from it.