PRACTICE EXAM

Difficulty: MEDIUM

Questions: 10

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# MEC511 Thermodynamics & Fluids - Chapter 3 Exam
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Instructions:

Answer all questions to the best of your ability. Show all work for problem-solving questions.

Section 1: Multiple Choice Questions (4 points each, 40 points total)

Instructions: Choose the best answer for each question.

Question 1: What does the incompressible substance model assume about the specific volume (density) of liquids or solids?
A) It varies significantly with temperature.
B) It varies significantly with pressure.
C) It is assumed to be constant.
D) It is always equal to 1.

Question 2: Which of the following is a characteristic of specific heat at constant pressure (cp)?
A) It is always smaller than specific heat at constant volume (cv).
B) It is solely dependent on the volume of the substance.
C) It relates to changes in enthalpy.
D) It is constant for all substances at a given temperature.

Question 3: According to Table A-5, what property of a liquid changes very little with pressure at a fixed temperature?
A) Enthalpy
B) Specific Heat
C) Specific Volume and Internal Energy
D) Entropy

Question 4: What primarily affects the specific internal energy of an incompressible substance?
A) Pressure
B) Volume
C) Temperature
D) Entropy

Question 5: What is the specific heat ratio, denoted as 'k', a ratio of?

A) Density to volume.
B) Enthalpy to internal energy.
C) cp to cv.
D) Temperature to pressure.

Section 2: Short Answer Questions (6 points each, 30 points total)

Instructions: Answer each question in 2-3 sentences.

Question 6: Explain why approximating liquid properties using saturated liquid data can be a useful method.

Question 7: Define the term "incompressible substance" and state one simplification it allows in thermodynamic analysis.

Question 8: Briefly explain how the specific heat (c) can be treated as constant in certain scenarios.

Section 3: Problem-Solving Questions (10 points each, 30 points total)

Instructions: Show all work for full credit.

Question 9: A 2-kg block of copper at 80°C is dropped into 5 kg of water at 25°C. Assuming the system is isolated and the copper and water are incompressible substances, determine the final equilibrium temperature. The specific heat of copper is 0.385 kJ/kg.K and the specific heat of water is 4.18 kJ/kg.K.

Question 10: A 5 kg iron casting, initially at 500°C, is quenched by plunging it into a 100 kg oil bath initially at 20°C. Assume no heat is lost to the surroundings and that the iron and oil are incompressible substances. Determine the final equilibrium temperature of the iron and oil. The specific heat of iron is 0.45 kJ/kg.K and the specific heat of the oil is 2.0 kJ/kg.K.
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