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Midterm Exam

Date: 6/10/2022 Duration: 90 minutes

Close Book and Offline

SUBJECT: PHYSICS 2 (FLUID MECHANICS AND THERMAL PHYSICS)

INSTRUCTIONS: the total of point is 100 (equivalent to 30% of the course)

1. *Purpose:*
   - Test your understanding of basic knowledge of The Kinetic Energy of Ideal Gas and the Second Law of Thermal Dynamics (CLO3).
   - Examine your skill in analysis and design a problem in science and engineering (CLO2).
   - Test your ability in applying knowledge of physics (CLO1).
   - Evaluate your English skills in writing communication manner (CLO4).
2. *Requirement:*
   - Read carefully each question and answer it following the requirements.
   - Write the answers and draw models CLEAN and TIDY directly in the exam paper.

Submit your exam including this cover page and the solutions of the following problems

Q1.(20 marks)

If 100 tons of crude oil are contained in a vertical cylindrical tank with an inner diameter of d = 4 m and the density of crude oil is ρ=850kg/m^3 at 10^{0}C, Determine the height of increase of the oil tank while increasing to 40^{0}C, know the coefficient of incompleteness due to heat β=0,00072^0/C^{-1}, and neglect flask expansion.

Q2.(15 marks)

What is the pressure drop due to the Bernoulli Effect as water goes into a 3.00-cm-diameter nozzle from a 9.00-cm-diameter fire hose while carrying a flow of 40.0 L/s? (b) To what maximum height above the nozzle can this water rise? (The actual height will be significantly smaller due to air resistance.)

Q3.(10 marks)

Making a premium cappuccino, bartenders will combine the room temperature coffee mixture with 200g of ice, which is required for a basic cappuccino with a temperature of 30^{0}C. Calculate the heat provided by the coffee marker (assuming a 20% heat loss) (c_{water}*=4200J/kg.K and* L_{water}*=1800J/kg.K)*

Q4.(15 marks) Proved at formula:

$$V = \sqrt{\frac{2a^2\,\Delta P}{\rho(a^2 - A^2)}}$$

(A: area of output hole; a: area of input hole and V:velocity in output hole)

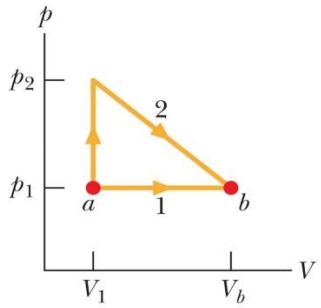
Q5.(20 marks)

A solid cylinder of radius r = 6 cm, length h = 7.5 cm, emissivity 0.75, and temperature 50°C is suspended in an environment of temperature 30°C

Find the energy lose in 1300s (knowing that σ=5,6703x10^{-8}($\frac{W}{m^2K^4}$)

Q6. (20 marks)

The p-V diagram in Fig shows two paths along which a sample of gas can be taken from state a to state b, where V_b= 3 V_1. Path 1 requires that energy equal to 5 p_1V_1 be transferred to the gas as heat.Path 2 requires that energy equal to 5.5 p_1V_1 be transferred to the gas as heat.What is the ratio p_2/p_1?



---GOOD LUCK---

"Difficulties in your life don't come to destroy you, but to help you realize your hidden potential.

It's only after you've stepped outside your comfort zone that you begin to change, grow, and transform".