

Quiz-1: ESO201/ 201A: Thermodynamics

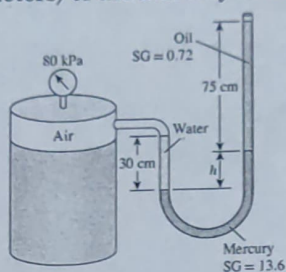
Name: Siryanish
Time: 1 Hour

Roll. No. 210355

Section: E-11
Maximum Marks: 30

- All questions are compulsory. Write all answers in SI units only.
- Please use property tables for the data. Please DO NOT write anything on the tables and return them after completing the quiz.
- The exchange of calculators and data tables is not allowed.
- Write your section carefully and correctly on the answer sheet and the question paper.

Question 1: (a) The gage pressure of the air in the tank, shown in the figure below, is measured to be 80 kPa. Determine the differential height h (in meters) of the mercury column. [5 marks]

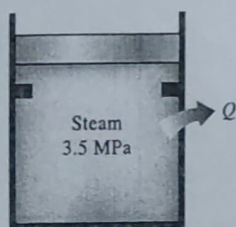


Question 1: (b) The gage pressure of an automobile tire is measured to be 200 kPa before a trip and 220 kPa after the trip at a location where the atmospheric pressure is 90 kPa. Assuming the volume of the tire remains constant at 0.035 m^3 , determine the percent increase in the absolute temperature of the air in the tire. [5 marks]

Tire
200 kPa
 0.035 m^3



Question 2: A piston-cylinder device initially contains steam at 3.5 MPa, superheated by 5°C . Now, steam loses heat to the surroundings, and the piston moves down, hitting a set of stops, at which point the cylinder contains saturated liquid water. The cooling continues until the cylinder contains water at 200°C . Show (a) the entire process on a T - v diagram and determine (b) the initial temperature, (c) the enthalpy change per unit mass of the steam by the time the piston first hits the stops, and (d) the final pressure and the quality (if mixture). [10 marks]



Question 3: A $4 \text{ m} \times 5 \text{ m} \times 7 \text{ m}$ room is heated by the radiator of a steam heating system. The steam radiator transfers heat at a rate of $10,000 \text{ kJ/h}$ and a 100 W fan is used to distribute the warm air in the room. The room's heat loss rate is estimated to be 5000 kJ/h . If the initial temperature of the room air is 10°C , determine how long (in seconds) it will take for the air temperature to rise to 20°C . Assume constant specific heat at room temperature. [10 marks]

