Fundamentals of thermodynamics assignment

The correspondence between the problem set in this sixth edition versus the problem set in the 5th edition text. Problems that are new are marked new and those that are only slightly altered are marked as modified (mod). Study guide problems 2. 1-2. 22 and 2. 23-2. 26 are all new problems. New 38 40 42 44 5th De. 13 18 14 59 61 63 28 mod 26 21 New 83 English unit Problems 89 12 102 82 1 03 Design and Open ended problems 106-116 are from 5th edition problems 2. 50260 Sonatas, arrogance and van Wylye Concept-study Guide Problems 2. 1 Make a control volume around the turbine in the steam power plant in Fig. 1 and list the flows of mass and energy that are there. Solution: We see hot high pressure steam flowing in at state 1 from the steam drum through a flow control (not shown). The Steam leaves at a lower pressure to the condenser (heat exchanger) at State 2. A rotating shaft gives a rate of energy (power) to the electric generator set. Make a control volume around the whole power plant in Figure 1. 2 and with the help tot Fig. 1. 1 list what flows tot mass and energy are in or out and any storage of energy. Make sure you know what is inside and what is outside your chosen C.

V, Smoke stack Boiler building Coal conveyor system Storage gypsum flue coal storage Turbine house Dock Combustion air Flue gas underground Wealthier power cable District heating Cold return Hot water Storage for later transport out: Gypsum, fly ash, slang Coal Sonatas, Gregorian and van Wylye 2. 3 Make a control volume that includes the steam flow around in the main turbine loop in the nuclear propulsion system in Fig, I . 3. Identify mass flows (hot or cold) and energy transfers that enter or leave the C. V. 1 Hot steam from generator 1 Electric power gene. Wealthier Condensate to steam gene. Old Cooling by seawater The electrical power also leaves the C. V. To

be used for lights, instruments and to charge the batteries. Sonatas, Brokerage and Van Wylye Take a control W)lumen around your kitchen refrigerator and indicate where the components shown in Figure I . 6 are located and show all flows Of energy transfer. Solution: The valve and the cold line, the evaporator, is inside close to the inside wall and usually a small blower distributes cold air from the freezer box to the refrigerator room, Q leak The black grille in the back or at the OTTOMH is the condenser that gives heat to the room air.

The compressor sits at the bottom. Sonatas, arrogance and van V, Helen An electric dip heater is put into a cup of water and heats it from ICC to ICC. Show the energy flow(s) and storage and explain what changes. Solution: Electric power is converted in the heater element (an electric resistor) so it becomes hot and gives energy by heat transfer to the water. The water heats up and thus stores energy and as it is warmer than the cup material it heats the cup which also stores some energy. The cup being armed than the air gives a smaller amount of energy (a rate) to the air as a heat loss.

Heliocentric Q loss Sonatas, Brokerage and van Wylye Separate the list P, F, V, v, p, T, a, m, L, t and V into intensive, extensive and inopportune. Solution: Intensive properties are independent upon mass: P, v, p, T Extensive properties scales with mass: Non-properties: Comment: You could claim that acceleration a and velocity V are physical properties for the dynamic motion Of the mass, but not thermal properties. An escalator brings four people of total 300 keg, 25 m up in a building. Explain hat happens with respect to energy transfer and stored energy.

The four people (300 keg) have their potential energy raised, which is how the energy is stored. The energy is supplied as electrical power to the motor that pulls the escalator with a cable. Water in nature exist in different phases like solid, liquid and vapor (gas). Indicate the relative magnitude of density and specific volume for the three phases. Values are indicated in Figure 2. 7 as density for common substances. More accurate values are found in Tables A. 3, A. 4 and A-5 Water as solid (ice) has density of around 900 keg/mm