

ME 1065 – HW 1

Due 9/3/08

Choose **3** of the following tasks (using the numbers, be clear which ones you have selected), and consider different design concepts that may be used to achieve the desired goals (utilize the “formulation of the problem” steps discussed in class). Compare 2 different options for each task in terms of their positive and negative features. Choosing one of the options for each task, sketch a conceptual design, and give a reason for your choice.

- 1) Scrap plastic pieces are to be melted and then solidified in the form of cylindrical rods at a rate of about 20 kg/hr.
- 2) Solar energy collected by a flat plate collector system is to be stored to supply hot water at a temperature of $70 \pm 5^\circ\text{C}$ to an industrial unit.
- 3) Hot water from a water processing plant is to be transported to and stored in a tank 200 m away and at a height of 5 m above the ground. A maximum flow rate of 10 gals/min is desired.
- 4) The water from a river is to be supplied at a flow rate of 50 gals/min and a pressure of 5 atm to a water treatment plant.
- 5) A company wants to discharge its nontoxic chemical waste into a river, with the smallest impact on the local water region, within 25 m of the discharge point.
- 6) Food materials are to be frozen by reducing the temperature to below -15°C . A net energy removal rate of 100 kW is desired.
- 7) A building of floor area 500 m^2 is to be heated by circulating hot air. The temperature of the air must not exceed 90°C .