



Chapter 6, Problem 80.

A geothermal power plant uses geothermal water extracted at 160°C at a rate of 440 kg/s as the heat source and produces 22 MW of net power. If the environment temperature is 25°C , determine (a) the actual thermal efficiency, (b) the maximum possible thermal efficiency, and (c) the actual rate of heat rejection from this power plant.

* Problems designated by a “C” are concept questions, and students are encouraged to answer them all. Problems designated by an “E” are in English units, and the SI users can ignore them. Problems with the  are solved using EES, and complete solutions together with parametric studies are included on the enclosed DVD. Problems with the  are comprehensive in nature and are intended to be solved with a computer, preferably using the EES software that accompanies this text.

Chapter 6, Problem 87.

A refrigerator is to remove heat from the cooled space at a rate of 300 kJ/min to maintain its temperature at -8°C . If the air surrounding the refrigerator is at 25°C , determine the minimum power input required for this refrigerator.

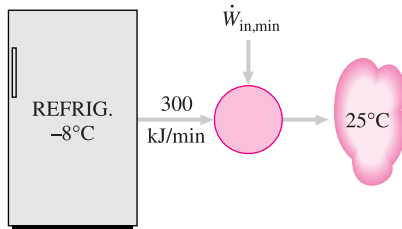




Figure P6-87

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Chapter 6, Problem 95.

A heat pump is used to maintain a house at 22°C by extracting heat from the outside air on a day when the outside air temperature is 2°C . The house is estimated to lose heat at a rate of $110,000\text{ kJ/h}$, and the heat pump consumes 5 kW of electric power when running. Is this heat pump powerful enough to do the job?

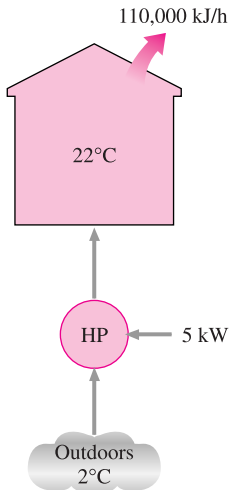






Figure P6-95

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Chapter 6, Problem 97.

The performance of a heat pump degrades (i.e., its COP decreases) as the temperature of the heat source decreases. This makes using heat pumps at locations with severe weather conditions unattractive. Consider a house that is heated and maintained at 20°C by a heat pump during the winter. What is the maximum COP for this heat pump if heat is extracted from the outdoor air at (a) 10°C , (b) -5°C , and (c) -30°C ?

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