

mech 262 - Assignment 7

Entropy and the Second Law

Question 1

Steam at 3.0 MPa, 500°C, 70 m/s enters an insulated turbine operating at steady state and exits at 0.3 MPa, 140 m/s. The work developed per kg of steam flowing is claimed to be 667 kJ/kg.

Can this claim be correct? Discuss.

Question 2

A new device claims to be able to produce 1800 kJ of work while transferring heat in the following complex way:

- 3200 kJ of heat enters the system from a 830 K reservoir;
- 530 kJ of heat leaves the system to a 280 K reservoir; and,
- An unknown amount of heat leaves the system to a 550 K reservoir.

- a. What is the claimed system efficiency (want “work”, pay for “heat in”)?
- b. Will the system operate as claimed? What’s wrong?
- c. What is the most amount of work the system can produce in real life?
- d. What will be the best system efficiency?