Assignment 08

The due date for submitting this assignment has passed. Due on 2018-09-26, 23:59 IST.
As per our records you have not submitted this assignment.

1) Tick whether the below statement is True/False.

“A power plant that has a higher thermal efficiency necessarily has higher second-law efficiency than one with a lower thermal efficiency”.

- True
- False

No, the answer is incorrect.

Score: 0

Accepted Answers: False

2) For a given temperature $T_1$, as the difference between $T_1$ and $T_2$ increases, the COP of a Carnot heat pump

- decreases
- increases
- first increases, then decreases
- first decreases, then increases

No, the answer is incorrect.

Score: 0

Accepted Answers: decreases

3) A definite zero point ___ on the absolute temperature scale but this point ___ be reached ___ violation of the second law.

- exists, can, without
- exists, can, with
- exists, cannot, without
- exists, cannot, with

No, the answer is incorrect.

Score: 0

Accepted Answers: exists, cannot, without

4) Tick the correct option from the below options.

$\sum Q_i/T_i < 0$ is valid for

- Week 8: Second Law of Thermodynamics and Entropy

No, the answer is incorrect.

Score: 0

Accepted Answers: Lecture 22: Second Law of Thermodynamics: Carnot Cycle and Efficiency
5) The entropy of a hot baked potato decreases as it cools. Based on this phenomenon which of the following statement is correct?

- $\Delta S_{\text{tot}} > 0$
- $\Delta S_{\text{tot}} < 0$
- $\Delta S_{\text{tot}} = 0$
- none of these

No, the answer is incorrect.
Score: 0

Accepted Answers:

- only irreversible engine

6) Which of the following is true?

- for an isolated system, $dS \geq 0$
- for a reversible process, $dS = 0$
- for an irreversible process, $dS > 0$
- all of the mentioned

No, the answer is incorrect.
Score: 0

Accepted Answers:

- all of the mentioned

7) A heat pump operates on a Carnot heat pump cycle with a COP of 8.7. It keeps a space at 26 °C by consuming 4.25 kW of power. Determine the temperature of the reservoir from which the heat is absorbed and the heating load provided by the heat pump.

- 265 K and 37 kW
- 365 kW and 37 kW
- 265 kW and 47 kW
- 365 K and 47 kW

No, the answer is incorrect.
Score: 0

Accepted Answers:

- 265 K and 37 kW

8) A Carnot heat engine receives heat from a reservoir at 900 °C at a rate of 15 kW and rejects the waste heat to the ambient air at 25 °C. The entire work output of the heat engine is used to drive a refrigerator that removes heat from the refrigerated space at 10 °C and transfers it to the same ambient air at 25 °C. Determine the maximum rate of heat removal from the refrigerated space.

- 200 kW
- 165 kW
- 125 kW
- 214 kW

No, the answer is incorrect.
Score: 0

Accepted Answers:
9) A rigid tank contains 5 kg of air at atmospheric pressure and 317 °C. The air is cooled to the surroundings temperature of 17 °C. Assume constant specific heats at 300 K. Determine the entropy change of the air in the tank during the process and the net entropy change of the universe due to this process. The specific heat of air at room temperature is \( c_v = 0.718 \text{ kJ/kg.K} \)

- 2.55 kJ/K and 3.71 kJ/K
- 1.16 kJ/K and 3.71 kJ/K
- -3.71 kJ/K and 2.55 kJ/K
- -2.55 kJ/K and 1.16 kJ/K

No, the answer is incorrect.
Score: 0
Accepted Answers:
- -2.55 kJ/K and 1.16 kJ/K

10) An insulated piston-cylinder device contains 5 L of saturated liquid water at a constant pressure of 150 kPa. An electric resistance heater inside the cylinder is now turned on, and 2200 kJ of energy is transferred to the steam. Determine the entropy change of the water during this process.

- 2.84 kJ/K
- 5.72 kJ/K
- 8.63 kJ/K
- 1.28 kJ/K

No, the answer is incorrect.
Score: 0
Accepted Answers:
- 5.72 kJ/K