Assignment 1

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2019-03-13, 23:59 IST.

1) Select the correct T-v diagram if steam at v1 = 0.005 m$^3$/kg is heated to v2 = 0.5 m$^3$/kg while maintaining P = 500 kPa. The dots are states 1 and 2 with 1 being on the left.

- a
- b
- c
- none

No, the answer is incorrect. Score: 0
Accepted Answers:
- a

2) A 2-kW electric resistance heater in a room is turned on and kept on for 50 min. The amount of energy transferred to the room by the heater is

- 2 kJ
- 100 kJ
- 3000 kJ
- 6000 kJ

No, the answer is incorrect. Score: 0
Accepted Answers:
- 6000 kJ

3) A 1-m$^3$ rigid tank contains 10 kg of water (in any phase or phases) at 160°C. The pressure in the tank is

- 738 kPa
4) A 3-m$^3$ rigid tank contains nitrogen gas at 500 kPa and 300 K. Now heat is transferred to the nitrogen in the tank and the pressure of nitrogen rises to 800 kPa. The work done during this process is

- 500 kJ
- 1500 kJ
- 0 kJ
- 900 kJ

No, the answer is incorrect.
Score: 0
Accepted Answers:

5) A 0.5-m$^3$ cylinder contains nitrogen gas at 600 kPa and 300 K. Now the gas is compressed isothermally to a volume of 0.1 m$^3$. The work done on the gas during this compression process is

- 720 kJ
- 483 kJ
- 240 kJ
- 175 kJ

No, the answer is incorrect.
Score: 0
Accepted Answers:

6) A 6-pack canned drink is to be cooled from 18°C to 3°C. The mass of each canned drink is 0.355 kg. The drinks can be treated as water, and the energy stored in the aluminum can itself is negligible. The amount of heat transfer from the 6 canned drinks is

- 22 kJ
- 32 kJ
- 134 kJ
- 187 kJ

No, the answer is incorrect.
Score: 0
Accepted Answers:

7) An ideal gas under goes a constant volume (isochoric) process in a closed system. The heat transfer and work are respectively

- 0, −cvΔT
- cvΔT, 0
- cpΔT, RΔT
- R ln(T2/T1), R ln(T2/T1)

No, the answer is incorrect.
Score: 0
Accepted Answers:

Accepted Answers:
8) An adiabatic heat exchanger is used to heat cold water at 15°C entering at a rate of 5 kg/s by hot air at 90°C entering also at rate of 5 kg/s. If the exit temperature of hot air is 20°C, the exit temperature of cold water is

- 27°C
- 32°C
- 52°C
- 85°C

No, the answer is incorrect.
Score: 0
Accepted Answers: 32°C

9) Water is boiling at 1 atm pressure in a stainless steel pan on an electric range. It is observed that 2 kg of liquid water evaporates in 30 minutes. The rate of heat transfer to the water is

- 2.51 kW
- 2.32 kW
- 2.97 kW
- 0.47 kW

No, the answer is incorrect.
Score: 0
Accepted Answers: 2.51 kW

10) 5 kg of liquid water initially at 12°C is to be heated to 95°C in a teapot equipped with a 800 W electric heating element inside. The specific heat of water can be taken to be 4.18 kJ/kg·°C, and the heat loss from the water during heating can be neglected. The time it takes to heat the water to the desired temperature is

- 5.9 min
- 7.3 min
- 10.8 min
- 14.0 min

No, the answer is incorrect.
Score: 0
Accepted Answers: 10.8 min

11) An ordinary egg with a mass of 0.1 kg and a specific heat of 3.32 kJ/kg·°C is dropped into boiling water at 95°C. If the initial temperature of the egg is 5°C, the maximum amount of heat transfer to the egg is

- 12 kJ
- 30 kJ
- 24 kJ
- 18 kJ

No, the answer is incorrect.
Score: 0
Accepted Answers: 30 kJ

12) An ideal gas has a gas constant \( R = 0.3 \text{ kJ/kg·K} \) and a constant-volume specific heat \( c_v = 0.7 \text{ kJ/kg·K} \). If the gas has a temperature change of 100 K, the change in enthalpy is, in kJ/kg
13) A heat exchanger is used to heat cold water at 15°C entering at a rate of 2 kg/s by hot air at 85°C entering at rate of 3 kg/s. The heat exchanger is not insulated, and is losing heat at a rate of 25 kJ/s. If the exit temperature of hot air is 20°C, the exit temperature of cold water is

- 28°C
- 35°C
- 38°C
- 41°C

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  

14) Steam expands in a turbine from 4 MPa and 500°C to 0.5 MPa and 250°C at a rate of 1350 kg/h. Heat is lost from the turbine at a rate of 25 kJ/s during the process. The power output of the turbine is

- 157 kW
- 207 kW
- 182 kW
- 287 kW

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  

15) Air at 27°C and 5 atm is throttled by a valve to 1 atm. If the valve is adiabatic and the change in kinetic energy is negligible, the exit temperature of air will be

- 10°C
- 15°C
- 27°C
- 23°C

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  

16) A solid is transferred into its vapor state without passing through the liquid state at below triple point. This process is called as sublimation

- True
- False
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Score</th>
<th>Accepted Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Ideal gas law applicable at high temperature and low pressure.</td>
<td>True</td>
<td>1 point</td>
<td>True</td>
</tr>
<tr>
<td>18. Ideal gas has zero energy at 0 °C</td>
<td>False</td>
<td>1 point</td>
<td>False</td>
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<tr>
<td>19. Entropy is extensive property</td>
<td>True</td>
<td>1 point</td>
<td>True</td>
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<tr>
<td>20. A change in state involving a decrease in entropy can be spontaneous only if it is exothermic</td>
<td>True</td>
<td>1 point</td>
<td>True</td>
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