Assignment 04

The due date for submitting this assignment has passed. Due on 2018-09-05, 23:59 IST.
As per our records you have not submitted this assignment.

1) Tick the correct option from below about the following statement.  

"Boundary work \( (W_b) \) associated with constant volume system is always zero".

- True
- False

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

2) Tick the correct option about perpetual motion machine of the first kind (PMMFK).

- obeys First Law of Thermodynamics and produce heat continuously
- obeys First Law of Thermodynamics and produce work continuously
- does not obey First Law of Thermodynamics and cannot be possible to devise such a device
- none of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
does not obey First Law of Thermodynamics and cannot be possible to devise such a device

3) Which of the following property changes when a potato is baked in an oven?

- Internal energy
- Enthalpy
- both
- none of these

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

4) Which of the following option correctly characterizes constant-pressure process?

- boundary work \( (W_b) \) is zero
- boundary work \( (W_b) \) is a positive quantity
- boundary work \( (W_b) \) is a negative quantity

No, the answer is incorrect.
Score: 0
Accepted Answers:
5) First law of thermodynamics is applied to a system which obeys $\delta Q = 0$ and $\delta W = 0$. Tick the correct option which characterizes this system.

- E = 0 and closed system
- E = constant and closed system
- E = 0 and isolated system
- E = constant and isolated system

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

boundary work ($W_b$) is a positive quantity

6) Tick the correct option which relates specific heat of ideal gas at constant pressure $C_P$ and at constant volume $C_V$, where $R$ is the universal gas constant.

- $C_P - C_V = R$
- $C_P / C_V = R$
- $C_P / C_V = R - 1$

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

$E = constant$ and $isolated$ system

7) A student living in a 4-m x 6-m x 6-m dormitory room turns on her 200 W fan before she leaves the room on a summer day, hoping that the room will be cooler when she comes back in the evening. Assuming all the doors and windows are tightly closed and disregarding any heat transfer through the walls and the windows, determine the temperature in the room when she comes back 8 h later. Use specific heat values at room temperature, and assume the room to be at 100 kPa and 27 °C in the morning when she leaves. Given: the gas constant of air is $R = 0.287 \text{ kPa.m}^3/\text{kg.K}$ and $c_v = 0.718 \text{ kJ/kg.K}$ at room temperature.

- 40 °C
- 27 °C
- 17 °C
- 75 °C

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

75 °C

8) A rigid container equipped with a stirring device contains 0.5 kg of motor oil. Determine the rate of internal energy increase per unit mass when heat is transferred to the oil at a rate of 1.5 W, and 2 W of power is applied to the stirring device.

- 1 kJ/kg
- 7 kW/kg
- 1 kW/kg
- 7 kJ/kg

No, the answer is incorrect.
Score: 0
Accepted Answers:
9) 1.5 kg of saturated water vapor in a closed system is condensed by cooling it at constant pressure to a saturated liquid at 40 kPa. Determine the heat transferred and the work done during this process.

- 160 kJ and 2318 kJ
- 2318 kJ and 160 kJ
- 240 kJ and 3478 kJ
- 3478 kJ and 240 kJ

No, the answer is incorrect.
Score: 0
Accepted Answers:
3478 kJ and 240 kJ

10) An insulated rigid tank initially contains 2 kg of helium at 40 °C and 350 kPa. A paddle wheel with a power rating of 15 W is operated within the tank for 30 min. Determine (a) the final temperature and (b) the final pressure of the helium gas. Take \( c_v \) of helium as 3.1156 kJ/kg.K

- 80 °C and 350 kPa
- 44 °C and 350 kPa
- 44 °C and 354 kPa
- 40 °C and 354 kPa

No, the answer is incorrect.
Score: 0
Accepted Answers:
44 °C and 354 kPa

11) A piston-cylinder device initially contains 0.5 m³ of nitrogen gas at 400 kPa and 27 °C. An electric heater within the device is turned on and is allowed to pass a current of 2 amp for time 't' from a 120-V source. Nitrogen expands at constant pressure by the resistance heater, and a heat loss of 5 kJ occurs during the process. If the temperature rises by 30°C then determine the time used for heating. Use \( c_p \) of N₂ as 1.039 kJ/kg-K and take R = 0.297 kPa.m³/kg.K

- 5 min
- 15 min
- 25 min
- 30 min

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