Unit 3 - Week 1

Assignment 1

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-08-14, 23:59 IST.

1) *1 point*

Which one of the following is NOT TRUE for reversible process?

(a) It comprises of a succession of equilibrium states
(b) Chemical potential change during the process is infinite
(c) Driving force is infinitesimal in magnitude
(d) The state of both the system and the surroundings can be restored by reversing the process

(a)
(b)
(c)
(d)

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

2) *1 point*

Which one of the following is an extensive property?

(a) Pressure
(b) Composition
(c) Temperature
(d) Energy

(a)
(b)
(c)
(d)

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

3) *1 point*

The mathematical statement of first law of thermodynamics for a cyclic process is given by

(a) $\delta Q = \delta W$
(b) $\delta Q = \delta U$
(c) $\delta Q = 0$
(d) $\delta W = \delta H$

(a)
(b)
(c)
(d)

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

4) *1 point*

During adiabatic process, a closed system does not exchange _____ with the surroundings.

(a) mass
(b) heat
(c) both (a) and (b)
(d) none of the options are correct

(a)
(b)
(c)
(d)

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

5) *2 points*

What is the degree of freedom of a liquid phase consisting of carbon tetrachloride and water in equilibrium with its vapor?
(a) 1
(b) 2
(c) 3
(d) 4

(a)
(b)
(c)
(d)

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

6) *2 points*

Consider a polytropic process, where PV^n=constant with n= polytropic coefficient for the process Now match the corresponding values of n with the respective processes.

Processes	Values of n
A. Isochoric	a. γ
B. Isobaric	b. 1
C. Adiabatic	c. 0
D. Isothermal	d. ∞

(a) A-a, B-c, C-d, D-b
(b) A-c, B-a, C-d, D-b
(c) A-d, B-c, C-a, D-b
(d) A-b, B-d, C-b, D-a

(a)
(b)
(c)
(d)

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

7) *2 points*

Calculate the mechanical work required to heat a closed system of ideal gas from 100K to 500K via an adiabatic process. The specific heat at constant volume is 21 kJ/ kmol K.
(a) 8400 J/mol work done on the system
(b) 8400 J/mol work done by the system
(c) 12600 J/mol work done on the system
(d) 12600 J/mol work done by the system

(a)
(b)
(c)
(d)

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

8) *5 points*

Calculate the enthalpy change in kJ for 1 kmol water as it is vaporized at a constant temperature of 373 K and constant pressure of 101.3 kPA. The specific volumes of liquid and vapor at these conditions are 1.04×10^{-3} m^3/kmol and 1.675 m^3/kmol respectively. 1030 kJ of heat is added to water for this change.

a. 150 kJ
b. 540 kJ
c. 790 kJ
d. 1030 kJ

a.
b.
c.
d.

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

9) *5 points*

10 kg air is compressed from 1 bar, 200 K to 4 bar in a single stage compressor. The process is adiabatic with $\gamma = 1.5$. The specific heat of air at constant pressure in kJ/kmol K is given by:

$$C_p = 12 + 3.5 \times 10^{-3}T - 7 \times 10^{-7}T^2$$

What is the work done on the compressor (Assume air to behave as an ideal gas and molecular weight of air = 29)?

(a) $7.5 \times 10^5 J$
(b) $5.8 \times 10^5 J$
(c) $6.7 \times 10^5 J$
(d) $8.1 \times 10^5 J$

(a)
(b)
(c)
(d)

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

10) *5 points*

A system consisting of some fluid is stirred in a tank. The rate of work done on the system by the stirrer is 2000 W. The heat generated due to stirring is measured to be 3600 kJ/h. Determine the change in internal energy.

a. 500 W
b. 1000 W
c. 1500 W
d. 2000 W

a.
b.
c.
d.

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