

Heat and Thermodynamics Assignment 3

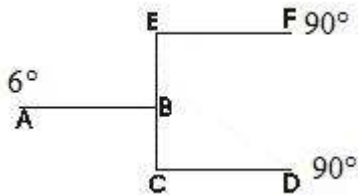
Question 1: What increase in radiated power results when the temperature of a blackbody is increased from 7 to 287°C

- a) 4
- b) 8
- c) 16
- d) None of these

Question 2: The internal energy of an ideal gas depends on

- a) Temperature
- b) Pressure
- c) Volume
- d) None of these

Question 3:



All Rod are of equal length and equal area of crosssection. Find the temperature at point B

- a, 45
- b, 51.4
- c, 50
- d, 51

Question 4:

An ideal gas is taken through a cyclic thermodynamics process through four steps.

The amount of heat involved in the steps are $Q_1 = 5960\text{ J}$, $Q_2 = -5600\text{ J}$, $Q_3 = -3000\text{ J}$, $Q_4 = -3600\text{ J}$ respectively. The corresponding quantities of Internal energy changes are $\Delta U_1 = 3.760\text{ J}$, $\Delta U_2 = -4800\text{ J}$, $\Delta U_3 = -1800\text{ J}$, $\Delta U_4 = ?$

find the value ΔU_4 & net work done

- a, 2930 J, 960 J
- b, 2830 J, 900 J
- C, 2930 J, -960 J
- d, -2930 J, 960 J

Question 5:

4 moles of an ideal gas undergoes an isothermal expansion at temperature T during which the volume becomes η times.

W -> Workdone by the gas

ΔU -> Change in internal energy

a) $W = -4RT \ln \eta$
 $\Delta U = 0$

$$W = -RT \ln \eta$$

b) $\Delta U = \frac{6RT}{5}$

$$W = RT \ln \eta$$

c) $\Delta U = \frac{6RT}{5}$

d) $W = 4RT \ln \eta$
 $\Delta U = 0$

Question 6:

M moles of an ideal polyatomic gas ($C_v = 7R/2$) are in a cylinder at temperature T. A heat Q is supplied to the gas. Some M/3 moles of the gas dissociate into atoms while the temperature remains constant. Find the correct relation

a) $3Q = 4MRT$

b) $2Q = 3MRT$

c) $Q = 4MRT$

d) $7Q = 4MRT$

Question 7:

Absorbing power of the surface is .7. Transmitting power of the surface is .1

A total heat Q is incident on the surface. Find the heat reflected back?

a) $Q/6$

b) $Q/4$

c) $Q/2$

d) $Q/5$

Question 8:

A hole of radius R_1 is made centrally in a circular disc of thickness d and radius R_2 . The inner surface is maintained at temperature T_1 and the other surface is maintained at T_2 ($T_1 > T_2$). Thermal conductivity of the circular plate is K.

a. Find the temperature as a function of radius from the centre

b. Find the heat flow per unit time

Assertion and Reason

- a) Statement I is true ,statement II is true ,statement II is correct explanation for statement I
- b) Statement I is true ,statement II is true ,statement II is not a correct explanation for statement I
- c) Statement I is true, Statement II is false
- d) Statement I is False, Statement II is True

Question 9:

STATEMENT 1:The molar specific heat capacity of the ideal gas in isothermal process is infinity

STATEMENT 2:Heat transfer is non zero in the Isothermal process

Question 10:

STATEMENT 1:Equation of state for a real gas is $(P+a/V^2)(V-b)=nRT$

STATEMENT 2: Molecular attraction is not negligible and the size of molecules are not negligible in comparison to average separation between them