INDIAN SCHOOL DARSAIT
DEPARTMENT OF PHYSICS

Subject : Physics	**Chapter** : Thermodynamics	**Worksheet No**. 12
Resource Person : Mrs. Jayalakshmi Ratish		**Date** :
Name of the Student :_____	**Class & Division** : XI A/B	**Roll Number** : ___

1. State Carnot's principle 1

2. What is isothermal process? What are essential conditions for an isothermal process to take place? 1

3. Name the principle used in the mercury thermometer. 1

4. Air pressure in a car tyre increases during driving. Explain. 1

5. An ideal gas undergoes cyclic process ABCDA as shown in given P-V diagram. Find the amount of work done by the gas. 1
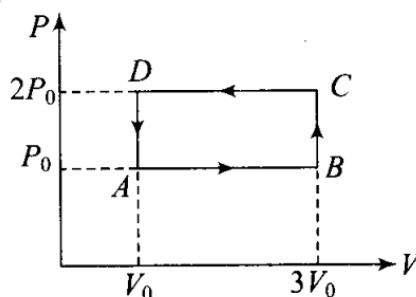

(As. $-2P_0V_0$)

6. The molar heat capacity of a gas at constant volume is found to be 5 cal $mol^{-1}K^{-1}$. Find the ratio ɣ for the gas. (Gas constant R = 2 cal mol^{-1} K^{-1}) 2

(As. ɣ = 1.4)

7. 200 J of work is done on a gas to reduce it's volume by compressing it. If this change is done under adiabatic conditions, find out the change in internal energy of the gas and also the amount of heat absorbed by the gas. 2

(As. 200J)

8. A cylinder with a movable piston contains 3 moles of hydrogen at STP. The walls of the cylinder are made of heat insulator and the piston is insulated by having a pile of sand on it. By what factor does the pressure of the gas increase if the gas is compressed to half its original volume? 2

(As. 2.64)

9. A Carnot engine operates between 500 K and 400 K. If it absorbs 6×10^5 cal heat at higher temperature, how much work per cycle can the engine perform? 2

(As. 5.04×10^5 J)

10. Which of the two will increase the pressure more in reducing the volume to 50% – an adiabatic process or an isothermal process 2

11. In changing the state of a gas adiabatically from an equilibrium state A to another 3

equilibrium state B, an amount of work equal to 22.3 J is done on the system. If the gas is taken from A to B via a process in which the net heat absorbed by the system is 9.35 cal, how much is the net work done by the system in the later case? (take 1 cal = 4.19 J)

(As. 17 J)

12. Figure shows the P-V diagram of an ideal gas undergoing a change of state from A to B. 3
Four different parts I, II, III and IV as shown in the figure may lead to the same change of state (i.e. state A to state B) Which of the following is true?
(a) Change in internal energy is same in IV and III cases, but not in I and II.
(b) Change in internal energy is same in all the four cases.
(c) Work done is maximum in case I.
(d) Work done is minimum in case II.
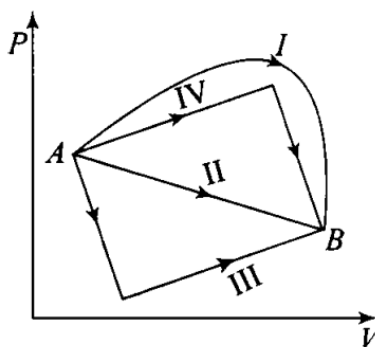
(As. b, c)

13. Consider a Carnot's cycle operating between $T_1 = 500$ K and $T_2 = 300$ K producing 1 kJ of 3
mechanical work per cycle. Find the heat transferred to the engine by the reservoirs.

(As. 1500 J)

14. If the coefficient of performance of a refrigerator is 5 and operates at the room temperature 3
(27°C), find the temperature inside the refrigerator.

(As. -23°C)

15. The initial state of a certain gas is (P_1, V_1, T_1). It undergoes expansion till its volume becomes 3
V_2. Consider the following two cases.
(a) the expansion takes place at constant temperature.
(b) the expansion takes place at constant pressure.
Plot the P-V diagram for each case. In which of the two cases, is work done by the gas more?