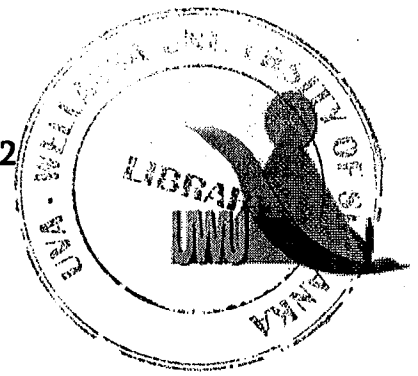


Uva Wellassa University, Sri Lanka
End Semester Examination – Sep/Oct 2012
SCT 254-1 Thermodynamics
and Repeat



Time: One (01) hour

Answer all four (04) questions
25 marks for each question

$$R = 8.31 \text{ J/ mol. K}^{-1}$$

- 01) I. What is thermal energy ?
II. Name three thermodynamic processes and explain them.
III. Write the first law of thermodynamics for an adiabatic process.
IV. Show that the work done by a system containing one mole of perfect gas, during an adiabatic process is given by;

$$W = \frac{R(T_1 - T_2)}{\gamma - 1}$$

- 02) I. What is a reversible process? What are the conditions for a process to be reversible ?
II. Give indicator diagrams to show reversible and irreversible processes.
III. Figure 01 shows a P-V graph of the thermodynamic behavior of an ideal gas. Find out
(a) Work done in the process A to B, B to C, C to D and D to A
(b) Work done in the complete cycle

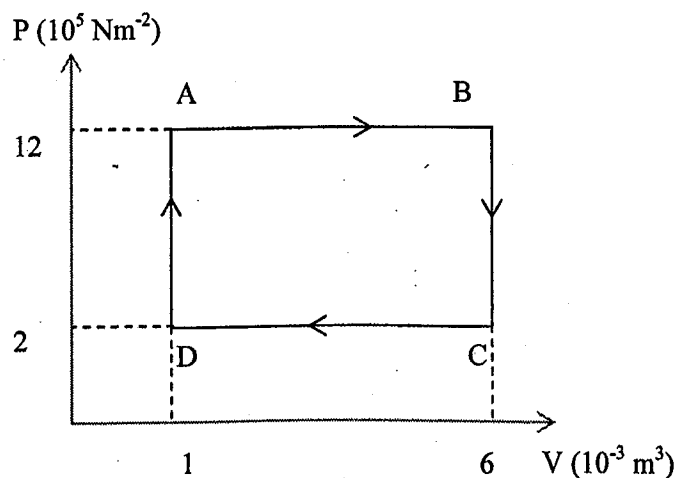


Fig. 01

- 03) I. Give the Kelvin-Planck and Clausius forms of second law of thermodynamics.
- II. How does an ideal refrigerator function ? Derive an expression for the coefficient of performance of a refrigerator ?
- III. A Carnot's refrigerator takes heat from water at $0\text{ }^{\circ}\text{C}$ and discards it to a room temperature at $27\text{ }^{\circ}\text{C}$. 1 kg of water at $0\text{ }^{\circ}\text{C}$ is to be changed into ice at $0\text{ }^{\circ}\text{C}$. How many calories of heat are discarded to the room? What is the work done by the refrigerator in this process ? What is the coefficient of performance of the machine?
- 04) I. Explain the concept entropy.
- II. Derive an expression for the change in entropy when ice changes into steam.
- III. 12.5 g of ice at $-24\text{ }^{\circ}\text{C}$ is converted into steam at $100\text{ }^{\circ}\text{C}$. Calculate the change in entropy. It is given that, latent heat of steam is 2250 kJ/kg , latent heat of ice is 336 kJ/kg , Specific heat of ice is 2.1 kJ/kg-K and Specific heat of water is 4.2 kJ/kg-K .