

2209T164

4. Define internal energy. How is energy stored in molecules and atoms? What is the difference between heat and internal energy? Which property of a system increases when heat is transferred: (a) at constant volume, (b) at constant pressure?
5. What is a Carnot cycle? What are the four processes which constitute the cycle? How does the efficiency of a reversible cycle depend only on the two temperatures at which heat is transferred?
6. Why does entropy remain constant in a reversible adiabatic process? What do you understand by entropy transfer? Why is entropy transfer associated with heat transfer and not with work transfer?
7. Air flows through an adiabatic compressor at 2 kg/s. The inlet conditions are 1 bar and 310 K and the exit conditions are 7 bar and 560 K. Compute the net rate of availability transfer and the irreversibility. Take  $T_0 = 298$  K.
8. State Dalton's law of partial pressures. How is the partial pressure in a gas mixture related to the mole fraction? How are the characteristic gas constant and the molecular weight of a gas mixture computed?

===END OF PAPER===

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**B.Voc Solar Technology**  
**Subject: Thermodynamics**  
**Subject Code: ME-604**  
**Semester: Fourth**  
**Session: September 2022**  
**Theory (External): 35 Marks**  
**Time: 03 Hours**

**Instructions to the Students**

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of short answers type in nature. All questions are compulsory. Each question carries 1 mark.
3. Section B comprises 8 essay type questions out of which students need to do any 5. Each question carries 5 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything in the question paper.
6. Whenever necessary, the diagram drawn should be neat and properly labelled

**Roll Number**

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## SECTION – A (OBJECTIVE TYPE QUESTIONS)

(10 × 1 = 10 Marks)

- A. In an open system, for maximum work, the process must be entirely
- Irreversible
  - Reversible
  - Adiabatic
  - none of the mentioned
- B. The work done by a closed system in a reversible process is always \_\_\_\_\_ that done in an irreversible process.
- less than or more than
  - equal to
  - less than
  - more than
- C. Equation of continuity comes from
- conservation of energy
  - conservation of mass
  - conservation of work
  - conservation of heat
- D. Irreversibility of a process may be due to
- lack of equilibrium during the process
  - involvement of dissipative effects
  - both of the mentioned
  - none of the mentioned
- E. Entropy is a
- path function; intensive property
  - path function, extensive property
  - point function, intensive property
  - point function, extensive property
- F. Which of the following is true?
- In a steady flow system, no work is done on the atmosphere
  - In case of unsteady flow system, the volume of the system changes
  - Both of the mentioned
  - None of the mentioned
- G. Which of the following is a property of a pure substance?
- It has constant chemical composition throughout its mass
  - It is a one-component system

- It may exist in one or more phases
  - all of the mentioned
- H. At NTP, the volume of a g mol of all gases is (in litres)
- 22.1
  - 22.2
  - 22.3
  - 22.4
- I. According to the Dalton's law of partial pressures, the total pressure of a mixture of ideal gases is equal to the
- difference of the highest and lowest pressure
  - product of the partial pressures
  - sum of the partial pressures
  - none of the mentioned
- J. What is the standard fixed point of thermometry?
- The ice point
  - The steam point
  - The triple point of water
  - None of the mentioned

## SECTION B (SUBJECTIVE TYPE QUESTIONS)

(5X5=25)

- The resistance of the windings in a certain motor is found to be 80 ohms at room temperature (25 °C). When operating at full load under steady state conditions, the motor is switched off and the resistance of the windings, immediately measured again, is found to be 93 ohms. The windings are made of copper whose resistance at temperature  $t$  °C is given by  $R_t = R_0 (1 + 0.00393 t)$  Where  $R_0$  is the resistance at 0 °C. Find the temperature attained by the coil during full load.
- What is an ideal gas? What is the difference between the universal gas constant and characteristic gas constant? What is the advantage of thermocouple in temperature measurement?
- What do you understand by path function and point function? What are exact and inexact differentials? Show that work is a path function, and not a property.