(05/25)

61511

Discipline Specific Courses (MD-DSC)

EXAMINATION

(For Batch 2024 & Onwards)

(Second Semester)

THERMAL PHYSICS

BSC/PHY/MD/2/DSC/103

Time : 2½ *Hours*   *Maximum Marks* : 50

Note :   Attempt *Four* questions in all. Q.No. **1** is compulsory. In addition to Q. No. **1** attempt three more questions selecting *one* question from each Unit.

(Compulsory Question)

1.   (a)   Give physical meaning of entropy of a system.   2

(b) What do you mean by state functions ? Explain with example. 2

(c) What are limitations of first law of thermodynamics ? 2

(d) Can the latent heat be zero ? If yes, under what conditions ? 2

Unit I

2. What is zeroth law of thermodynamics ? State and explain first law of thermodynamics. What is its significance ? Discuss its limitations also. Using first law of thermodynamics prove that : 14

$$C_P - C_V = R.$$

3. Derive expression for the work done during : 7+7=14

    (i) Isothermal process

    (ii) Adiabatic process.

Unit II

4. (a) Define Entropy. What is its Physical significance ? Derive expression for change in entropy of a perfect gas in terms of pressure and temperature. 10

    (b) One mole of a gas expands isothermally to twice its initial volume. Find the change in entropy. Given R = 8.31 J mol^{-1} K^{-1}. 4

5. (a) What are irreversible processes ? Give condition for a reversible process to take place. Prove that entropy increases in an irreversible process. 10

    (b) State third law of thermodynamics. Show how it leads to unattainability of absolute zero. 4

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Unit III

6. Using Maxwell's Thermo dynamical relations, derive relationship between two molar specific heats for both the perfect and real gases. 14

7. Explain the following thermodynamical functions : 14

    (i)   Internal Energy (U)

    (ii) Helmholtz function (F)

    (iii) Enthalpy (H)

    (iv) Gibbs' free energy (G).

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