(c) Show that entropy increases in a natural process.

(d) Discuss triple point and phase diagram in brief. (2 each)

8. What is adiabatic demagnetisation ? Deduce thermodynamic expression for cooling produced by adiabatic demagnetisation of a paramagnetic salt. How will you employ phenomena to produce very low temperature ? 1,4,3

B. Sc. 4th Semester (Hons) New Scheme

Examination, May–2016

PHYSICS

Paper–Phy–402

Thermal Physics

Time allowed : 3 hours] *[Maximum marks : 40*

*Note : Attempt **five** questions in all, selecting at least **two** questions from each unit.*

Unit–I

1. (a) What is the physical significance of the thermodynamical relation $S = K \log W + C$ 2 each

(b) What are the limitations of second Law of thermodynamics

(c) The entropy of a substance is a measure of the degree of disorder prevailing its molecules. Comment.

(d) If ds is change in entropy of thermodynamical system, it is found $ds > 0$ for irreversible process and $ds < 0$ for reversible process. Justify this conclusion with all arguments in support of it.

2. (a) Give full description of thermodynamical scale of temperature. 4

(b) Find the increase in entropy when 10 gm of ice at 0°C melts and produces water at the same temp, given that the latent heat of fusion of ice is 80 cal/gm. 4

3. (a) What is temperature-entropy diagram ? Represent the Carnot's cycle on a temperature-entropy diagram. Show in it the area representing heat rejected to the sink. 4

(b) One of the most efficient engine ever developed operates between 2400 K and 600 K, Its actual efficiency is 50%. What % age of its maximum possible efficiency is this. 4

4. (a) State zeroth law of thermodynamics and explain its significance. On the basis of this law introduce the concept of temperature 2,3

(b) Explain the terms adiabatic and isothermal changes. (1 ½ each)

Unit–II

5. (a) Using Maxwell's relation, prove that for any substance the ratio of adiabatic and isothermal elasticities is equal to the ratio of the two specific heats. 4

(b) Deduce the Clapeyron's latent heat equation from Maxwell's thermodynamical relations. 4

6. (a) Define Helmholtz and Gibb's functions and obtain a relation between them. What is the significance of these functions ? 4

(b) Calculate the specific heat of saturated steam at 100°C from the following data–L at 90°= 545.26 cal., L at 100°C = 539.30 cal., L at 110°C = 533.17 cal., specific heat of water at 100°C = 1.013 cal/g. 4

7. (a) What do you understand by internal energy of a thermodynamical system

(b) Why does boiling point of water rise when boiled in a pressure cooker.