Mid-West University

Examinations Management Office

Birendranagar, Surkhet

End Semester (Alternative/Physical) Examinations -2078

Bachelor level/ B.Sc / 2nd Semester — Full Marks : 60
Time: 3hrs — Pass Marks : 30
Subject : Thermal Physics (PHY321)

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks

Attempt all questions **(6x10=60)**

1. a) What are thermodynamic potentials? Deduce Helmholtz and Gibb's Potentials.
   b) Explain the working of thermoelectric thermometer with suitable diagram.
2. a) Explain the theory of Joule Thomson regenerative cooling . How can you obtain liquid helium by its application?
   b) Discuss Brownian motion. Describe how the experimental study of this motion yielded the value of Avogadro's number.
3. a) State and proof Carnot's theorem.
   b) State and explain the principle of increase of entropy.

OR

   a) State and prove Boltzmann's canonical distribution law and give some of its applications.
   b) Explain phase space. What is the minimum size of phase cell? What is the propose of dividing of phase into phase cells?
4. a) Explain the Clausius-Clapeyron equation with its significance.
   b) Show that temperature of inversion, $T_i = \frac{2a}{Rb}$. Where symbols are there usual meanings.
5. a) A body of mass 10gm is kept in an enclosure of temperature 27^0C. If the temperature of the body is 127^0C ,its specific heat is 0.1kilocalorie per kg per degree C and area of emitting surface of the boy is 10^{-3} m^2 , find out the rate of cooling of the body .[$\sigma = 5.72 \times 10^{-8}$ $jm^2s^{-1}C^{-4}$]
   b) A monoatomic ideal gas initially at 27^oC is suddenly compressed to one tenth of its original volume. Calculate its temperature afte compression. Make the same calculation for a diatomic gas like oxygen.

OR

   a) Calculate the depression of the melting point of ice (L = 80cal) per atmospheric increase in pressure, if ratio of densities of ice and water at 0^oC is 10/11.
   b) From Planck's law deduce the value of ν corresponding to peak of $E_\nu - \nu$ curve at 1000k. In what spectral region does this frequency lie?
6. a) Derive an expression for the Maxwell-Boltzmann law of particles for the distribution of their velocities.
   b) What is Joule Thomson effect? Describe the porous plug experiment and explain its results.

THE END