ASSIGNMENT-II

NORTH GAUHATI COLLEGE

Department of Physics

3rd Semester HC (CBCS)

Paper code: PHY-HC-3026, Thermal Physics (Kinetic Theory of Gases)

Total Marks: 20

(The figures in the margin indicate the full marks for the questions)

1. Write the virial equation of state of a real gas. 1
2. Draw Andrew's curve for CO_2 at different temperatures and explain them. 3
3. The mean free path of the molecules of a gas is 2×10^{-7} m at a pressure P and temperature is 200 K. Calculate its value at (i) P, 400 K, (ii) 2P, 200 K, (iii) $\frac{1}{2}$ P, 400 K. 3
4. Deduce Van der Waals equation of state for a real gas and discuss the nature of Van der Waals forces. Also compare it with experimental P-V curves. 4
5. Define Joule-Thomson effect. Explain why hydrogen and helium show heating effect at ordinary temperature while other gases do not. 4
6. The number of molecules in energy range ϵ and $\epsilon + d\epsilon$ is given by

$$n(\epsilon)d\epsilon = 2\pi N\left(\frac{1}{\pi kT}\right)^{3/2} \epsilon^{1/2}\, e^{-\epsilon/kT} d\epsilon$$

Deduce the expression for

   a) The most probable energy.
   b) The number of molecules containing most probable energy.
   c) The probability at the most probable energy.
   d) The mean energy. 5

Nota Bene:

- Write your answers in A4 paper sheet mentioning clearly **your name, GU roll number, registration number, paper code etc.** at the front page of your answer sheet.
- You have to make a single PDF file of your answer sheets.
- You need to submit your respective PDF at the online portal of our college website or at the mail id: ngcphysicsdept@gmail.com.
- The submission due date is on or before 11th August, 2021.