

# Government General Degree College, Chapra

Internal Assessment- 3<sup>rd</sup> Semester, 2023-24

Physics- General

Paper: PHY-G-CC-T-03

Total Marks: 15

Time: 40 minutes

## Answer any three questions only:

1. Write down the second law of thermodynamics. State the difference between isothermal change and adiabatic change. Does the gas work in case of adiabatic expansion? If so, what is its source? 1+2+1+1
2. Define Thermal Conductivity and Thermometric conductivity. What will be the change in entropy if 5g of ice at 0°C is converted completely into water at 0°C? (Latent heat of fusion 80 cal/g). 2+3
3. What is meant by internal energy of a gas? Is this a state function? Under what conditions a process will be reversible? When will the efficiency of Carnot Engine be 100%? 1+ 1+1+2
4. Define entropy. What is its physical significance? A Carnot's engine works between two sources at 127 °C and 27 °C. In a complete cycle it rejects 1260 Joule of heat. How much work is obtained in complete cycle? 1+1+3
5. Define average velocity and r.m.s velocity of gas molecules. Keeping pressure unchanged, at what temperature the r.m.s. speed of nitrogen will be double of its r.m.s. speed at N.T.P.? 2+3
6. State the principal of equipartition of energy. Define degrees of freedom. For a diatomic gas, how many transitional degrees of freedom are there? What is Boyel temperature? 2+2+1
7. Prove that the ratio of two specific heats of a gas is  $\gamma = 1 + \frac{2}{n}$ , where n is the number of degrees of freedom. Explain, how water remains under ice slab in polar region. 3+2
8. What is a perfect black body? Draw the energy distribution curve of black body radiation for two different temperatures. Draw Fermi-Dirac distribution function at temperature T = 0K and T ≠ 0K. What do you mean by phase-space? 1+1+2+1
9. Show that  $C_p - C_v = \left[ P + \left( \frac{\partial U}{\partial V} \right)_T \right] \left( \frac{\partial V}{\partial T} \right)_P$ . 5
10. Write Stefan's law related to radiation. How Newton's law of cooling is obtained from it? Write down Planck's law of black body radiation. 2+2+1