# University of Information Technology & Sciences (UITS)

## Faculty of Science & Engineering

## Department of CSE

### Term Final Examination, Autumn – 2023

### Course Title: Engineering Physics

### Course Code: PHY -175

**Marks: 50** **Time: 3 Hours**

(Answer any *five* out of *Six* questions)

1. (a) Write down the fundamental postulates of kinetic theory of gases. [3]

   (b) Obtain an expression for pressure exerted by the gas molecule in a vessel and hence show that kinetic energy per unit volume of the gas is $\frac{1}{2}\rho c^2$ [5]

   (c) Calculate the mean free path of a gas molecule, given that the molecular radius is $2.0\times10^{-10}$ m and the number of molecule per cc is $3.0\times10^{19}$. [2]

2. (a) State and explain first law of Thermodynamics. [2]

   (b) Prove that $PV^{\gamma}$ = constant. ( Symbols have their usual meaning ). [5]

   (c) Show that the slope of an adiabatic curve is $\gamma$ times that of the isothermal. [3]

3. (a) Explain Maxwell's law of equipartition of energy. [2]

   (b) Derive an expression for work done by a working substance in a complete Carnot's cycle. [6]

   (c) A Carnot's engine whose low temperature reservoir is at 7 °C has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees should the temperature of the high temperature reservoir be increased? [2]

4. (a) What are coherent sources? Explain the importance of such sources in interference phenomenon. [3]

   (b) Show that the intensity distribution due to interference of plane monochromatic light waves coming from two sources of equal intensity is given by $I = 4a^2\cos^2\frac{\delta}{2}$ and hence explain energy distribution diagram for maximum and minimum intensities. [7]

5. (a) What is meant by diffraction of light? [3]

   (b) Explain how Fraunhofer diffraction patterns are obtained with the help of a single slit? [7]

6. (a) What do you mean by angle of polarization? [2]

   (b) State and explain Brewster's law. Prove that the reflected and refracted rays are perpendicular to each other when light is reflected at the polarizing angle. [5]

   (c) The refractive index of plastic is 1.25. Calculate the angle of refraction for a ray of light incident at the polarizing angle. [3]