

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034****B.Sc. DEGREE EXAMINATION – PHYSICS****SECOND SEMESTER – APRIL 2023****PH 2505 – MECHANICS & STATISTICAL PHYSICS**

Date: 10-05-2023

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

PART – A**(10 x 2 = 20 Marks)**

Q. No.	Answer ALL questions
1	State Graham's law for diffusion of gases.
2	What are generalized coordinates?
3	State Fick's law.
4	Define Phase space.
5	Explain the effect of temperature on thermal conductivity of a gas.
6	Define mean free path.
7	Differentiate between intensive and extensive variables.
8	Define entropy.
9	What is the advantage of phase space over configuration space?
10	Mention any two limitations of Maxwell Boltzmann statistics.

PART – B**(4 x 7.5 = 30 Marks)****Answer any FOUR questions**

11	Derive an expression for the time period of oscillation of a compound pendulum and show that points of suspension and oscillations are interchangeable.
12	Discuss the application of Lagrange's equation to a bead sliding on a uniform rotating wire.
13	Derive Clausius' expression for mean free path. Also show that the mean free path varies directly with the absolute temperature.
14	With a neat diagram, explain in detail the Clausius inequality.
15	What is meant by Doppler broadening of spectral lines? Obtain an expression for the wavelength shift.
16	Derive the Gibbs-Helmholtz equation for the E.M.F of a reversible cell.

PART – C**(4 x 12.5 = 50 Marks)****Answer any FOUR questions**

17	State and prove Bernoulli's theorem.
18	Derive an expression for the time period of bifilar pendulum suspended by equal and parallel strings.
19	Explain second order phase transition and hence derive the Ehrenfest's equations.
20	What are transport phenomena? Explain in detail, viscosity and self diffusion on the basis of kinetic theory of gases.
21	Deduce the general form of Maxwell-Boltzmann energy distribution law.
22	Derive Lagrange's equation using D'Alembert's principle.

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