

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

SECOND SEMESTER – NOVEMBER 2015

PH 2505 - MECHANICS & STATISTICAL PHYSICS

Date : 04/09/2015

Dept. No.

Max. : 100 Marks

Time : 01:00-04:00

PART – A

Answer ALL questions:

(10x2=20)

1. State the law of conservation of angular momentum. Give example.
2. Water flowing with a velocity of 3 m/s in a 4 cm diameter pipe enters a narrow pipe having a diameter of only 2 cm. Calculate the velocity in the narrow pipe.
3. What are generalized co-ordinates?
4. What is meant by phase space?
5. What is the molecular weight of a gas which diffuses 1/50 as fast as hydrogen?
6. Explain the variation of mean free path with temperature.
7. State Joule Thomson cooling effect.
8. What is first order phase transition? Give example.
9. State the limitation of Maxwell-Boltzmann statistics.
10. What is momentum space and phase space?

PART – B

Answer ANY FOUR questions:

(4x7.5=30)

11. Explain the method of using a compound pendulum to determine the acceleration due to gravity in the laboratory.
12. State and explain D'Alembert's principle.
13. Derive the Clausius expression for mean free path on the basis of kinetic theory of gases.
14. Derive Clausius Clapeyron's latent heat equation and discuss the effect of pressure on the boiling and melting point of matter.
15. Define entropy and probability. Show that the entropy of the system is proportional to the logarithm of probability of that system.
16. Write the theory of Venturimeter and derive an expression for the rate of flow of a liquid through a pipeline.

PART – C

Answer ANY FOUR questions:

(4X12.5=50)

17. State and prove Bernoulli's theorem.
18. State Lagrange's equations of motion in generalized coordinates. Apply them to the Atwood's machine to find the acceleration of the system.
19. Show that the co-efficient of thermal conductivity of the gas is proportional to the square root of absolute temperature.
20. Derive Clausius inequality.
21. State and explain Maxwell-Boltzmann energy distribution law. Derive an expression for the total internal energy and specific heat at constant volume for an ideal gas.
22. Derive an expression for time period of oscillation of a bifilar pendulum with non parallel threads.

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