

Physics (Hons.) Paper-II

Answer five questions in all, selecting two questions each from Group-A and Group-B, Q.No. 1 is compulsory.

1. Answer any three of the following :

- (a) Explain degrees of freedom and state the law of equipartition of energy.
- (b) State and explain the Zeroth Law of thermodynamics.
- (c) Explain why gases have two specific heats. Why is the specific heat at constant pressure greater than that at constant volume ?
- (d) What is Coulomb's Law of electrostatics ? Express the unit and dimension of permittivity.
- (e) Two parallel wires carrying current in the same direction are separated by a finite distance. Will they repel or attract each other ? How do you get definition of Ampere from here ?
- (f) What is meant by a B-H curve ? Give an account for energy loss in hysteresis.

Group-A

Answer any two questions :

2. What do you mean by Transport Phenomena ? On the basis of Kinetic theory of gases derive an expression for the viscosity of a gas.
3. Deduce van der Waals equation of state. Discuss the critical constants of a gas.
4. Define Thermal Conductivity. Discuss the Fourier's equation of rectilinear flow of heat.
5. Give a brief account of thermodynamical functions and deduce Maxwell's thermodynamic realtions.

Group-B

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Answer any two questions :

6. Deduce Laplace's equation and give one of its application.
7. What is a Quadrupole ? Calculate the potential and intensity at a point due to a linear quadrupole.
8. Derive an expression for the magnetic field B at the centre of a circular coil carrying current. Find the magnetic dipole moment of a magnet placed at the centre of coil and producing an equivalent magnetic field.
9. What is a Magnetic Circuit ? Establish its analogy with an electric circuit. Use the concept to obtain the magnetic flux in the air gap of an electromagnet.