HG(I) — Phy (2)

2020

Time : 3 hours

Full Marks : 75

Pass Marks : 34

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer five questions selecting two from each Group in which Q. No. 1 is compulsory.

1. Give an account of any **three** of the following :

$$5 \times 3 = 15$$

   (a) What is meant by electric field intensity and potential ? Establish the relation $dv = -\vec{E} \cdot \vec{dv}$.

   (b) What is meant by mean free path of the molecules of a gas ? How mean free path depends upon the diameter of gas molecules ?

BQ – 6/1   (Turn over)

   (c) State Ampere's circuit law and deduce it from Biot-Savart-Laplace law.

   (d) Distinguish between isothermal and adiabatic processes. Deduce adiabatic relation between P, V and T for ideal gas.

   (e) What is electromagnetic induction ? State and explain Faraday's law of electromagnetic induction.

   (f) What is black body radiation ? Explain the terms emissive and absorptive powers.

Group – A

2. Obtain Maxwell's law of distribution of velocity for the molecules of gas within velocity range C and C + dc. https://www.lnmuonline.com   15

3. Define thermal conductivity and electrical conductivity. Obtain Weidman-Franz law for the thermal and electrical conductivity of metal.   15

4. On the basis of thermodynamic considerations, explain Stefan-Boltzmann law of radiation.   15

BQ – 6/1   (2)   Contd.

5. What is Joule-Thomson effect ? Obtain thermodynamically an expression for Joule-Thomson Cooling.   15

Group — B

6. What do you understand by Dielectric Polarization and Electric Displacement Vector ? Show that $\vec{D} = \vec{E} + 4\pi\vec{P}$, where the symbols have their usual meanings.   15

7. Explain Biot-Savart Law. With its help derive an expression for the magnetic field at any point on the axis of a current carrying circular loop.   15

8. What is Laplace's equation ? Give the solutions of this equation in Cartesian Coordinates.   15

9. Discuss the boundary conditions at the surface of separation of the two dielectrics and hence explain the refraction of lines of force.   15

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BQ – 6/1 (11,000)   (3)   HG(I) — Phy (2)