Answer five questions. Group-A is compulsory, selecting two each from Group-B and Group-C.

Group-A

1. Choose the correct answer from the given alternatives :

(a) The mean translational K.E. per molecule of an ideal gas is :

(i) KT (ii) $\frac{1}{2}$ KT (iii) $\frac{3}{2}$ KT (iv) $\frac{2}{3}$ KT

(b) The angular momentum of the electron in hydrogen atom is :

(i) $\frac{h}{4\pi}$ (ii) $\frac{h}{2\pi}$ (iii) $\frac{2\pi}{h}$ (iv) $\frac{h}{\pi}$

(c) Gyromagnetic ratio for electron is :

(i) $\frac{e}{m}$ (ii) $\frac{m}{e}$ (iii) $\frac{2m}{e}$ (iv) $\frac{e}{2m}$

(d) The Dimension of Electric Potential are the same as that of :

(i) Work (ii) Power
(iii) Electric field per unit charge (iv) Work per unit charge

(e) When a current is passed through a junction of two dissimilar metal, heat is evolved or absorbed at the junction. This process is called :

(i) Seebeck effect (ii) Peltier effect
(iii) Joule effect (iv) Thomson's effect

(f) The most suitable metal for making transformation core is :

(i) Steel (ii) Iron (iii) Copper (iv) Aluminium

(g) In a pure LC circuit, the energy stored when Peak current I_0 is :

(i) LI_o^2 (ii) $\frac{1}{2} LI_o^2$ (iii) $\frac{1}{2}\frac{i_o^2}{L}$ (iv) $\frac{1}{2} L^2 I_o$

(h) In ac circuit, the rms value of current I_{rms} is related to peak value of current I_0 by the relation :

(i) $I_{rms} = \sqrt{2}\, I_o$ (ii) $I_{rms} = \frac{I_o}{\pi}$ (iii) $I_{rms} = \frac{I_o}{\sqrt{2}}$ (iv) $I_{rms} = \pi I_o$

(i) Which of the following does not support the wave nature of light ?

(i) Interference (ii) Diffraction
(iii) Polarization (iv) Photoelectric effect

(j) When an electron in an atom jumps 1st orbital to 3rd orbital, then it will :

(i) Absorb energy (ii) Release energy
(iii) No gain of energy (iv) None of these

Group-B

2. Define electrical image. A point charge q is placed at a diatance 'd' from an earthed conducting infinite plane. Find the electrical intensity and density of induced charged at any point on the conductor.
3. What is Magnetic Shell ? Deduce an expression for potential and intensity of magnetic field at a point on the axis of a circular magnetic shell.
4. What is reactance of the a.c. circuit ? Deduce an expresson for current in an a.c. circuit containing Capacitance and Resistance in series.
5. Describe, with thery, Anderson's Bridge method for the determination of self inductance of a coil.
6. What is Radioactivity ? Explain Rutherford-Soddy theory of radioactive disintegration.

Group-C

7. Define Resolving Power. Obtain an expression for resolving power of microscope.
8. Describe Bohr's thery of hydrogen for atom.
9. Explain the production and detection of plane, circularly and elliptically polarised light.
10. Write notes on any two of the following : (a) X-ray Absorption Spectra (b) Ruby Laser (c) Nicol's Prism (d) Fermat's Principle