Physics (Sub./Gen.)

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

Group-A

1. Choose the correct option in each of the following :

(a) The relative permeability (μr) in a paramagnetic material is characerised by :
(i) $\mu_r > 1$ (ii) $\mu_r = 1$ (iii) $\mu_r < 1$ (iv) None of these

(b) The relation between $\vec{E}$ and $\vec{H}$ of an electromagnetic wave propagating through a medium of permeability and permitivity is :
(i) $\varepsilon \vec{E} = \mu \vec{H}$ (ii) $\varepsilon \vec{H} = \mu \vec{E}$
(iii) $\sqrt{\varepsilon}\ \vec{E} = \sqrt{\mu}\ \vec{H}$ (iv) $\sqrt{\mu}\ \vec{E} = \sqrt{\varepsilon}\ \vec{H}$

(c) The magnetomotive force (mmf) in a magnetic circuit having reluctance R and magnetic flux is given by :
(i) $\text{mmf} = \frac{\Phi_B}{R}$ (ii) $\text{mmf} = \frac{R}{\Phi_B}$ (iii) $\text{mmf} = R\Phi_B$ (iv) $\text{mmf} = \sqrt{R\Phi_B}$

(d) The optical path of a ray of light of length l in a medium of refractive index is defined as :
(i) μl (ii) μ / l (iii) l/μ (iv) $\mu^2 l$

(e) Newton's rings are :
(i) Fringes of equal thickness (ii) Fringes of equal inclination
(iii) Both of these (iv) None of these

(f) Which one of the following is different from others ?
(i) X-rays (ii) β-rays (iii) γ–rays (iv) Infrared rays

(g) Gyromagnetic ratio for electron is :
(i) e/m (ii) m/e (iii) 2m/e (iv) e/2 m

(h) Wattless current is :
(i) An imagination (ii) Found in d.c.
(iii) Found in a.c. (iv) Found both in a.c. and d.c.

(i) In a transformer the core is laminated to reduce :
(i) Hysteresis loss (ii) Eddy current loss (iii) Copper loss (iv) Loss of flex density

(j) Laser is a beam of :
(i) X-rays (ii) Coherent light (iii) Microwaves (iv) Intense white light

Group-B

2. Discuss boundary condition at the surface of separation of two dielectrics and hence explain the phenomenon of refaction of electric lines of force.
3. Describe Weiss theory of ferro-magnetic and obtain Curie-Weiss law.
4. Explain Pelitier and Thomson coefficients. Apply thermodynamics to obtain relations for these coeffcients.
5. Give the construction and working of a G.M. Counter.

Group-C

6. Describe, with necessary theory, Newton's ring method for the determination of wavelength of monochromatic light.
7. Give the construction and theory of plane transmission grating. How is ths grating used to determine the wavelength of light ?
8. Establish Maxwell's equations for electromagnetic wave in free space.
9. Write notes on any two of the following :
(a) Resolving power of a Microscope (b) Ruby Laser
(c) Mosley's law (d) Babinet compensator