

Roll No.

Total Pages : 3

BT-3/D-21

43137

OPTICS AND WAVES

Paper-BS-201A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions in all, selecting atleast *one* question from each section.

SECTION-I

1. (a) Derive the differential equation of one dimensional wave considering the transverse vibration in a stretched string. (8)
- (b) Derive the equations of electromagnetic waves propagation through free space and deduce important properties of EM wave propagation in free space. (7)
2. (a) Formulate Schrodinger's time dependent equation starting from a plane wave equation by using de Broglie's formula and Einstein's relation for photon energy. (8)
- (b) Define D, E and P and establish relation between them. What do you mean by dielectric and dielectric polarization? (7)

SECTION-II

3. (a) Explain Fresnel's Biprism and give its application. (8)
- (b) Derive the expression for the diameter of the n th dark ring in Newton's ring interference pattern. With necessary equations explain briefly the experimental procedure to determine the refractive index of a liquid. (7)
4. (a) With the help of a diagram highlight the functioning of Michelson Interferometer and give its applications. (8)
- (b) Explain the Young's double slit experiment in detail. (7)

SECTION-III

5. (a) A paramagnetic material has a magnetic field intensity of 10^4 A/m. If the Susceptibility of the material, at room temperature is 3.7×10^{-3} , calculate the magnetization and flux density of the material. (8)
- (b) Discuss Fraunhofer's diffraction at a double slit with neat diagram. What is the effect of increasing the (i) slit width, (ii) slit separation? (7)
6. (a) Define Specific rotation. Describe the construction and working of a Laurent's half shade polarimeter. (8)
- (b) Explain in detail double refraction. Discuss the functioning of Nicol Prism. (7)

SECTION-IV

7. (a) Explain the working of Ruby laser with proper energy level diagram. (8)
- (b) Explain the construction and working of CO₂ laser. (7)
8. Explain the following in detail :
- (a) Einstein's Coefficients. (8)
- (b) Semiconductor Laser. (7)

