Roll No.

Total Pages : 3

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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

- (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)

- (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.
 - (b) Define D, E and P and establish relation between them.
 What do you mean by dielectric and dielectric polarization? (7)

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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)

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SECTION-IV

- (a) Explain the working of Ruby laser with proper energy level diagram.
 - (b) Explain the construction and working of CO_2 laser.

(7)

- 8. Explain the following in detail :
 - (a) Einstein's Coefficients. (8)
 - (b) Semiconductor Laser. (7)

