



- 2 (a) Explain different types of optical fibers with proper diagrams. 8  
 (b) State advantages and disadvantages of optical fibers. 4
- 3 (a) Describe the phenomenon of Fraunhofer diffraction due to a single slit and derive expressions for the positions of maxima and minima. 8  
 (b) In Fraunhofer diffraction, a slit of width  $2.51 \times 10^{-4}$  cm is illuminated by light of wavelength  $\lambda$ . If the first minimum falls at an angle  $\theta = 15^\circ$ , calculate the wavelength  $\lambda$ . 4

OR

- 3 (a) Explain how plane polarized light is obtained by a crystal. State and derive Malu's law. 8  
 (b) Explain optical activity. 4
- 4 (a) Explain spontaneous and stimulated emission. Discuss the main components of laser with proper diagrams. 8  
 (b) State applications of lasers. 4

OR

- 4 (a) Explain Compton effect and derive an expression for the change in wavelength ( $\Delta \lambda$ ). 8  
 (b) Calculate the energy difference between the two energy levels of Neon atom if the transition between these two levels results in the emission of light of wavelength

$$\lambda = 6328 \text{ \AA} .$$

$$(h = 6.632 \times 10^{-34} \text{ J.S; } C = 3 \times 10^8 \text{ m/s})$$

- 5 Write short notes on any **three** of the following : 12  
 (i) Plasma skinning  
 (ii) Physics of Alveoli  
 (iii) Convective transport of gases.  
 (iv) Infrared spectroscopy and its applications.  
 (v) Poiseuille's formula.
- 6 Write short notes on any **three** of the following : 12  
 (i) Resolving power of eye.  
 (ii) Chromatic aberration  
 (iii) Doppler effect  
 (iv) Polarization and vision  
 (v) Wave nature of light.