Roll No. ...5610230...... Total Pages : 03

BT-1/D-13 **8102**

PHYSICS-I

PHY-101-E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) Describe the construction and working of Michelson's interferometer. How can this interferometer be used to measure the wavelength of light ? 12

   (b) What do you understand by double refraction phenomena ? 8

2. (a) Derive an expression for dispersive power of diffraction grating. 10

   (b) Describe the construction and working of Laurent half-shade polarimeter. 10

Unit II

3. (a) What do you understand by stimulated absorption, spontaneous emission and stimulated emission ? 10

   (b) Explain Semiconductor Laser. 10

4. (a) Explain the terms :

   Critical angle, Acceptance angle and Numerical aperture. 10

   (b) Discuss in detail the various modes in Optical Fibre. 10

Unit III

5. (a) State and prove Gauss's law. 10

   (b) What is equation of continuity ? 5

   (c) Write a note on co-axial cable. 5

6. (a) Derive an expression for energy stored in dielectric in electromagnetic field. 10

   (b) Show that $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$, where the symbols have their usual meanings. 10

Unit IV

7. (a) Derive an expression for variation of mass with velocity. **10**

   (b) Apply Lorentz transformations to derive expression for length contraction and time dilation. **10**

8. (a) Explain Neutron cross-section. **10**

   (b) Describe the construction and working of Scintillation Counter. **10**