

Roll No.

1983

B. E. (1st Semester)

Examination – December, 2012

PHYSICS – I

Paper : Phy-101-E

Time : Three hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all selecting at least *two* questions from each Part. All questions carry equal marks.

PART – A

1. (a) Discuss the formation of Newton's Rings by reflected light and explain why the central spot is dark. Find the radius of n th bright ring. How Newton's Rings can be used to determine the wavelength of sodium light. 15

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- (b) The movable mirror of Michelson's interferometer is moved through a distance 0.02603 mm. Find the number of fringes shifted across the cross-wire of eye piece of the telescope, if the wavelength of 5206 Å is used. 5
2. (a) Distinguish between dispersive and resolving power of an optical instrument. Using the Rayleigh's criterion for just resolution, find the resolving power of a plane transmission grating. 10
- (b) Discuss the Fraunhofer diffraction due to a single slit and show that the relative intensities of the maxima are in the ratio $1 : 4/9\pi^2 : 4/25\pi^2$. 10
3. (a) Explain the phenomenon of double refraction. Describe the construction and working of Nicol prism to show how it uses the phenomenon of double refraction to produce a plane polarized light. 10
- (b) What is specific rotation? Describe the construction and working of Laurent's half shade polarimeter. 10

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4. (a) What do you mean by population inversion?

Describing the construction and working of He-Ne laser explain how population inversion is achieved in it. 10

(b) Discuss the propagation of light waves through an optical fibre. Obtain an expression for acceptance angle and the Numerical Aperture of an optical fibre. 10

PART – B

5. (a) Define damped harmonic oscillations. Derive an expression for the average total energy and average power dissipation in case of damped harmonic oscillator. 10

(b) Write down Maxwell's equations for electromagnetic fields and obtain the wave equation in free space. Discuss the concept of Poynting vector. 10

6. (a) State and prove Gauss law in dielectrics. Deduce an expression for energy stored in dielectric in an electrostatic field. 14

(b) Define D, P and E vectors in dielectric and find the relation between them. 6

7. (a) Describe Michelson's experiment and explain the physical significance of negative results. 10
- (b) Derive an expression for the dependence of relativistic mass on its velocity. 10
8. (a) Explain the principle, construction and working of Geiger Muller (GM) counter. 15
- (b) Distinguish between cloud chamber and bubble chamber. 5