B.E./B.Tech. 1st Semester Examination,

December–2013

PHYSICS–I

Paper–Phy-101-E

Time allowed : 3 hours]   _[Maximum marks : 100_

_Note : Attempt five questions in all, selecting at least **two**
questions from each part._

Part–A

1. What do you understand by superposition principle and interference of light ? Explain with the help of a neat diagram the formation of Newton's ring by reflected light. Also, prove that the diameters of the dark rings are proportional to the square root of the natural number.   20

2. Distinguish between Fraunhofer and Fresnel type of diffraction. Discuss the phenomenon of Fraunhofer diffraction at a single slit and show that the relative intensities of the maxima are nearly in the ratio $1:4/9\pi^2 : 4/25\ \pi^2 : 4/49\ \pi^2$.   20

3. What is double refraction ? Describe the construction and working of Nicol prism. How it is used as analyser and polarizer ?   20

4. Discuss the essential requirement for producing laser action. Describe a He-Ne laser. 20

Part–B

5. Explain single mode and multimode fibers. Derive an expression for acceptance angle and numerical aperture in optical fiber. 20

6. Obtain an expression for local field in dielectric and thus find the Clausius-Mossotti relation. 20

7. Write short notes on the following :

    (a) Time dilation 4

    (b) Lorentz-Fitzgerld contraction 4

    (c) Mass-energy equivalence 4

    (d) Variation of mass with velocity 4

    (e) Lorentz transformation 4

8. Write short notes on the following :

    (a) Meissner effect 4

    (b) Critical current and critical field of a superconductor 4

    (c) Type I and Type II superconductors 4

    (d) Cooper pair 4

    (e) BCS theory of superconductivity 4