RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. SECOND SEMESTER (January – June), 2012

Mid-Semester Examination, March 2012

Date : 21/03/2012 **PHYSICS (General)**

Time : 11 am – 12 noon Paper : II Full Marks : 25

[Use separate Answer Books for each Section]

Section – I

Answer **any two** questions

1. a) Derive an expression for the longitudinal strain energy. [3]
   b) A one meter long wire of cross-section 2 mm^2 is stretched by a mass of 1 Kg. Find its strain energy. [$Y = 10^{10}\ Nm^{-2}$] [2]
2. Derive an expression for torsional rigidity of a twisted metal-wire. [5]
3. a) What is meant by coefficient of viscosity? [2]
   b) If two capillary tubes are subjected to same pressure difference, find the rate of volume of liquid flowing out through them.
   [The ratios of their radius = 1: 2 and length = 1: 4 respectively] [3]

Section – II

Answer **any two** questions

4. a) What do you mean by optical path ? [2]
   b) State and explain Fermat's principle. [3]
5. Define principal and secondary foci of a spherical surface. Write down the relation between them. [4+1]
6. a) What do you mean by the power of a lens ? [1]
   b) An object of height 6 cm is placed at 20 cm distance from a convex lens of 10 cm focal length. Find the height and position of the image. Also find the power of the lens. [1+3]

Section – III

Answer **any one** question

7. a) What do you mean by transient beats ? [1]
   b) Write down the equation of motion of a body which is set into oscillation in presence of damping. Show that displacement of the body gradually decreases with increase of time. [1+3]
8. a) What is resonance ? [1]
   b) Show that if two SHM of same angular frequency (ω_o) and same amplitude at right angles to each other having $\frac{\pi}{2}$ phase difference propagating in a medium, then the resultant motion is a uniform circular motion of same angular frequency. [4]