RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. FIRST SEMESTER (July – December) 2014

Mid-Semester Examination, September 2014

Date : 17/09/2014 **PHYSICS (General)**

Time : 12 noon – 1 pm Paper : I Full Marks : 25

[Use a separate answer book for each group]

[*Answer **five questions** taking at least **one** from each group*]

Group – A

1. a) Explain modulus of elasticity with an example and mention its dimension [2+1]
   b) A metal wire 2 meters long and 0·32 mm diameter is stretched with a load of 5 kg. Find the elongation of the wire. Given Young's modulus of the metal $Y = 2\times10^{11}\ \text{Nt/m}^2$, $g = 9{\cdot}81\text{m/s}^2$. [2]

2. a) What is called a beam? [1]
   b) Find out the expression for the depression of a beam supported at the ends and loaded at the middle point. [4]

3. a) State Newton's formula for flow of fluid over a solid surface and define coefficient of viscosity from the formula. [2+1]
   b) Define critical velocity of a flowing fluid and show relation with the Reynol's number. [1+1]

Group – B

4. a) State and explain Fermat's principle for the rectilinear propagation of light. [3]
   b) What is 'Optical Path' (with expression) [2]

5. What is Spherical aberration in a lens. (with diagram). Explain different methods for removal of spherical abberation in a lens. [2+3]

Group – C

6. a) Write down the differential equation of an S.H.M. [1]
   b) Show that the resultant of two S.H.M of the same period but of different amplitudes and plase in perpendicular directions is an elliptic motion.
   Also find the condition for which the path of motion will be a (i) circle and (ii) a st. line [2+2]

7. a) Set up the equation of (i) Damped vibration & (ii) forced vibration, mentioning the opposing forces. [2]
   b) A solid cubical block of edge 4cm and mas 48gms floats on a liquid of density one fourth of water. The block now is been slightly depressed vertically and released. Established the equation of motion of the block & find the period of scillation. [3]

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