

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. SECOND SEMESTER (January – June) 2013

Mid-Semester Examination, March 2013

Date : 05/03/2013

PHYSICS (General)

Time : 12 noon – 1 pm

Paper : II

Full Marks : 25

Answer five questions from Gr-A, Gr-B and Gr-C

Use three separate scripts, one for each group.

Group – A

Answer any one question.

1. What is rigidity modulus ? Deduce its relation with Young's modulus and Poisson ratio for a solid homogeneous body. 1+4
2. A solid cylinder of length L and radius R is fixed at its upper end and a twist is applied at the free end. Derive an expression for moment of the twisting couple on it. 5

Group-B

Answer any two questions.

3. What is optical path ? State Fermat's principle and hence prove the laws of refraction. 1+4
- 4.a) Find the ratio of two principal focal lengths of a spherical refracting surface separating two homogeneous media of refractive indices μ_1 and μ_2 . 2
- b) There is a sign of ink on the surface of a sphere of glass. If the sign is directly viewed from the opposite surface, find the position of the image. 3
5. Two convex lenses of focal lengths f_1 and f_2 are kept separated by a distance d on the common axis. Calculate the equivalent focal length of the system and its position from the first lens. 5

Group-C

Answer any two questions

- 6.a) Mention the characteristics of a simple harmonic motion. 2+1
- Give an example of this kind of motion.
- b) Define amplitude of oscillation and its time period. 1+1
7. Establish the differential equation of a simple harmonic motion from its definition and find out its solution. 2+3
- 8.a) Two SHMs with different amplitudes and phases, but with same time period act on a body collinearly. Find out the resultant SHM when the component motions are composed. If the phase difference of the component SHMs is 180° , what will be the resultant SHM ? 4+1