



EASTERN UNIVERSITY, SRI LANKA  
FIRST EXAMINATION IN SCIENCE – 2012/2013  
FIRST SEMESTER (PROPER/REPEAT)  
(JANUARY/FEBRUARY 2014)

PH 105 GENERAL PHYSICS

Time: 01 hour

Answer ALL Questions.

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Q1. Define the terms *elasticity*, *plasticity*, *stress*, and *strain* of an elastic material which is subjected to a force.

Defining the necessary parameters, show how Hooke's law can be deduced from the expressions of stress, and strain.

Sketch a typical graph of extension versus load for a stretched spring. Clearly indicate and briefly describe the following in the graph:

- i. validity region of Hooke's law
- ii. elastic limit and
- iii. plastic limit.

An elastic metal wire is found to be with 2.5 mm diameter and 2 m long. Upon applying a static force of 12 N to one end, it stretches by 0.3 mm. Determine the stress, strain and modulus of elasticity of the metal wire.

02. (a) Explain how *condensation* and *rarefaction* of air molecules can be associated with the formation of sound waves.

Assume that a sound wave travels in air with a frequency of 578.8 Hz. Determine the distance between a region of condensation and an adjacent region of rarefaction.

(b) Briefly describe the characteristics of standing sound waves. Obtain expressions for the wavelengths and frequencies of sound wave modes in a tube with both ends open, and one end closed.

A tube with a cap on one end, but open at the other end, produces a standing sound wave whose fundamental frequency is 130.8 Hz.

- i. if the cap is removed, what is the new fundamental frequency?
- ii. calculate the length of the tube?

Given that the speed of sound in air is  $343 \text{ ms}^{-1}$ .