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EASTERN UNIVERSITY, SRI LANKA

FIRST EXAMINATION IN SCIENCE – 2012/2013

FIRST SEMESTER (PROPER/REPEAT)

(FEBRUARY/MARCH 2015)

PH 105 GENERAL PHYSICS

Time: 01 hour

Answer ALL Questions.

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01. Define the terms *stress*, *strain*, and *Young's modulus* of a material.

State *Hooke's law* for an elastic material. Hence, identifying necessary parameters derive an expression for Young's modulus of the material.

A cylindrical copper wire and a cylindrical steel wire each of length 2 m and diameter 2 mm are joined at one end to form a composite wire of long 4 m. When the composite wire is loaded at its bottom as shown in figure 1, its length becomes 4.004 m. Young's modus for copper and steel are 1×10^{11} Nm^{-2} and 2×10^{11} Nm^{-2} respectively.

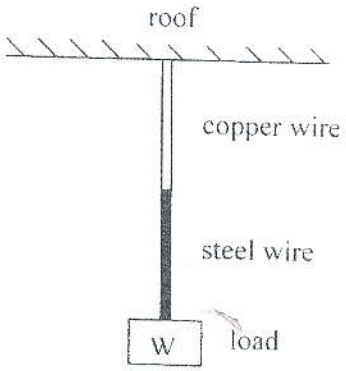

Figure 1

Calculate

i. the strain in the copper and steel wires and

ii. the magnitude of the load applied to the wire.

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02. Describe the difference between *latent heat of fusion* versus *latent heat of vaporization.*

Briefly describe the three principle physical mechanisms by which heat energy can be transported.

The phase diagram of temperature versus time in figure 2 refers to 1.1 kg of water electrically heated at a constant rate of 4000 W at atmospheric pressure.

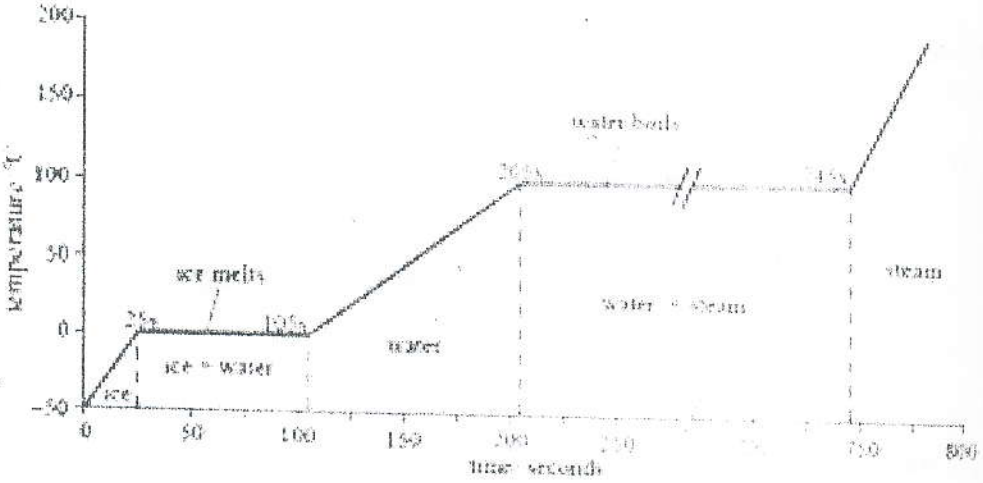

Figure 2

i. calculate the required energy in each state. State at least two assumptions you made in the calculations. The values in figure 2 and information given below may useful.

ii. calculate how much energy is required in total to change the ice at -50°C to steam at 100°C.

Given that

the specific heat for ice is 2100 J/(kg°C)

the specific heat for water is 4200 J/(kg°C)

the latent heat of fusion for ice is 3.34×10^5 J/kg

the latent heat of vaporization for water is 2.26×10^6 J/kg.