Worked Solutions for ENGAA Papers by Topic

Section 1

Topic: Materials

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ENGAA S1 2019 - Question 36

A light, vertical, copper wire of length 2.4 m and uniform cross-sectional area $2.0 \times 10^{-6} m^2$ 36 supports a load of mass 4.0 kg.

The Young modulus of copper is 1.2×10^{11} Pa.

What is the strain energy in the wire?

(gravitational field strength = 10 N kg^{-1} ; assume that the wire obeys Hooke's law and that the cross-sectional area remains constant)

- A 8.0 × 10^{−5} J
- 1.7 × 10⁻⁴ J в
- C 4.0 × 10⁻⁴ J
- **D** 8.0 × 10⁻³ J
- E 4.0 × 10⁻² J
- F 1.6 × 10^{−2} J

ENGAA S1 2019 - Question 36 - Worked Solution

SION $4 \times 10 \times 2.4$ x = $2 \times 10^{-6} \times 1.2 \times 10^{11}$ $x = 4 \times 10$ $\frac{1}{2}$ × 4 × 10 × 4 × 10⁻⁴ Strain energy : $E = \frac{1}{2}Fx =$ 8×10^{-3}

Answer is D

ENGAA S1 2016 - Question 24

24 Bronze is a mixture of tin and copper.

A particular sample of bronze contains 10% tin by volume. (In other words, 10% of the total volume of the sample is tin and 90% of it is copper.)

What percentage of the mass of the sample is tin?

(Density of tin = Y and density of copper = X.)

$$A \quad \frac{X}{9X-Y} \times 100$$

$$B \quad \frac{X}{9Y-X} \times 100$$

$$C \quad \frac{Y}{9X-Y} \times 100$$

$$D \quad \frac{Y}{9Y-X} \times 100$$

$$E \quad \frac{X}{9X+Y} \times 100$$

$$F \quad \frac{X}{9Y+X} \times 100$$

G
$$\frac{1}{9X+Y} \times 100$$

H $\frac{Y}{9Y+X} \times 100$

- Worked Solution

ENGAA S1 2016 - Question 24 - Worked Solution

Let the volume = V The mass of tin = 0.1VY = M_T The mass of copper = 0.9 VX = M_c The total mass = (0.1Y+0.9X)V = M $\frac{M_T}{M} = \frac{0.1YV}{(0.1Y + 0.9X)V}$ $\frac{M_T}{M} = \frac{Y}{Y + 9X} \times 100\%$

Answer is G