



SNS COLLEGE OF ENGINEERING

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AN AUTONOMOUS INSTITUTION



Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

UNIT – I PROPERTIES OF MATTER

TOPIC – IX PROBLEM DISCUSSION

1. Calculate the Poisson's ratio for the material.

given $Y = 12.25 \times 10^{10} \text{ Nm}^{-2}$ and $n = 4.55 \times 10^{10} \text{ Nm}^{-2}$.

Given data:

$$Y = 12.25 \times 10^{10} \text{ Nm}^{-2}$$

$$n = 4.55 \times 10^{10} \text{ Nm}^{-2}$$

Solution:

$$\text{We have } \sigma = (Y/2n) - 1$$

$$= \left(\frac{12.25 \times 10^{10}}{2(4.55 \times 10^{10})} \right) - 1$$

$$\sigma = 1.34615 - 1$$

$$\sigma = 0.34615$$

Poisson's ratio $\sigma = 0.34615$

2. Calculate the Young's modulus in the cantilever depression method used. The length of cantilever beam is 1 m which is suspended with a load of 150 gm. The depression is found to be 4 cm. The thickness of the beam is 5 mm and breadth of the beam is 3 cm.

Given data:

Length of cantilever beam = 1 m

Depression = 4 cm

Thickness of the beam = 5 mm

Breadth of the beam = 3 cm

Load = 150 gm

Solution:

$$Y = \frac{4gl^3}{bd^3} \left(\frac{M}{Y} \right)$$
$$= \frac{4 \times 9.8 \times 1^3 \times 150 \times 10^{-3}}{3 \times 10^{-2} \times (5 \times 10^{-3}) \times 4 \times 10^{-2}}$$
$$= \frac{5.88}{1.5 \times 10^{-10}} \text{ N m}^{-2}$$

Young's modulus = $3.92 \times 10^{10} \text{ Nm}^{-2}$