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AN AUTONOMOUS INSTITUTION

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

UNIT – I PROPERTIES OF MATTER

TOPIC – VI : Young's Modulus – Uniform Bending

Uniform Bending

The given beam is supported symmetrically on two knife edges A and b as shown in Fig. Two equal weight hangers are suspended so that their distances from the knife edge are equal. A pin is placed vertically at the centre of the beam and is fixed by wax.

Initial reading of the microscope in the vertical scale is noted. Equal weights are added to both hangers simultaneously and the reading of the microscope in the vertical scale is noted.

The experiment is repeated for decreasing order of magnitude of the equal masses.

The observations are then noted and mean elevation at the mid point of the bar is determined.

<i>Load 'm' in kg</i>	<i>Microscope Reading</i>			<i>Elevation 'y' for 'm' kg</i>
	<i>Loading</i>	<i>Unloading</i>	<i>Mean</i>	

The length of the bar between the knife edges 'l' is measured. The distance of the one of the weight hangers from the nearest knife edge a is measured. The breadth(b) and thickness(d) of the bar are measured by using vernier calipers and screw gauge.

Young's modulus of the beam is determined by the relation.

$$Y = \frac{3 Mg al^2}{2bd^3y} \text{ Nm}^{-2}$$

By knowing the mass (m), length (l), breadth (b) and thickness (d) of the beam and depression (y), the Young's modulus (Y) is determined.