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Paper BMT

Date: 23/06/2020

Q No :→ 1 A cord has original length of 100 cm is pulled by a force. The change in length of the cord is 2mm.
Determine the strain.

Ans No 1 :→

Known:
Original length (l_o) = 100 cm = 1m

The change in length (Δl) = 2mm
= 0.002m

Wanted: The strain

Solution:

$$\text{Strain} = \frac{\text{the change in length}(\Delta l)}{\text{Original length}(l_o)}$$

$$\text{Strain} = \frac{0.002\text{m}}{1\text{m}}$$

$$\text{Strain} = 0.002$$

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Q No :-> 2 (Part A)

Given Data

Applied Load = F = 10N

Rectangular Bar dimensions:

Hight = h = 8cm

h = 8 x 10^-2 m

Breadth = b = 15cm

b = 15 x 10^-2 m

Length = L = 30cm

L = 30 x 10^-2 m

Required:

Stress in the bar = Q = ?

Solution:

Formula:

Q = F/A

To find the stress first we will find the cross sectional area of the bar.

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Part (A)

Formula 2

A = b * h

= (8 x 10^-2 m) x (5 x 10^-2 m)

= 8 x 15 (10^-2)^2 m^2

= 120 x 10^-4 x m2

(B) Stress = σ = F/A

= 5 N / [120 x 10^-4 x m2]

= (5 x 10^4) N / 120 m2

= 416 N/m2

Answer

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Ans No 2:-> Part (B)

Given Data:

Applied Load = F = 10N

Rectangular Bar dimensions:

Height = h = 8cm

$h = 8 \times 10^{-2} m$

Breadth = b = 15 cm

$b = 15 \times 10^{-2} m$

Length = L = 30 cm

$L = 30 \times 10^{-2} m$

Required:

Stress in the bar = ?

Solution:

Formula:

$\sigma = F / A$

To find the Stress first we will find the cross Sectional area of the bar.

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Part (B)

Formula 2

$A = L \times b$

$= (30 \times 10^{-2} m) \times (15 \times 10^{-2} m)$

$= 30 \times 15 \ (10^{-2})^{2} \times m^{2}$

$= 450 \times 10^{-4} \ m^2$

Stress = $q = F / A$

$= 10 N$

$[450 \times 10^{-4} \times m^{2}]$

$= \frac{(10 \times 10^{4}) N}{450 m^2}$

$= 222.22 \ N/m^2$

Answer

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Q No :-> 3 part (A)

Principle of momentum.

The law of momentum conservation can be stated as follows. For a collision occuring between object 1 and object 2 in an isolated system, the total momentum of the two objects before the collision is equal to the ~~total~~ total momentum of the two objects after the collision.

Momentum of Seesaw

A seesaw is released from rest at the position shown in fig. The weight at B half the weight at D. Using Conservation of moment of momentum with respect to the function point A, derive a different equation that governs

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Part (A)

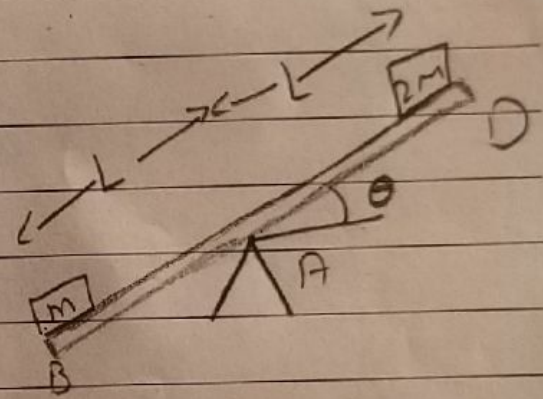
the time course of the orientation of the seesaw until D hits the ground.

Assume that the seesaw itself is weightless. Masses m and 2m are fixed to the seesaw.

Answer: $\alpha = (g/3L)\cos\theta$

FIGURE

A seesaw held at rest is released at time $t = 0$ with two weights acting on opposite sides. The seesaw itself is assumed weightless.



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Ans No: 8 Part (B)

Equilibrium:

Stable or unstable with proper Examples.

Equilibrium is a state of a system which does not change.

If the dynamics of a system is described by a differential equation (or a system of differential equations) then equilibria can be estimated by setting a derivative (all derivatives) to zero.

Example:

Logistic model

$$\frac{dN}{dt} = r_0 N\left(1 - \frac{N}{K}\right)$$

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Part (B)

To find equilibria we have to solve the equation:
$dN/dt = 0$:

This equation has two roots: $N=0$ and $N=K$. An equilibrium may be stable or unstable.

For example, the equilibrium of a pencil standing on its tip is unstable; The equilibrium of a picture on the wall is (usually) stable.

An equilibrium is considered stable (for simplicity we will consider asymptotic stability only if the system always returns to it after small disturbances. If the system moves away from the equilibrium after small disturbances then the equilibrium is unstable.

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Q No:-4

Define stress :->

In a medical or biological context, stress is a physical, mental, or emotional factor that causes bodily or mental tension.

Stresses can be external (from the environment, psychological, or social situations) or internal (illness, or from a medical procedure).

Following terms

1. Tensile stress
2. Compressive stress
3. Shear stress

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① Tensile Stress :->

Tensile stress is defined as: The magnitude F of the force applied along an elastic rod divided by the cross-sectional area A of the rod in a direction that is perpendicular to the applied force.

ultimate tensile stress (UTS)

② Compressive Stress

The stress that results from the shortening in one dimension of an elastic body due to oppositely directed collinear

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force tending to crush it.

(3) Shear Stress

Shear stress, force tending to cause deformation of a material by slippage along a plane or planes parallel to the imposed stress. The resultant shear is of great important in nature, being intimately related to the downslope movement of earth materials and to earthquakes.