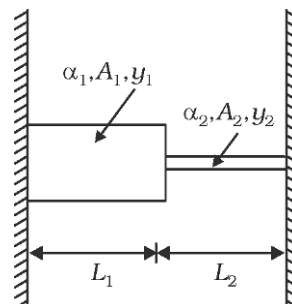


Date Planned : __ / __ / __	Daily Tutorial Sheet - 11	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 2	Exact Duration : _____
Topics covered : Elasticity		

- 131.** Two elastic rods are joined between fixed supports as shown in figure. Condition for no change in the lengths of individual rods with the increase of temperature (α_1, α_2 linear expansion coefficient, A_1, A_2 = area of rods, y_1, y_2 = Young's modulus) is:



- (A) $\frac{A_1}{A_2} = \frac{\alpha_1 y_1}{\alpha_2 y_2}$ (B) $\frac{A_1}{A_2} = \frac{L_1 \alpha_1 y_1}{L_2 \alpha_2 y_2}$
- (C) $\frac{A_1}{A_2} = \frac{L_2 \alpha_2 y_2}{L_1 \alpha_1 y_1}$ (D) $\frac{A_1}{A_2} = \frac{\alpha_2 y_2}{\alpha_1 y_1}$

- 132.** A flask of mercury is sealed off at 20°C and is completely filled with mercury. If the bulk modulus for mercury is 250 MPa and the coefficient of volume expansion of mercury is $1.82 \times 10^{-4}/^\circ\text{C}$ and the expansion of glass is ignored, the pressure of mercury within the flask at 100°C will be :

- (A) 10 MPa (B) 7.2 MPa (C) 3.6 MPa (D) 2.4 MPa

- 133.** A wire of length ℓ , area of cross section A and Young's modulus of elasticity Y is stretched by a longitudinal force F . The change in length is $\Delta\ell$. Match the following two columns.

Note : In column I, corresponding to every option, other factors remain constant.

Column I

Column II

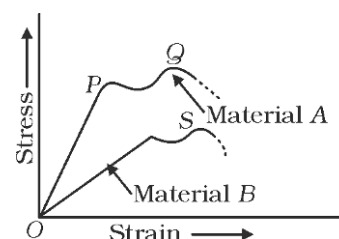
- | | |
|-------------------------|--------------------------------|
| (A) F is increased | (P) $\Delta\ell$ will increase |
| (B) ℓ is increased | (Q) Stress will increase |
| (C) A is increased | (R) $\Delta\ell$ will decrease |
| (D) Y is increased | (S) Stress will decrease |

- *134.** A uniform plank is resting over a smooth horizontal floor and is pulled by applying a horizontal force at its one end. Which of the following statements are not correct?

- (A) Stress developed in plank material is maximum at the end at which force is applied and decrease linearly to zero at the other end.
- (B) A uniform tensile stress is developed in the plank material
- (C) Since plank is pulled at one end only, plank starts to accelerate along direction of the force. Hence, no stress is developed in the plank material
- (D) None of these

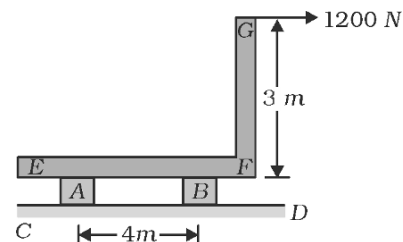
- *135.** Figure shows the stress-strain graphs for materials A and B . From the graph it follows that :

- (A) material A has a higher Young's modulus
- (B) material B is more ductile
- (C) material A can withstand greater stress
- (D) material B can withstand greater stress



PARAGRAPH FOR QUESTIONS 136 - 138

In the figure shown, A and B are two short steel rods each of cross-sectional area 5 cm^2 . The lower ends of A and B are welded to a fixed plate CD. The upper end of A is welded to the L-shaped piece EFG, which can slide without friction on upper end of B. A horizontal pull of 1200 N is exerted at G as shown. Neglect the weight of EFG.



- 136.** Mark out the correct statement(s)
- (A) Shearing stress in A is zero (B) Shearing stress in B is zero
(C) Shearing stress in both A and B is zero (D) Shearing stress in both A and B is non-zero
- 137.** Longitudinal stress in A is :
- (A) Tensile in nature and having magnitude 180 N/cm^2
(B) Tensile in nature and having magnitude 240 N/cm^2
(C) Compressive in nature and having magnitude 180 N/cm^2
(D) Compressive in nature and having magnitude 240 N/cm^2
- 138.** Longitudinal stress in B is :
- (A) Tensile in nature and having magnitude 180 N/cm^2
(B) Tensile in nature and having magnitude 240 N/cm^2
(C) Compressive in nature and having magnitude 180 N/cm^2
(D) Compressive in nature and having magnitude 240 N/cm^2
- 139.** A thin ring of radius R is made of material of density ρ and Young's modulus Y . When the ring is rotated about its centre in its own plane with angular velocity ω , the small increase in its radius is $\Delta R = n \left(\frac{\rho \omega^2 R^3}{2Y} \right)$. Find the value of n
- 140.** A wire having a length L and cross-sectional area A is suspended at one of its ends from a ceiling. Density and Young's modulus of material of the wire are ρ and Y , respectively. Its strain energy due to its own weight is $\frac{\rho^2 g^2 AL^3}{nY}$. Find the value of n