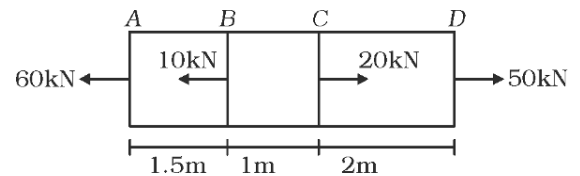
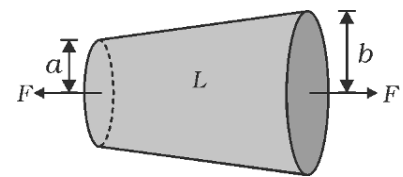


Date Planned : __ / __ / __	Daily Tutorial Sheet - 15	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 3	Exact Duration : _____

- 159.** A steel rod of cross-sectional area 1m^2 is acted upon by forces as shown in the figure. Determine the total elongation of the bar. Take $Y = 2.0 \times 10^{11}\text{N/m}^2$.



- 160.** A conical wire of length L and radius a and b is stretched by two forces as shown. Find the elongation of the wire. Young modulus of the wire is Y .



- 161.** A composite rod is made by joining a copper rod, end to end, with a second rod of different material but of the same cross-section. At 25°C , the composite rod is 1 m in length, of which the length of the copper rod is 30 cm. At 125°C the length of the composite rod increases by 1.91 mm. When the composite rod is allowed to expand by holding it between two rigid walls, it is found that the length of the two constituents do not change with the rise of temperature. Find the Young's modulus and the coefficient of linear expansion of the second rod. (Given, Coefficient of linear expansion of copper $= 1.7 \times 10^{-5}/^\circ\text{C}$, Young's modulus of copper $= 1.3 \times 10^{11}\text{N/m}^2$)
- 162.** A reinforced concrete column consists of concrete filled with iron bars. Assume that iron occupies $\frac{1}{21}$ of the total cross-section area and Young's modulus of concrete is $\frac{1}{10}$ of that of iron. The concrete column is under a compressive load F . Determine the fraction of load on the concrete.
- 163.** Estimate the pressure deep inside the sea at a depth h below the surface. Assume that the density of water is ρ_0 at sea level and its bulk modulus is B .
- 164.** A deforming force in one direction can produce strain in other directions also. For example, for a wire under longitudinal strain, the lateral dimensions (radius of cross section) will undergo a small change. This phenomenon is measured by another elastic constant of the material called Poisson Ratio ν which is defined as $\nu = -\frac{\text{Lateral strain}}{\text{Longitudinal strain}}$. Using this concept, find the fractional change in the density of a cylindrical copper rod when it is compressed by a pressure P at both ends. Young's modulus is Y , Poisson ratio is ν .