

Problem set-2

Q.1 A steel wire 20m long and 3mm in diameter is attached to the ceiling and a 300N weight is attached to the end. What is the applied stress?

Q.2 The elastic limit for steel is 3.16×10^8 Pa. What is the maximum weight that can be supported without exceeding the elastic limit?

Q.3 A load of 4 kg is suspended from a ceiling through a steel wire of radius 2mm. Find the tensile stress developed in the wire when equilibrium is achieved. Take $g = 3.17 \text{ m/s}^2$.

Q.4 A rope 1 cm in diameter breaks if the tension in it exceeds 500N. Find out the maximum tension that it may be given to a similar rope of diameter 2 cm.

Objective Questions

Q(i) The breaking stress of a wire depends on

- (a) material of the wire (b) length of the wire
(c) radius of the wire (d) shape of the cross-section

Q(ii) A wire can sustain the weight of 20kg before breaking. If the wire is cut into two equal parts, each part can sustain a weight of

- (a) 10kg (b) 20kg (c) 40kg (d) 80kg.

Q(iii) A wire elongates by 2mm when a load W is hung from it. If this wire goes over a pulley and two weights W each are hung at the two ends, the elongation of the wire will be

- (a) 0.5mm (b) 1mm (c) 2.0mm (d) 4mm.