Suggested problems

Chapter 12

The quiz questions will be same or very similar to the following text-book problems.

Refer to the course website for the latest version of this document.

You are encouraged to seek the help of your instructor during his office hours.

15. Forces$ \vec{F}\_{1}, \vec{F}\_{2} and \vec{F}\_{3}$ act on the structure of Fig. 12-31, shown in an overhead view. We wish to put the structure in equilibrium by applying a fourth force, at a point such as P. The fourth force has vector components $ \vec{F}\_{h} and \vec{F}\_{v}$ .We are given that a = 2.0 m, b = 3.0 m, c = 1.0 m , F1 = 20 N, F2 = 10 N and F3 = 5.0 N. Find (a) Fh (b) Fv and (c) d.

**Answer:** (a) 5.0 N; (b) 30 N; (c) 1.3 m

21. The system in Fig. 12-36 is in equilibrium. A concrete block of mass 225 kg hangs from the end of the uniform strut of mass 45.0 kg. For angles *φ* = 30.0° and θ = 45.0°, find (a) the tension T in the cable and the (b) horizontal and (c) vertical components of the force on the strut from the hinge.

**Answer:** (a) 6.63 kN (b) 5.74 kN (c) 5.96 kN

23. In Fig. 12-38, one end of a uniform beam of weight 222 N is hinged to a wall; the other end is supported by a wire that makes angles *θ* = 30.0° with both wall and beam. Find (a) the tension in the wire and the (b) horizontal and (c) vertical components of the force of the hinge on the beam.

**Answer:** (a) 192 N (b) 96.1 N (c) 55.5 N

43. A horizontal aluminum rod 4.8 cm in diameter projects 5.3 cm from a wall. A 1200 kg object is suspended from the end of the rod. The shear modulus of aluminum is $3.0 ×10 ^{10}N/m^{2}$. Neglecting the rod’s mass, find (a) the shear stress on the rod and (b) the vertical deflection of the end of the rod?

**Answer:** $\left(a\right) 6.5×10^{6} N/m^{2} \left(b\right) 1.1×10^{-5} m$