AE 670 Aerospace Structural Analysis-I

Assignment No. 2

2.1 Two equal cylinders, each weighing 900 N are placed in a box as shown. Neglecting friction between the cylinders and the box, estimate the reactions at *A*, *B*, and *C*. See figure 2.1.

2.2 Compare the forces *F* required to just start the 900-N lawn roller over a 75-mm step when (*a*) the roller is pushed and (*b*) the roller is pulled. See figure 2.2.

2.3 The bracket *ABC* is free to swing out horizontally on the vertical rod. Estimate the forces transmitted to the vertical rod at *A* and *B* when a 900-N load is supported at *C*. Show magnitudes and directions on a clear sketch. See figure 2.3.

2.4 A 100-N force is required to operate the foot pedal as shown. Determine the force in the connecting link and the force exerted by the lever on the bearing at *O*. Neglect the weight of the lever. See figure 2.4.

2.5 A spot weld which holds the bracket to the plate at point *A* as shown in the figure 2.5 can with-stand a maximum twist in the plane of the plate of 100 N m. Determine the maximum load *W*.

2.6 During a hurricane, some of the wires attached to a power pole are broken so that the loading of the pole is as shown in the figure 2.6. There are two wires still attached to the crossarm, exerting loads of 400 lb and 500 lb parallel to the *x* axis. There is a transformer weighing 1,000 lb whose center of gravity lies in the *yz* plane a distance of 20 ft above the ground and 2 ft from the center pole. Neglect the weight of the pole. The pole is buried in the ground for a depth of 8 ft. Find the forces and moments which act *on* the buried section *GA* at the ground level *G*.

2.7 A rigid rod with negligible weight and small transverse dimensions carries a load *W* whose position is adjustable. The rod rests on a small roller at *A* and bears against the vertical wall at *B*. Determine the distance *x* for any given value of θ such that the rod will be in equilibrium. Assume that friction is negligible. See figure 2.7.

2.8 It is desired to lift the wheelbarrow shown with one hand at the handle *A* by applying at *A* a vertical force **F** and a twisting moment **M** about the axis of the handle. Estimate the magnitudes of **F** and **M**. See figure 2.8.

Figure 1.1

Figure 1.2

Figure 1.3

Figure 1.4

Figure 1.5

Figure 1.6

Figure 1.7

Figure 1.8