AEM 2011 Homework #9 (6.1, 6.2) Wednesday, March 22, 2023

Unless otherwise mentioned, these problems should be solvable using a basic calculator. Practice clear communication by showing all work (free body diagrams, algebra, etc). This will be required to receive full credit on any graded problems.

1. Book problems:

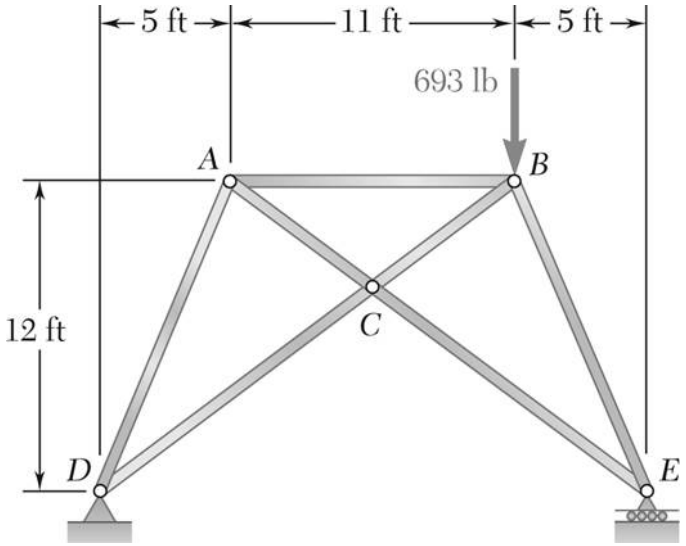
   (a) 6.5

   (b) 6.51

   Additional Practice Problems: 6.11, 6.22, 6.45, 6.61

   The quiz problem will not be selected from these additional practice problems. However, these exercises contain important elements of the course and similar problems may appear on the exam.

2. While constructing the new recreational-center building, the construction company erected a temporary platform as shown in the figure. The equipment kept on the platform at point B weighs 693 lb. The platform can be modeled as a truss. Using the method of joints, determine the force in each member of the truss shown. State whether each member is in tension or compression.

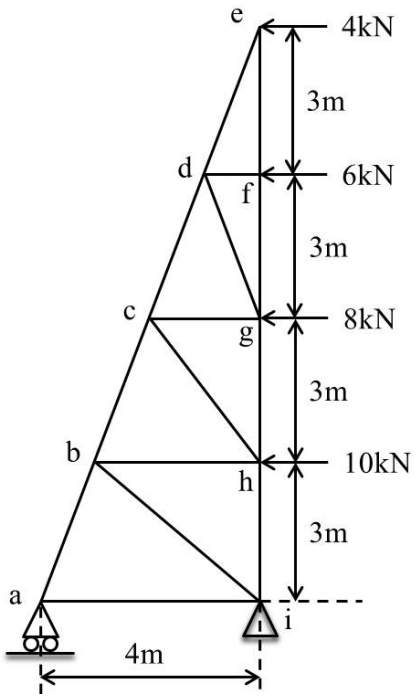


Temporary Platform

3. Considering the truss shown in Fig. 2, answer the following questions:

   (a) Show that the truss is stable (*i.e. static*).

   (b) Find the fices in members cd, cg, and gh.

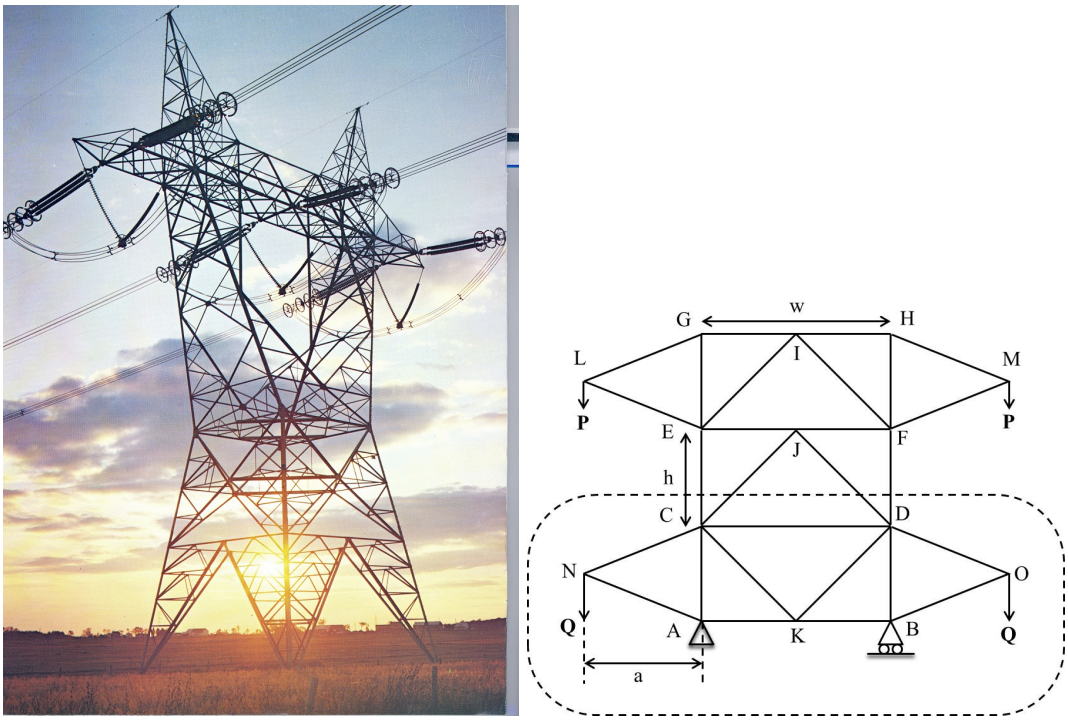


Schematic of Truss

4. Electrical transmission towers can be modeled as trusses, as shown in the figure. Although they are actually three-dimensional space trusses, in this problem, they can be approximated as the standard two-dimensional truss. Consider a simplified section of the transmission tower, as shown, with the following dimensions and forces: $w = 1m$, $h = 0.5m$, $a = 0.8m$, $P = 800N$, and $Q = 1200N$. Assume that sections AC, CE, and EG all have the same height h. You may also make use of the fact that the truss is symmetric about a vertical axis passing through points I, J, and K. Compute the following:

   (a) The reaction forces at supports A and B.

   (b) The forces in all members enclosed by the dashed region shown in the figure.

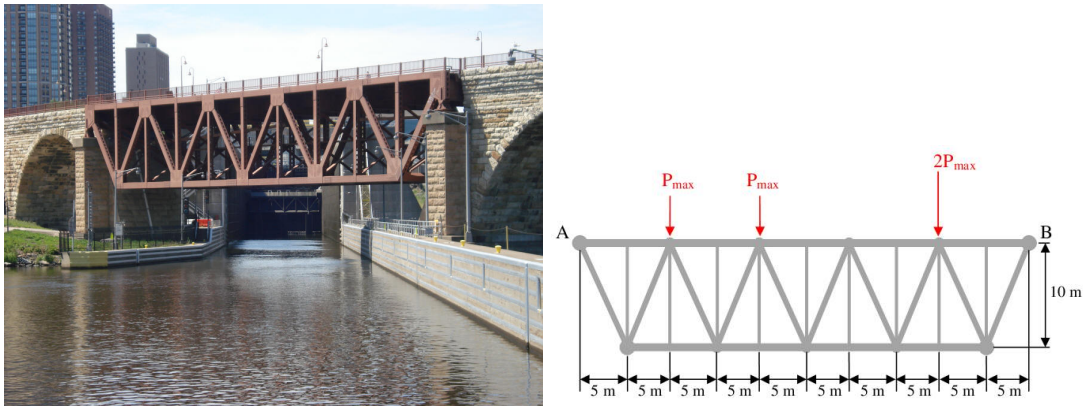


Electrical Transmission Tower

5. The Stone Arch Bridge in Minneapolis consists of 21 stone arch spans and one steel truss span. The steel truss span replaced two of the original stone arches when the St. Anthony Falls lock and dam system was built. Under maximum loading conditions, the truss experiences the forces shown in the diagram below. Assume that:

   - horizontal members can withstand a maximum of 3600 kN in tension and 1200 kN in compression
   - diagonal members can withstand a maximum of 1200 kN in tension and 400 kN in compression
   - vertical members can withstand a maximum of 300 kN in tension and 100 kN in compression.

   Find the value of P_{max} such that the forces remain within the specified tension and compression limits. The truss is attached to the bridge with a fixed support at A and a roller support at B.



Stone Arch Bridge (left) and free body diagram of steel truss span (right)