MECHANICS OF SOLIDS

Tutorial – 2 : Trusses

1. Classify each of the given truss system shown in Figure 1 as completely, partially or improperly constrained system. If completely constrained, further classify as determinate or indeterminate system. Assume that all the truss members can act both in tension and in compression.
2. Using the method of joints, determine the force in each member of the truss shown in Figure 2. State whether each member is in tension or in compression.
3. * A planar truss is composed of equilateral triangles of sides a = 0.3 m and is supported and loaded as shown in Figure 3. Determine the forces in members *DE*, *DF* and *EF* using the method of joints.
4. Find the force in the members *CF*, *CG*, *CH* and *FG* of the truss shown in Figure 4 using the method of sections. State the nature of each member force.
5. Using the method of sections, determine the forces in the members *FG* and *FJ* of the truss shown in Figure 5.

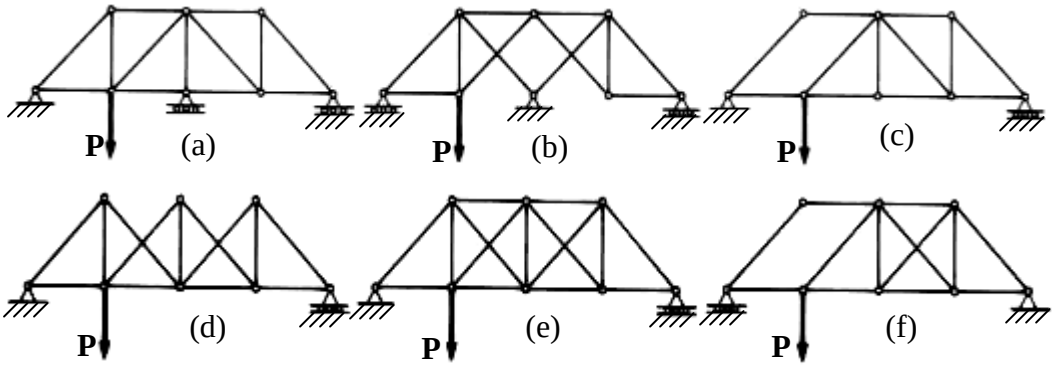

Figure 1

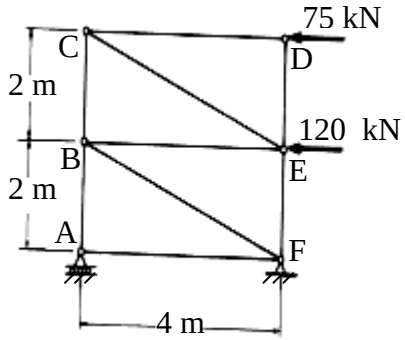

Figure 2

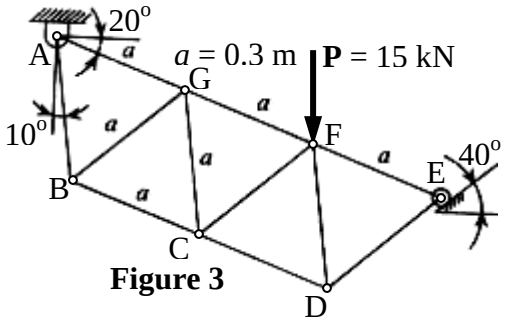

Figure 3

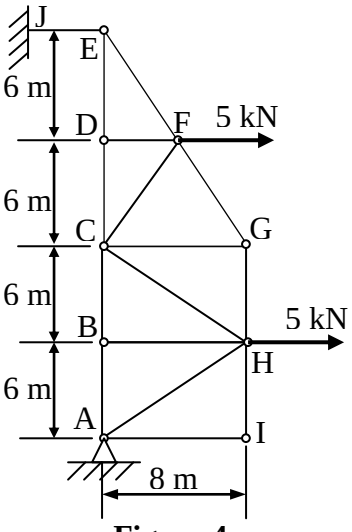

Figure 4

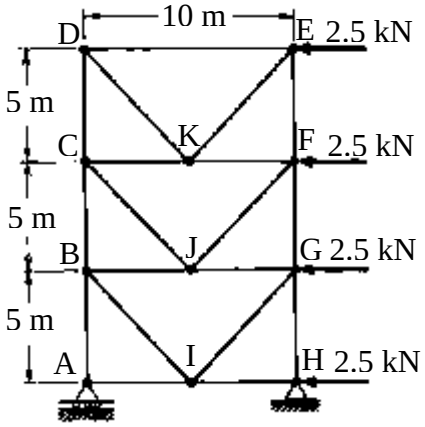

Figure 5

6.* The guide-ways for a large overhanging crane are suspended from the joints *M*, *K* and *J*,*G* of the truss shown in Figure 6. Neglecting the weight of the truss members and the guide-ways, determine the forces in the members *BC*, *BK*, *DE*, DI and *EF*. Note that the guide-ways only transmit the supported loads to the pins at their ends and are not considered as part of the truss structurally.

7. Determine the nature and magnitude of the forces in the members *DE*, *EM* and *KN* of the Fink truss shown in Figure 7.

8.* Show that the bridge truss shown in Figure 8 is a just-rigid simple truss. Determine the nature and magnitude of the forces in the members *CD* and *KM* of the truss.

9. Show that the bridge truss shown in Figure 9 is a just-rigid simple truss. Determine the nature and magnitude of the forces in the members *CJ*, *DI*, *HI* and *IJ* of the truss using the method of sections. Check whether there is any zero-force-member in this truss.

10.* Check whether the space truss supported by a ball-and-socket joint at *D* and by rollers at *A*, *B* and *C* as shown in Figure 10, is a simple just-rigid truss. Further, determine the support reactions and the internal forces in all the members of the truss under the action of a load given as **P** = (20 **i** – 12 **j** – 24 **k**) kN acting at the joint E as shown.

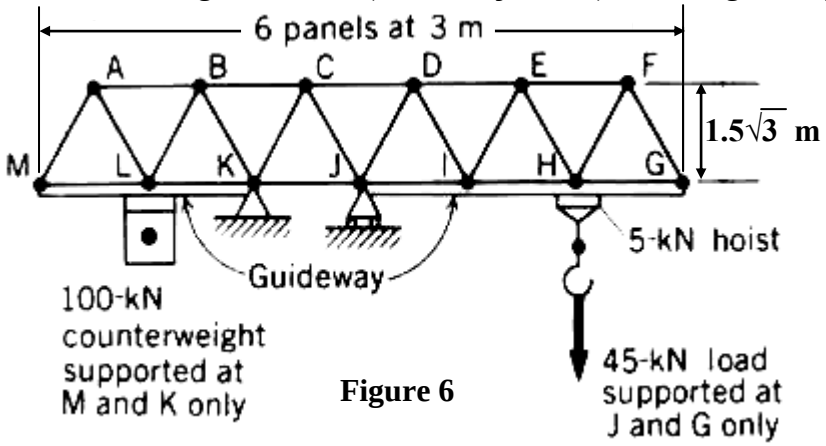

Figure 6

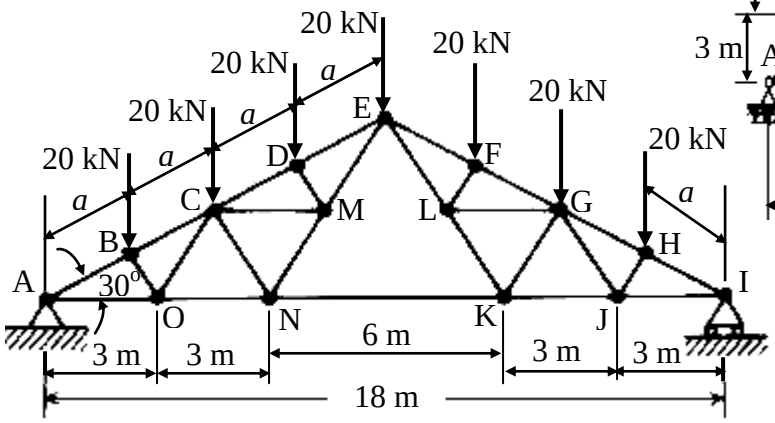

Figure 7

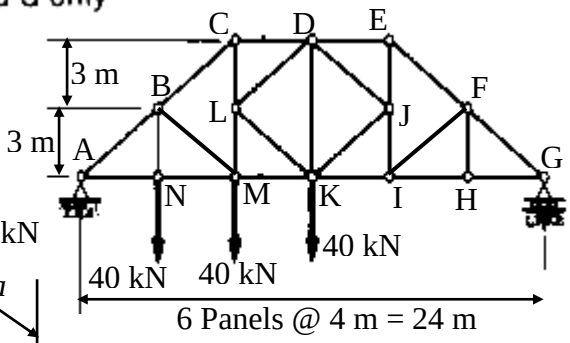

Figure 8

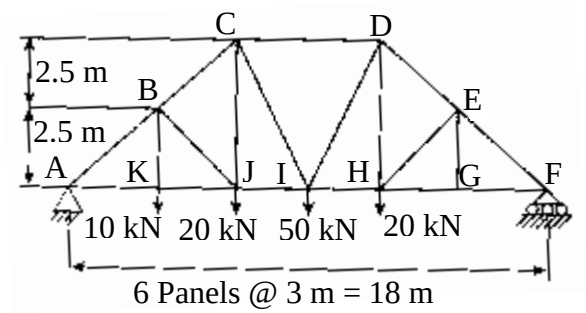

Figure 9

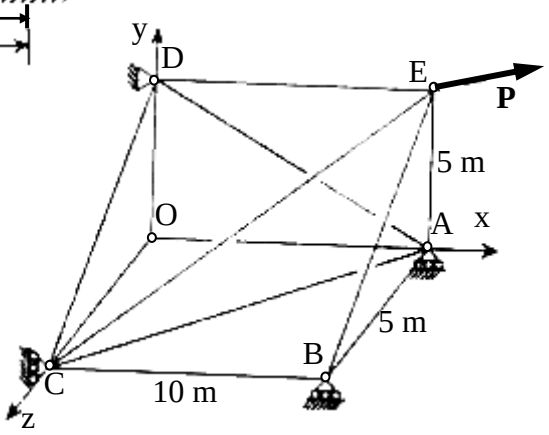

Figure 10