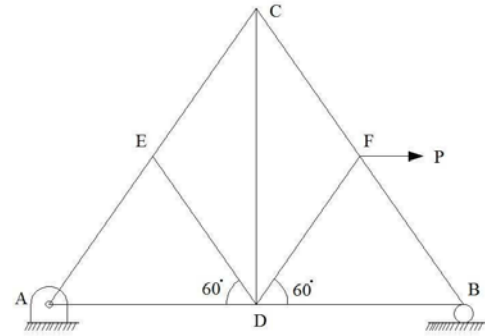


TUTORIAL SHEET 4
TRUSSES AND STRUCTURES

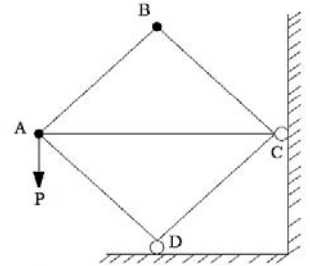
STRUCTURAL ANALYSIS

1. Determine the force in the bar CD of the simple truss supported and loaded as shown. The ABC forms an equilateral triangle.

Ans: $BF = -0.5P, CF = 0.5P, CD = -0.866P$

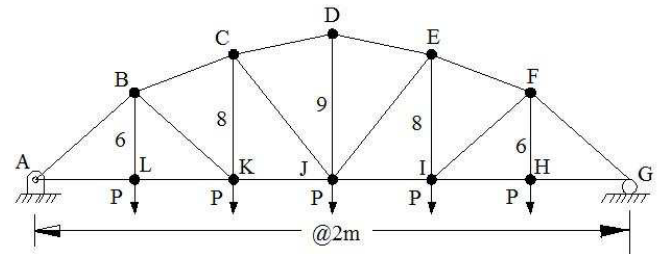


2. Determine the axial force in each bar of the plane truss supported and loaded as shown. *Ans: $DA = DC = -0.707P, BC = -BA = 0.707P, CA = 0$*

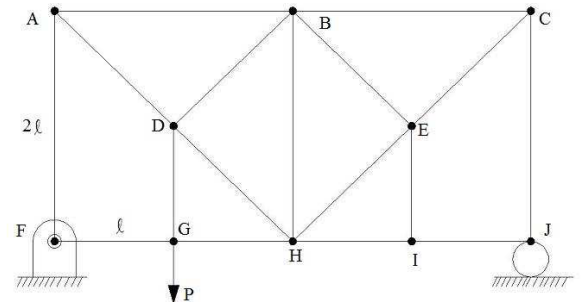


3. Roadway and vehicle loads are transmitted to the highway bridge truss as the idealized forces. What are the forces in members? Take $P = 100\text{KN}$.

Ans: $AB = 354\text{kN}, BK = -70.7\text{ kN}, JD = 100\text{ kN}$

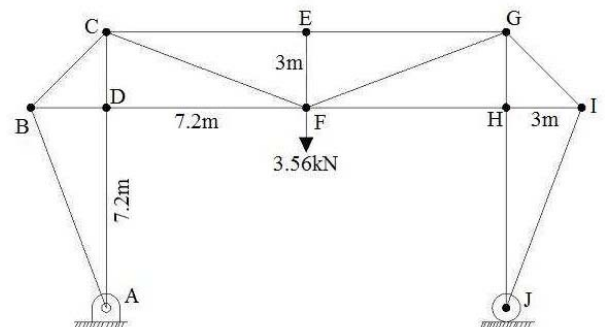


4. Indicate whether the truss shown is a simple truss. Determine the zero-force members for the given loading. *Ans: IE, JI, HI, BE, FG and GH*



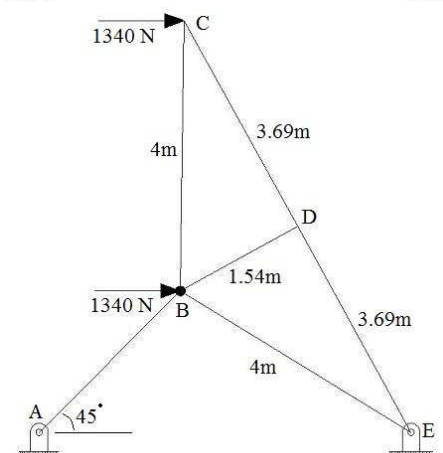
5. The trussed building bent is subjected to a loading of 3560N. Approximate each joint as a pin and determine the forces in each member. State whether the members are in tension or compression.

*Ans: $JH = AD = HG = CD = 1780C,$
 $GF, FC = 4628 T, GE, EC = 4272C$*

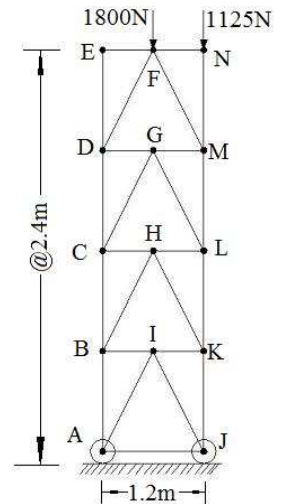
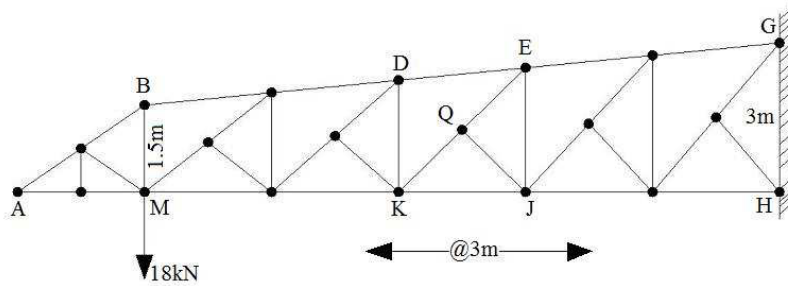


6. A sign is subjected to a wind loading that exerts horizontal forces of 1340N on joints B and C of one of the side supporting trusses. Determine the force in members BC, CD, DB and DE of the truss and state whether the members are in tension or compression.

Ans: $CD = DE = 3472C, BC = 3202T, DB = 0$

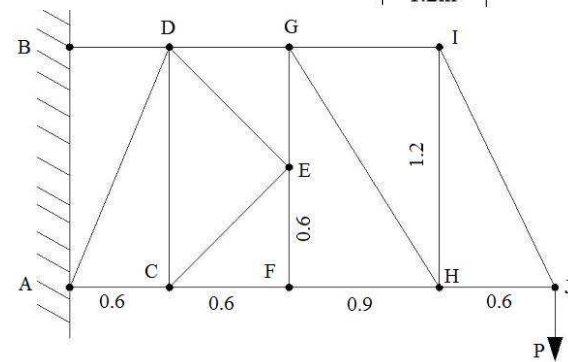


7. Determine the force developed in members DE, EQ and KJ of the side truss of the 'hammer-head crane'. Assume that each side truss supports a load of 18000N as shown. Indicate whether the members are in tension or compression. *Ans: QE=20.6kNT, DE=51.7kNT, KJ=67.5kNC*

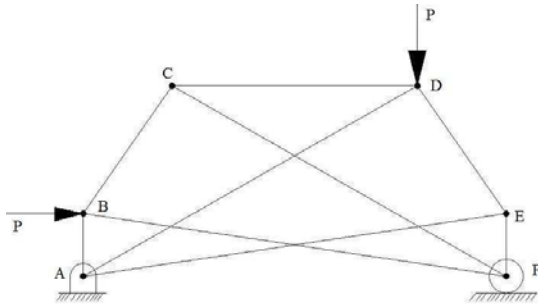


8. A "K" truss used for scaffolding is loaded as shown. Determine the force in members ML and CD using the method of sections. All joints are pin connected. *Ans: ML=2025N C, DC=900N C*

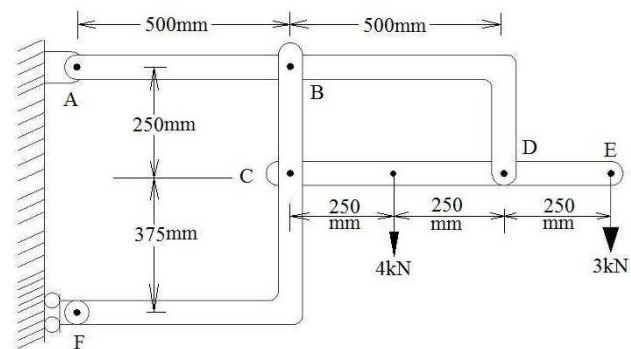
9. Determine by the method of sections the axial forces in each of the bars IH, GH and CF of the plane truss shown in the figure. *Ans: GH=2.92P C, IH=P T, CF=1.25P C*



10. Determine the forces in the bars AB, CD, and EF of the plane truss loaded and supported as shown. The plane truss frame ABCDEF is one-half of a regular octagon. *Ans: AB= 0.293P, CD= -P, EF= -1.21P*



11. For the frame and loading shown, determine the components of all forces acting on member ABD. *Ans: A=-10.8i+7j kN, B= -16.2i-.5j kN, D=27i-6.5j kN*



12. The tool shown is used to crimp terminals onto electric wires. Knowing that $P= 135\text{ N}$, determine the magnitude of the crimping forces which will be exerted on the terminal. *Ans: 2220 N*

