# 工程力學

## Exam. # 1 （10/25/2019）

1. (10pts) Knowing that the tension in rope $AC$ is 365 N as shown in Fig. 1, determine the resultant of the three forces exerted at point $C$ of post $B$.

2. (20pts) Three cables are connected at $A$, where the forces $\mathbb{P}$ and $\mathbb{Q}$ are applied as shown in Fig. 2. Knowing that $Q = 0$, find the value of $P$ for which the tension in cable $AD$ is 305 N.

3. (30pts) A regular tetrahedron has six edges of length $a$. A force $\mathbb{P}$ is directed as shown along edge $BC$ as shown in Fig. 3. Determine the moment of $\mathbb{P}$ about edge $OA$.

4. (20pts) A machine component is subjected to the forces and couples as shown in Fig. 4. The component is to be held in place by a single rivet that can resist a force but not a couple. For $P = 0$, determine the location of the rivet hole if it is to be located (a) on line $FG$, (b) on line $GH$.

5. (20pts) Four signs are mounted on a frame spanning a highway, and the magnitudes of the horizontal wind forces acting on the signs are as shown in Fig. 5. Determine the magnitude and the point of application of the resultant of the four wind forces when $a = 0.4$ m and $b = 4.8$ m.
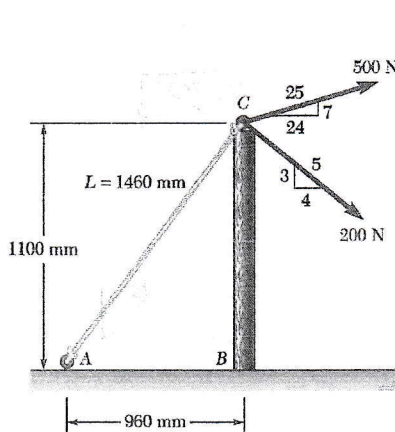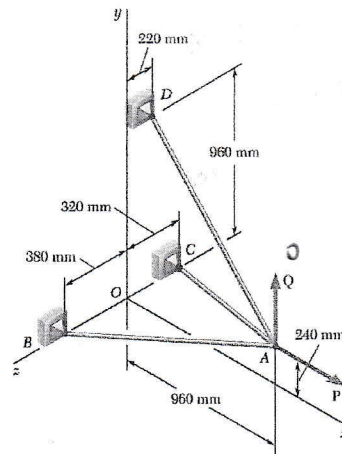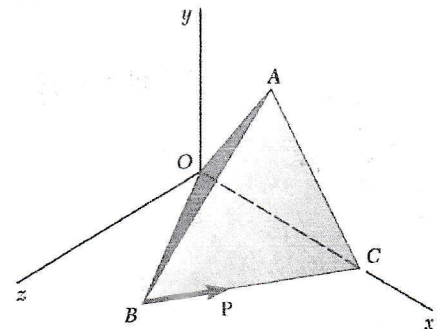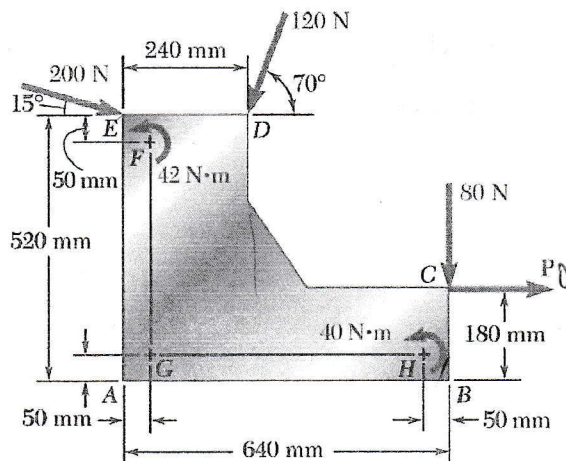


Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5