

## 21-S-6-ZA-55 Solution

Question: The truss structure shown has a pin at point C and is acted on by two forces  $F_A$  and  $F_B$  at points A and B respectively. If  $F_A$  N,  $F_B$  N, and  $\theta^\circ$ , find the required type of support at point D without over constraining the system, assuming the maximum force pin C can handle without deforming is  $F_{max}$  N in each direction.

Solution:

We can take the sum of forces of the system to find the reaction forces on the pin at point C, assuming the system is in equilibrium.

$$\Sigma F_x = -F_A + F_B \cos\theta + R_x = 0$$

$$\Sigma F_y = F_B \sin\theta - R_y = 0$$

$$R_y = F_B \sin\theta$$

$$R_x = F_A - F_B \cos\theta$$

If  $|R_x| \leq F_{max}$  and  $|R_y| \leq F_{max}$  then no support is required.

If  $|R_x| \leq F_{max}$  and  $|R_y| > F_{max}$  then a roller support is required.

If  $|R_x| > F_{max}$  then a pin support is required.