

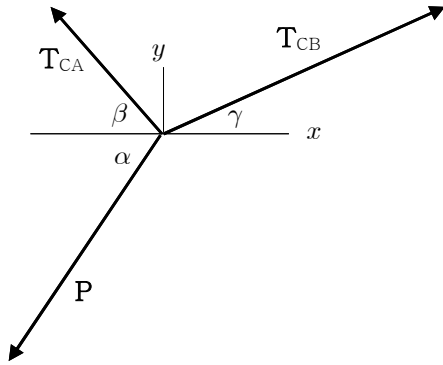
[2.3절]

2.46 $P = 500 \text{ N}$, $\alpha = 60^\circ$, $\beta = 45^\circ$, $\gamma = 25^\circ$

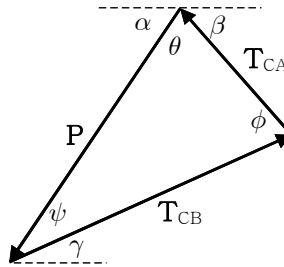
S; known P , α , β , γ , unknown T_{AC} , T_{BC} ,

질점의 평형 문제 \Rightarrow 직각성분 방법 또는 힘 삼각형 방법

M; 자유물체도 (F.B.D.)



힘 삼각형(force triangle)



$$\begin{aligned} \theta &= 180^\circ - (\alpha + \beta) \\ &= 180^\circ - (60^\circ + 45^\circ) = 75^\circ \\ \psi &= \alpha - \gamma \\ &= 60^\circ - 25^\circ = 35^\circ \\ \phi &= 180^\circ - (\theta + \psi) \\ &= 180^\circ - (75^\circ + 35^\circ) = 70^\circ \end{aligned}$$

A; <방법1 : 직각 성분>

$$\Sigma F_x = 0 ; -P \cos\alpha - T_{AC} \cos\beta + T_{BC} \cos\gamma = 0 \quad \dots \textcircled{1}$$

$$\Sigma F_y = 0 ; -P \sin\alpha + T_{AC} \sin\beta + T_{BC} \sin\gamma = 0 \quad \dots \textcircled{2}$$

(a) $\textcircled{1} \times \sin\gamma - \textcircled{2} \times \cos\gamma$

$$-P (\cos\alpha \sin\gamma - \sin\alpha \cos\gamma) - T_{AC} (\cos\beta \sin\gamma + \sin\beta \cos\gamma) = 0$$

$$\Rightarrow T_{AC} = P \frac{\sin(\alpha - \gamma)}{\sin(\beta + \gamma)} = (500 \text{ N}) \frac{\sin(60^\circ - 25^\circ)}{\sin(45^\circ + 25^\circ)} = 305.2 \text{ N}$$

$$\Rightarrow T_{AC} = 305 \text{ N}$$

$$(b) \textcircled{1} \Rightarrow T_{BC} = \frac{1}{\cos\gamma} (P \cos\alpha + T_{AC} \cos\beta)$$

$$= \frac{1}{\cos 25^\circ} [(500 \text{ N}) \cos 60^\circ + (305.2 \text{ N}) \cos 45^\circ] = 514.0 \text{ N}$$

$$\Rightarrow T_{BC} = 514 \text{ N}$$

<방법2 : 힘 삼각형>

$$\frac{T_{AC}}{\sin\psi} = \frac{T_{BC}}{\sin\theta} = \frac{P}{\sin\phi}$$

$$(a) T_{AC} = P \frac{\sin\psi}{\sin\phi} = (500 \text{ N}) \frac{\sin 35^\circ}{\sin 70^\circ} = 305.2 \text{ N} \quad \Rightarrow T_{AC} = 305 \text{ N}$$

$$(b) T_{BC} = P \frac{\sin\theta}{\sin\phi} = (500 \text{ N}) \frac{\sin 75^\circ}{\sin 70^\circ} = 514.0 \text{ N} \Rightarrow T_{BC} = 514 \text{ N}$$

R; (과정의 타당성 서술)

(가령, 두 가지 방법 비교)

T; (결과의 의미 서술)

(가령, $T_{AC} < T_{BC}$ 인 이유)