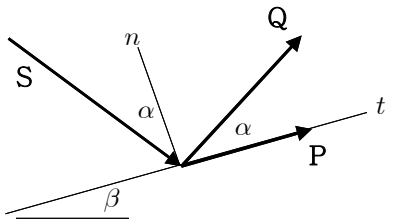
{2.7~8절}

2.37 [직각성분 합에 의한 힘의 합성]



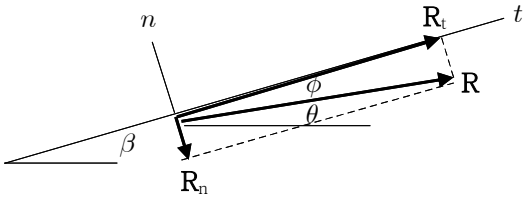
$\alpha = 40°, \quad \beta = 20°$

$P = 60$ N, $\quad Q = 80$ N, $\quad S = 120$ N

$R_t = P + Q\cos\alpha + S\sin\alpha$

$= (60\text{ N}) + (80\text{ N})\cos 40° + (120\text{ N})\sin 40°$

$= 198.41$ N



$R_n = Q\sin\alpha - S\cos\alpha$

$= (80\text{ N})\sin 40° - (120\text{ N})\cos 40°$

$= -40.50$ N

$R = \sqrt{R_t^2 + R_n^2}$

$= \sqrt{(198.41\text{ N})^2 + (-40.50\text{ N})^2} = 202.5$ N

$\tan\phi = \dfrac{R_n}{R_t} = \dfrac{-40.50}{198.41} = -0.2041$

$\phi = \tan^{-1}(-0.2041) = -11.54°$

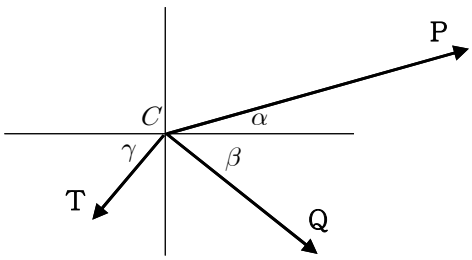
$\theta = \beta + \phi = (20°) + (-11.54°) = 8.46°$ $\quad \Rightarrow \quad$ **R** = 203 N ∠8.46°

2.40 [직각성분 합에 의한 힘의 합성]

$P = 500$ N, $\quad Q = 200$ N

$\cos\alpha = \dfrac{24}{25}, \quad \cos\beta = \dfrac{4}{5}, \quad \cos\gamma = \dfrac{0.96}{1.46}$

$\sin\alpha = \dfrac{7}{25}, \quad \sin\beta = \dfrac{3}{5}, \quad \sin\gamma = \dfrac{1.10}{1.46}$



(a) **R** is horizontal $\Rightarrow \quad R_y = 0$

$R_y = P_y + Q_y + T_y$

$= \dfrac{7}{25}(500\text{ N}) - \dfrac{3}{5}(200\text{ N}) - \dfrac{1.10}{1.46}T = 0$

$\Rightarrow \quad T = \dfrac{1.46}{1.10}[(140\text{ N}) - (120\text{ N})] = 26.54$ N

$\Rightarrow \quad T = 26.5$ N

(b) $R_x = P_x + Q_x + T_x$

$= \dfrac{24}{25}(500\text{ N}) + \dfrac{4}{5}(200\text{ N}) - \dfrac{0.96}{1.46}(26.54\text{ N})$

$= (480\text{ N}) + (160\text{ N}) - (17.45\text{ N}) = 622.5$ N

$\Rightarrow \quad R = 623$ N