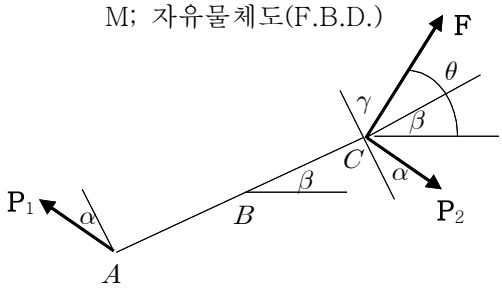
[3.3절]

3.89 P = 90 N, F = 216 N, α = 20°, β = 30°, γ = 55°, d_{AB} = 0.6 m, d_{BC} = 0.45 m

S; 2차원 등가 힘-우력 계 M; 자유물체도(F.B.D.)



A; (a) $\theta = \beta + (90° - \gamma)$

$= 30° + (90° - 55°) = 65°$

$\mathbf{F}_B \parallel \mathbf{F}$, $\Sigma\mathbf{F} = \mathbf{F}_B = \mathbf{F}$

$\Rightarrow$ $\mathbf{F}_B$의 방향 = $\mathbf{F}$의 방향 = $\angle 65.0°$

$F_B = F$ = 216 N

$\Rightarrow$ $\mathbf{F}_B$ = 216 N $\angle 65.0°$

$\circlearrowleft \Sigma M_B = M_B$

$= -(d_{AB} + d_{BC})\,(P\cos\alpha) + d_{BC}\,(F\cos\gamma)$

$= -(0.6 + 0.45\ \text{m})\,(90\ \text{N})\cos 20° + (0.45\ \text{m})\,(216\ \text{N})\cos 55°$

$= -88.80 + 55.752\ \text{N·m} = -33.048\ \text{N·m}$

$\Rightarrow$ $\mathbf{M}_B$ = 33.0 N·m ↺

(b) $\Sigma\mathbf{F} = \mathbf{F}_D = \mathbf{F}$ = 216 N $\angle 65.0°$

$\circlearrowleft \Sigma M_B = M_B = d_{BD}\,(F\cos\gamma)$

$\Rightarrow \quad d_{BD} = \dfrac{-33.048\ \text{N·m}}{(216\ \text{N})\cos 55.0°} = -0.2667\ \text{m} = -266.7\ \text{mm}$

B의 왼쪽 267 mm 지점에 힘 216 N $\angle 65.0°$ 작용

R(과정의 타당성) ; (가령, $\circlearrowleft \Sigma M_B$ 대신 $\circlearrowleft \Sigma M_A$ 또는 $\circlearrowleft \Sigma M_C$ 를 비교하면?)

T(결과의 의미) ; (가령, $d_{BD} < 0$ 의 의미)