〈예제 4.95〉

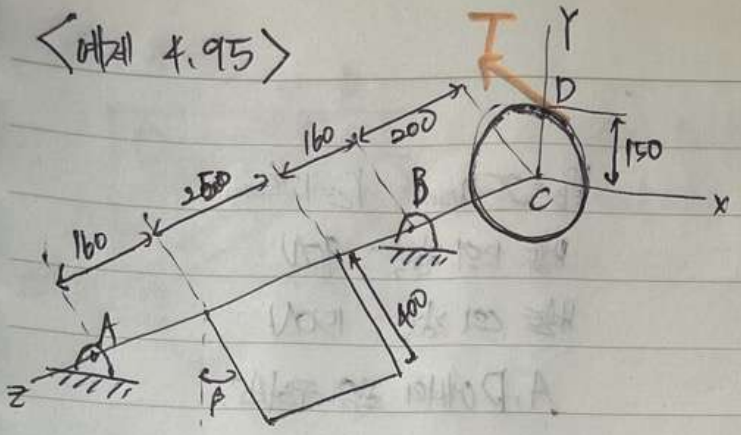


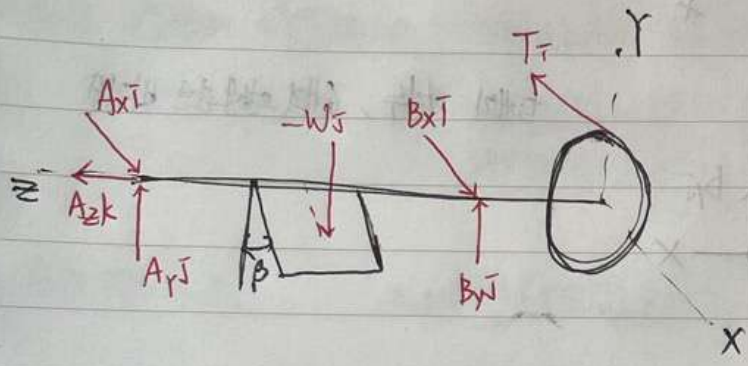
Plate : 250×400, 12kg

$R_C = 150mm$

$\beta = 30°$ 일 때

(a) 케이블의 장력.

(b) A, B에 작용하는 힘.



(b)

$\therefore A = -(27.5N)\bar{T} + (158.9N)\bar{j}$

$B = (106.0N)\bar{i} + (58.9N)\bar{j}$

$W = -mg = -(12kg)(9.81 m/s^2) = -117.720\bar{j}N$

$r_{B/A} = 570\bar{k}$, $r_{D/A} = 150\bar{j} - 770\bar{k}$, $r_{C/A} = (200\sin\beta)\bar{i} - (200\cos\beta)\bar{j} + 285\bar{k}$

$\Sigma M_A = 0 : r_{B/A} \times (B_x\bar{i} + B_y\bar{j}) + r_{D/A} \times -T\bar{i} + r_{C/A} \times (-W)\bar{j} = 0$

$$\begin{vmatrix} \bar{i} & \bar{j} & \bar{k} \\ 0 & 0 & -570 \\ B_x & B_y & 0 \end{vmatrix} + \begin{vmatrix} \bar{i} & \bar{j} & \bar{k} \\ 0 & 150 & -770 \\ -T & 0 & 0 \end{vmatrix} + \begin{vmatrix} \bar{i} & \bar{j} & \bar{k} \\ 200\sin\beta & -200\cos\beta & -285 \\ 0 & -W & 0 \end{vmatrix} = 0$$

$570B_y\bar{i} - 570B_x\bar{j} + 770T\bar{j} + 150T\bar{k} - 285W\bar{i} - (200\sin\beta)W\bar{k} = 0$

$\bar{i} : 570B_y - 285(117.72) = 0 \longrightarrow B_y = 58.860N$

$\bar{j} : -570B_x - 770T = 0 \longrightarrow B_x = \frac{77}{57}T$, $B_x = 106.017N$

$\bar{k} : 150T - (200\sin 30°)117.720 = 0 \longrightarrow T = 78.480N$ (a) $T = 78.5N$

$\Sigma F_y = 0 : A_y + B_y - W = 0 \longrightarrow A_y = 117.720 - 58.860 = 58.860N$

$\Sigma F_z = 0 : A_z = 0$, $\Sigma F_x = 0 : A_x + B_x - T = 0$, $A_x = -27.537N$