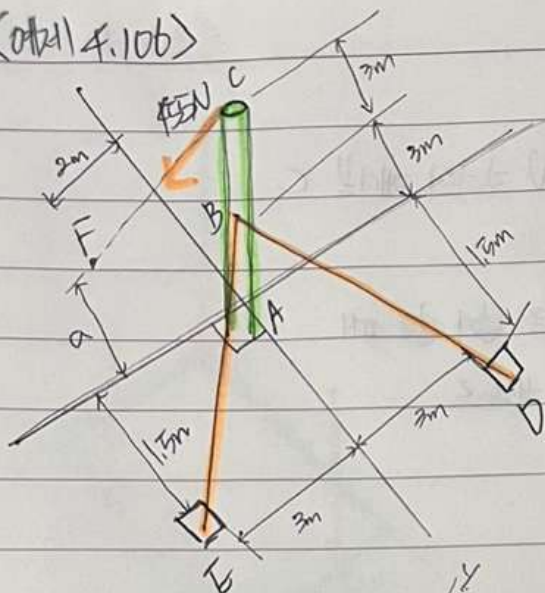


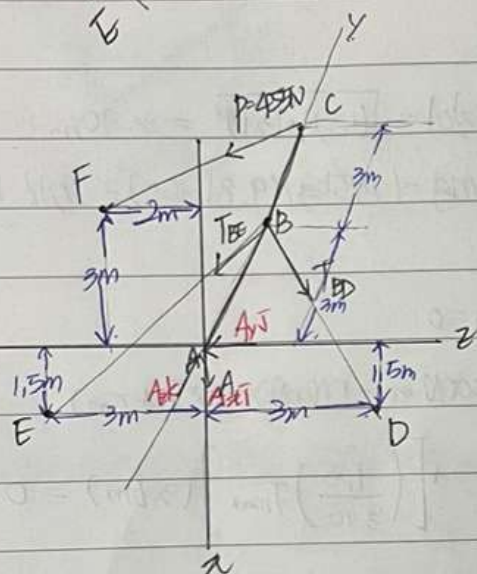
<예제 4.10b>



6m 장의 막 ABC

ball-and-socket 조인트 연결.

$\alpha = 30^\circ$ 일 때, 케이블 BD, BE의 장력?



$r_B = 3j$, $r_C = 6j$

$\vec{CF} = -3i - 6j + 2k$, $CF = 7m$

$\vec{BD} = 1.5i - 3j - 3k$, $BD = 4.5m$

$\vec{BE} = 1.5i - 3j + 3k$, $BE = 4.5m$

$$P = P \frac{\vec{CF}}{CF} = \frac{P}{7} (-3i - 6j + 2k)$$

$$T_{BD} = T_{BD} \frac{\vec{BD}}{BD} = \frac{T_{BD}}{4.5} (1.5i - 3j - 3k) = \frac{T_{BD}}{3} (i - 2j - 2k)$$

$$T_{BE} = T_{BE} \frac{\vec{BE}}{BE} = \frac{T_{BE}}{3} (i - 2j + 2k)$$

$\sum M_A = 0: r_B \times T_{BD} + r_B \times T_{BE} + r_C \times P = 0$

$$\begin{vmatrix} i & j & k \\ 0 & 3 & 0 \\ 1 & -2 & -2 \end{vmatrix} \frac{T_{BD}}{3} + \begin{vmatrix} i & j & k \\ 0 & 3 & 0 \\ 1 & -2 & 2 \end{vmatrix} \frac{T_{BE}}{3} + \begin{vmatrix} i & j & k \\ 0 & 6 & 0 \\ -3 & -6 & 2 \end{vmatrix} \frac{P}{7} = 0$$

$i: -2T_{BD} + 2T_{BE} + \frac{12}{7}P = 0$, $k: -T_{BD} - T_{BE} + \frac{18}{7}P = 0 \Rightarrow -4T_{BD} + \frac{48}{7}P = 0$

$T_{BD} = \frac{12}{7}P$

$-\frac{12}{7}P - T_{BE} + \frac{18}{7}P = 0 \Rightarrow T_{BE} = \frac{6}{7}P$

$P = 455N$, $T_{BD} = \frac{12}{7}(455N) = 780N$, $T_{BE} = \frac{6}{7}(455N) = 390N$

$\sum F = 0: T_{BD} + T_{BE} + P + A = 0$

$$\begin{cases} i: \frac{780}{3} + \frac{390}{3} - \frac{3}{7}(455) + A_x = 0 \Rightarrow A_x = 195.0N \\ j: -\frac{2}{3}(780) - \frac{2}{3}(390) - \frac{6}{7}(455) + A_y = 0 \Rightarrow A_y = 1170N \\ k: -\frac{2}{3}(780) + \frac{2}{3}(390) + \frac{2}{7}(455) + A_z = 0 \Rightarrow A_z = 130.0N \end{cases}$$

$A = -(195.0N)i + (1170N)j + (130.0N)k$