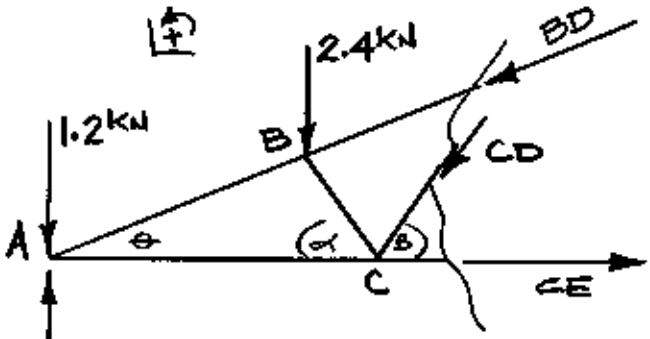
Method of Sections

6.13



$\theta = \tan^{-1}\left[\frac{7.5}{18}\right] = 22.62°$

$\alpha = \tan^{-1}\left[\frac{2.5}{3}\right] = 39.8°$

$\beta = \tan^{-1}\left[\frac{5}{3}\right] = 59.04°$

$R_{A_y} = 3.6^{KN}$

$\Sigma F_x = 0$ = 3 unknowns $= -BD_x - CD_x + CE$

$\Sigma F_y = 0$ = 2 unknowns $= -1.2 - 2.4 + 3.6 - BD_y - CD_y$

$\therefore BD \sin 22.62° = -CD \sin 59.04°$

$\overset{+}{\circlearrowleft}\Sigma M_C = 0$ = eliminates CD and CE

$= -3.6(9m) + 1.2(9m) + 2.4(3m) + \underbrace{BD_x(2.5m) + BD_y(3m)}_{\text{move force to jt. B}}$

or move BD to pt. A $\therefore$ only need $BD_y(9m)$

$BD \sin 22.62°(9) = 32.4 - 10.8 - 7.2 = 14.4$

$\underbrace{BD \sin 22.62° = 1.6\,kN}_{\text{SUB. BACK INTO } \Sigma F_y = 0}$ $\therefore$ **$BD = 4.16\,kN$ (C)**

where $BD \sin 22.62° = 1.6^{KN} = -CD \sin 59.04°$

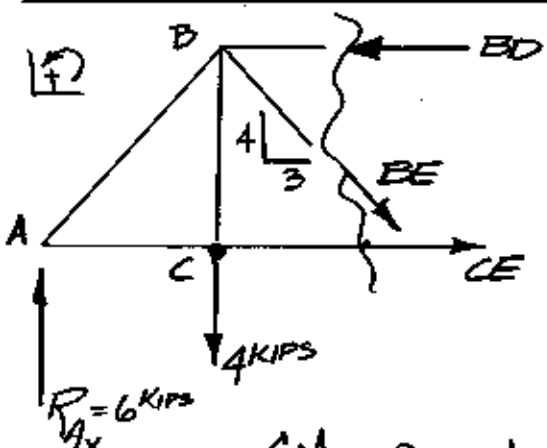
$\therefore CD = -1.866$

$CD = 1.866$ (T)

$\therefore CE = BD \cos 22.62° + CD \cos 59.04° = 4.16 \cos 22.62° + (-1.866)\cos 59.04°$

$\therefore$ **$CE = 2.88$ (T)**

6.15



$\Sigma F_x = 0$ = 3 unknowns

$= -BD + BE_x + CE$

$\Sigma F_y = 0 = 6^{KIPS} - 4^{KIPS} - \frac{4}{5}BE$

$\therefore BE = \frac{5}{4}[6-4] = \frac{5}{2} = \underline{2.5^{KIPS}\ (T)}$

$\Sigma M_B = 0$ eliminates BD, BE and 4 KIPS

$= -6^{KIPS}(9') + CE\,(12'\ HEIGHT)$

$\therefore CE = \frac{6(9)}{12} = \frac{9}{2} = \underline{4.5^{KIPS}\ (T)}$

$\Sigma F_x = 0 = -BD + \frac{3}{5}\left[\frac{5}{2}\right] + 4.5$ $\therefore BD = \frac{3}{2} + 4.5 = \underline{6.0\ (C)}$