Solutions: 21-S-6.5-MK-01

$d1 = 1.65$ m $P_1 = 6$ KN

$d2 = 2.25$ m $P_2 = 2$ KN

$d3 = 1.95$ m

Point A, assume all members in tension

$P_1 = 0\hat{i} - 6\hat{j} + 0\hat{k}$

AE { $r_{AE} = 2.25\hat{i} + 1.95\hat{j} - 1.65\hat{k}$ $\|r_{AE}\| = 3.51$

$u_{AE} = 0.64\hat{i} + 0.556\hat{j} - 0.526\hat{k}$

AB { $r_{AB} = 0\hat{i} + 1.95\hat{j} + 0\hat{k}$

$u_{AB} = 0\hat{i} + 1\hat{j} + 0\hat{k}$

AC { $r_{AC} = 0\hat{i} + 0\hat{j} - 1.65\hat{k}$

$u_{AC} = 0\hat{i} + 0\hat{j} - 1\hat{k}$

$\Sigma F_x = 0 = 0.64\,AE \rightarrow$ **AE = 0 KN**

$\Sigma F_z = 0 = -0.526\,AE - AC \rightarrow$ **AC = 0 KN**

$\Sigma F_y = 0 = -6 + AB \rightarrow$ **AB = 6 KN** Tension

Point B, Assume all unknown members in tension

$P_2 = 0\hat{i} + 0\hat{j} - 2\hat{k}$

$B_A = 0\hat{i} - 6\hat{j} + 0\hat{k}$

BD { $r_{BD} = 0\hat{i} + 0\hat{j} - 1.65\hat{k}$

$u_{BD} = 0\hat{i} + 0\hat{j} - 1\hat{k}$

BE { $r_{BE} = 2.25\hat{i} + 0\hat{j} - 1.65\hat{k}$ $\|r_{BE}\| = 2.92$

$u_{BE} = 0.77\hat{i} + 0\hat{j} - 0.64\hat{k}$

BC { $r_{BC} = 0\hat{i} - 1.95\hat{j} - 1.65\hat{k}$ $\|r_{BC}\| = 2.69$

$u_{BC} = 0\hat{i} - 0.72\hat{j} - 0.69\hat{k}$

$\Sigma f_x = 0 =$ $0.77\,BE$ → $BE = 0$ kN

$\Sigma f_y = 0 =$ $-6 - 0.72\,BC$ → $BC = -8.33$ kN → $BC = 8.33$ kN comp

$\Sigma f_z =$ $-2 - BD - 0.69\,BC$ → $BD = 3.74$ Tension

No forces in x direction ∴ f_{CE}, F_{CD}, $f_{DE} = 0$