

<2.15 >

$$2.101 \quad \mathbf{P} = -P \mathbf{j}, \quad F_{BA} = 146 \text{ N}$$

$$d_{BA} = \sqrt{(-0.220 \text{ m})^2 + (0.192 \text{ m})^2 + 0^2} = 0.292 \text{ m}$$

$$\mathbf{F}_{BA} = F_{BA} \lambda_{BA} = \frac{146 \text{ N}}{0.292 \text{ m}} [(-0.220 \text{ m})\mathbf{i} + (0.192 \text{ m})\mathbf{j}] = (-110 \text{ N})\mathbf{i} + (96 \text{ N})\mathbf{j}$$

$$d_{CA} = \sqrt{0^2 + (0.192 \text{ m})^2 + (-0.144 \text{ m})^2} = 0.240 \text{ m}$$

$$\mathbf{F}_{CA} = F_{CA} \lambda_{CA} = \frac{F_{CA}}{0.240 \text{ m}} [(0.192 \text{ m})\mathbf{j} + (-0.144 \text{ m})\mathbf{k}] = F_{CA} [0.80 \mathbf{j} + 0.60 \mathbf{k}]$$

$$d_{DA} = \sqrt{(0.192 \text{ m})^2 + (0.192 \text{ m})^2 + (0.096 \text{ m})^2} = 0.288 \text{ m}$$

$$\begin{aligned} \mathbf{F}_{DA} = F_{DA} \lambda_{DA} &= \frac{F_{DA}}{0.288 \text{ m}} [(0.192 \text{ m})\mathbf{i} + (0.192 \text{ m})\mathbf{j} + (0.096 \text{ m})\mathbf{k}] \\ &= F_{DA} [0.66667 \mathbf{i} + 0.66667 \mathbf{j} + 0.33333 \mathbf{k}] \end{aligned}$$

$$\mathbf{F} = 0 \quad \mathbf{F}_{BA} + \mathbf{F}_{CA} + \mathbf{F}_{DA} + \mathbf{P} = 0$$

$$x \quad (-110 \text{ N}) + 0 + 0.66667 F_{DA} = 0 \quad F_{DA} = 165.0 \text{ N}$$

$$z \quad 0 + 0.60 F_{CA} + 0.33333 F_{DA} = 0 \quad F_{CA} = 91.7 \text{ N}$$

$$y \quad (96 \text{ N}) + 0.80 F_{CA} + 0.66667 F_{DA} - P = 0 \quad P = 279 \text{ N}$$

$$2.105 \quad T_{AB} = 3 \text{ kN}, \quad \mathbf{W} = -W \mathbf{j}$$

$$d_{AB} = \sqrt{(-0.720 \text{ m})^2 + (1.2 \text{ m})^2 + (-0.54 \text{ m})^2} = 1.5 \text{ m}$$

$$\begin{aligned} \mathbf{T}_{AB} = T_{AB} \lambda_{AB} &= \frac{3 \text{ kN}}{1.5 \text{ m}} [(-0.720 \text{ m})\mathbf{i} + (1.2 \text{ m})\mathbf{j} + (-0.54 \text{ m})\mathbf{k}] \\ &= (-1.440 \text{ kN}) \mathbf{i} + (2.4 \text{ kN}) \mathbf{j} - (1.08 \text{ kN}) \mathbf{k} \end{aligned}$$

$$d_{AC} = \sqrt{0^2 + (1.2 \text{ m})^2 + (0.64 \text{ m})^2} = 1.36 \text{ m}$$

$$\mathbf{T}_{AC} = T_{AC} \lambda_{AC} = \frac{T_{AC}}{1.36 \text{ m}} [(1.2 \text{ m})\mathbf{j} + (0.64 \text{ m})\mathbf{k}] = T_{AC} [0.88235 \mathbf{j} + 0.47059 \mathbf{k}]$$

$$d_{AD} = \sqrt{(0.8 \text{ m})^2 + (1.2 \text{ m})^2 + (-0.54 \text{ m})^2} = 1.54 \text{ m}$$

$$\begin{aligned} \mathbf{T}_{AD} = T_{AD} \lambda_{AD} &= \frac{T_{AD}}{1.54 \text{ m}} [(0.8 \text{ m})\mathbf{i} + (1.2 \text{ m})\mathbf{j} + (-0.54 \text{ m})\mathbf{k}] \\ &= T_{AD} [0.51948 \mathbf{i} + 0.77922 \mathbf{j} - 0.35065 \mathbf{k}] \end{aligned}$$

$$\mathbf{F} = 0 \quad \mathbf{T}_{AB} + \mathbf{T}_{AC} + \mathbf{T}_{AD} + \mathbf{W} = 0$$

$$x \quad (-1.440 \text{ kN}) + 0 + 0.51948 T_{AD} = 0 \quad T_{AD} = 2.77 \text{ kN}$$

$$z \quad (-1.08 \text{ kN}) + 0.47059 T_{AC} - 0.35065 T_{AD} = 0 \quad T_{AC} = 4.359 \text{ kN}$$

$$y \quad (2.4 \text{ kN}) + 0.88235 T_{AC} + 0.77922 T_{AD} - W = 0 \quad W = 8.40 \text{ kN}$$