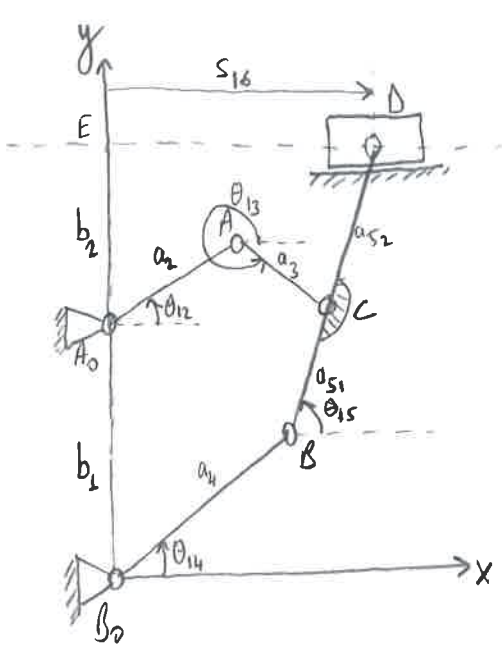


1



a)  $\vec{A_0A} + \vec{AC} = \vec{A_0B_0} + \vec{B_0B} + \vec{BC}$

$a_2 \cdot e^{i\theta_{12}} + a_3 \cdot e^{i\theta_{13}} = -b_1 i + a_4 e^{i\theta_{14}} + a_{51} e^{i\theta_{15}}$

$B_0B + B_0D = B_0E + E_0D$

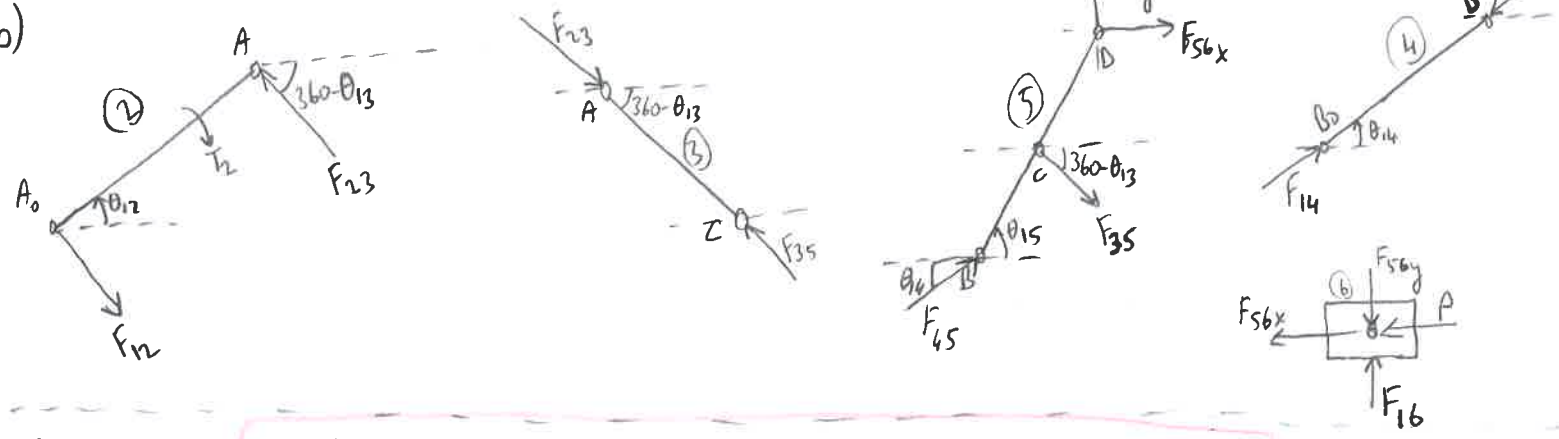
$a_4 \cdot e^{i\theta_{14}} + a_5 \cdot e^{i\theta_{15}} = (b_1 + b_2) i + s_{16}$

$a_2 \cos\theta_{12} + a_3 \cos\theta_{13} = a_4 \cos\theta_{14} + a_{51} \cos\theta_{15}$   
 $a_2 \sin\theta_{12} + a_3 \sin\theta_{13} = a_4 \sin\theta_{14} + a_{51} \sin\theta_{15} - b_2$   
 $a_4 \cos\theta_{14} + a_5 \cos\theta_{15} = s_{16}$   
 $a_4 \sin\theta_{14} + a_5 \sin\theta_{15} = b_1 + b_2$

1  
Kann  
denke.

$\theta_{12}, \theta_{13}, \theta_{14}, \theta_{15}, s_{16}$  kann denkleinende: parameter.  
 $\theta_{12} = 60^\circ$  girds durch verilmiş.

b)



$\sum \underline{M}_{A_0} = 0 \quad -T_2 \underline{k} + a_2 (\cos\theta_{12} \underline{i} + \sin\theta_{12} \underline{j}) \times (-F_{23} \cos\theta_{13} \underline{i} - F_{23} \sin\theta_{13} \underline{j}) = 0$

$-T_2 \underline{k} - a_2 F_{23} \cos\theta_{12} \sin\theta_{13} \underline{k} + a_2 F_{23} \sin\theta_{12} \cos\theta_{13} \underline{k} = 0 \Rightarrow T_2 = a_2 F_{23} \sin(\theta_{12} - \theta_{13})$

$F_{23} = \frac{T_2}{a_2 \cdot \sin(\theta_{12} - \theta_{13})}$

$F_{12} + F_{23} = 0 \Rightarrow F_{12} = F_{23}$

$F_{23} + F_{35} = 0 \Rightarrow F_{23} = F_{35}$

$F_{56x} + F_{45} \cos\theta_{14} + F_{35} \cos\theta_{13} = 0$

$F_{56y} + F_{45} \sin\theta_{14} + F_{35} \sin\theta_{13} = 0$

$\sum \underline{M}_O = 0$

$$-a_5 (\cos \theta_{15} \underline{i} + \sin \theta_{15} \underline{j}) \times F_{45} (\cos \theta_{14} \underline{i} + \sin \theta_{14} \underline{j}) +$$

$$-a_5 (\cos \theta_{15} \underline{i} + \sin \theta_{15} \underline{j}) \times F_{35} (\cos \theta_{13} \underline{i} + \sin \theta_{13} \underline{j}) = 0$$

$$-a_5 F_{45} \sin(\theta_{14} - \theta_{15}) \underline{k} - a_5 F_{35} \sin(\theta_{13} - \theta_{15}) \underline{k} = 0$$

$$F_{45} = - \frac{a_5 F_{35} \cdot \sin(\theta_{13} - \theta_{15})}{a_5 \sin(\theta_{14} - \theta_{15})} = - \frac{a_5 \sin(\theta_{13} - \theta_{15})}{a_5 \sin(\theta_{14} - \theta_{15})} \cdot \frac{T_2}{a_2 \sin(\theta_{12} - \theta_{13})}$$

$$F_{56x} = \left( \frac{a_5 \sin(\theta_{13} - \theta_{15})}{a_5 \sin(\theta_{14} - \theta_{15})} \cdot \cos \theta_{14} - \cos \theta_{13} \right) \frac{T_2}{a_2 \sin(\theta_{12} - \theta_{13})}$$

$$F_{56y} = \left( \frac{a_5 \sin(\theta_{13} - \theta_{15})}{a_5 \sin(\theta_{14} - \theta_{15})} \sin \theta_{14} - \sin \theta_{13} \right) \frac{T_2}{a_2 \sin(\theta_{12} - \theta_{13})}$$

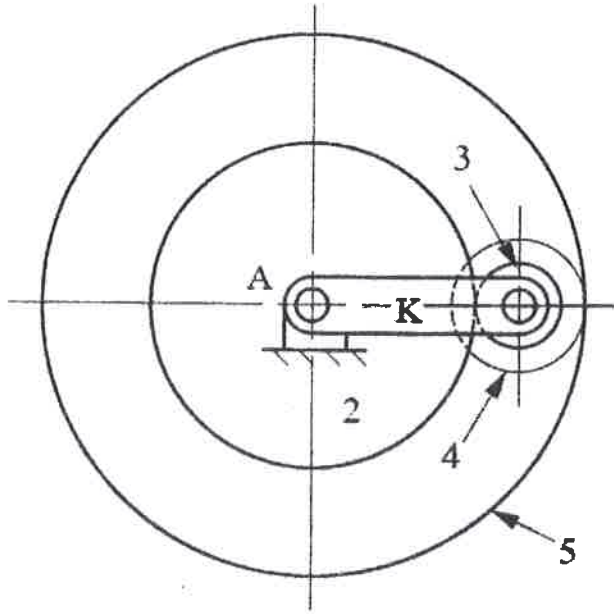
$$-F_{56x} - P = 0 \Rightarrow P = -F_{56x}$$

$$-F_{56y} + F_{16} = 0 \Rightarrow F_{16} = F_{56y}$$

$$P = - \left( \frac{a_5 \sin(\theta_{13} - \theta_{15})}{a_5 \sin(\theta_{14} - \theta_{15})} \cos \theta_{14} - \cos \theta_{13} \right) \frac{T_2}{a_2 \sin(\theta_{12} - \theta_{13})}$$

$$F_{14} + F_{45} = 0 \quad F_{14} = F_{45}$$

2.)



$$\begin{aligned} T_2 &= 60T \\ T_3 &= 16T \\ T_4 &= 24T \\ T_5 &= 100T \end{aligned}$$

Şekildeki planet dişli mekanizmasında, 3 ve 4 nolu dişliler bir bileşik dişli oluşturur. 5 numaralı dişli saatin tersi yönünde 100 dev/dk hız ile dönmektedir. 2 numaralı dişli sabitlenmiştir. Kolun dönme hızını ve yönünü bulunuz.

$$R_{23} = -\frac{T_2}{T_3} = -\frac{60}{16} = \frac{n_3 - n_k}{n_2 - n_k}$$

$$R_{45} = +\frac{T_4}{T_5} = \frac{24}{100} = \frac{n_5 - n_k}{n_4 - n_k}$$

$$R_{23} \cdot R_{45} = \frac{n_3 - n_k}{n_2 - n_k} \cdot \frac{n_5 - n_k}{n_4 - n_k} = -\frac{60}{16} \cdot \frac{24}{100}$$

$$\frac{n_5 - n_k}{n_2 - n_k} = -\frac{9}{10} \quad (n_2 = 0)$$

$$\frac{-100 - n_k}{-n_k} = -\frac{9}{10}$$

$$n_k = 52,63 \text{ dev/dk} \quad (\text{saatin tersi})$$