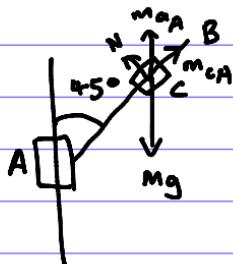


1)



$$m_A a_{CA} \sin 45^\circ - N \sin 45^\circ = 0$$

$$N = m_A a_{CA} - (1)$$

$$m_A a_{CA} \cos 45^\circ + N \cos 45^\circ + m_A g = m_A g - (2)$$

Sub (1) into (2)

$$2N \cos 45^\circ + 2(4) = 2(9.81)$$

$$N \cos 45^\circ = 13.81$$

$$N = 13.81\sqrt{2}$$

$$\approx 19.53 \text{ N}$$

From (1):

$$m_A a_{CA} = N$$

$$a_{CA} = \frac{N}{m} \\ = \frac{13.81\sqrt{2}}{2}$$

$$= \frac{13.81}{\sqrt{2}}$$

$$\approx 9.765 \text{ ms}^{-2}$$

$$\vec{a}_C = \vec{a}_A + \vec{a}_{CA}$$

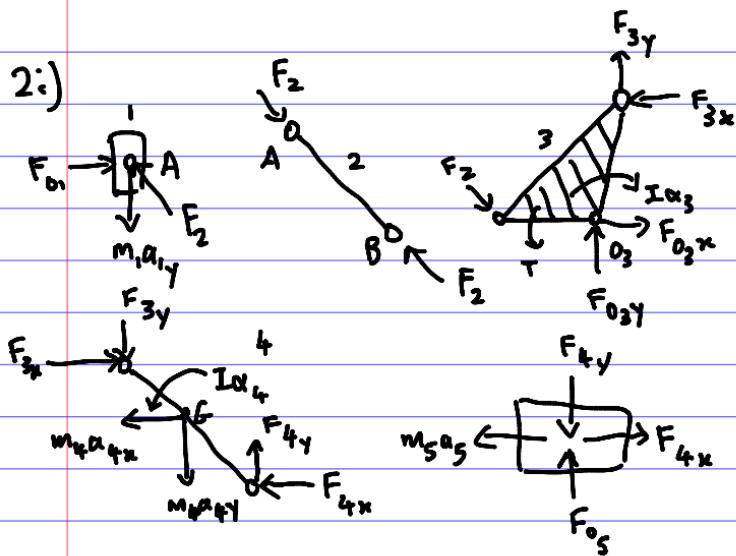
$$= 4\hat{j} + \frac{13.81}{\sqrt{2}} \cos 45^\circ \hat{j} + \frac{13.81}{\sqrt{2}} \sin 45^\circ \hat{i}$$

$$= 6.905\hat{i} + 10.905\hat{j}$$

$$= 12.9072867 \angle -122.3418182^\circ$$

$$\approx 12.9 \angle -122^\circ$$

2:)



ii) For link 1:

$$F_2 \sin 45^\circ = F_{01}$$

$$F_2 \cos 45^\circ = m_1 a_{1y}$$

For link 3:

$$T - I \alpha_3 + 3F_2 \sin 45^\circ + 3F_{3y} \cos 45^\circ + 3F_{3x} \sin 45^\circ = 0$$

$$F_2 \cos 45^\circ + F_{3x} = F_{3x}$$

$$F_2 \sin 45^\circ = F_{3y} + F_{03y}$$

For link 4:

$$I \alpha_4 - 4.24F_{3x} \sin 30^\circ + 4.24F_{3y} \cos 30^\circ + 2.12m_4 a_{4x} \sin 30^\circ$$

$$+ 2.12m_4 a_{4y} \cos 30^\circ = 0$$

$$F_{3x} = m_4 a_{4x} + F_{4x}$$

$$F_{4y} = m_4 a_{4y} + F_{3y}$$

For link 5:

$$F_{4x} = m_5 a_5$$

$$F_{4y} = F_{05}$$