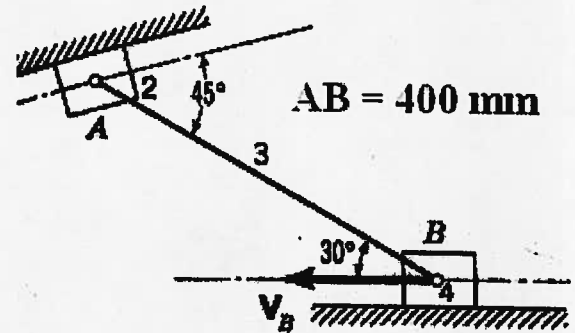


Mechanical Industrial Engineering Department, Concordia University
MECH 343/4 T and M: Theory of Machines 1
Assignment 2

Question 1:

Blocks (2) and (4) of the mechanism shown remain in contact with frame (1) throughout their motion. Here, $AB = 400$ mm and the block B moves to the left at 20 m/s.

- Using the velocity components of A and B along AB, determine the velocity of block A.
- Using $\vec{V}_{B|A} = \vec{V}_B - \vec{V}_A$, determine the velocity of A relative to B
- Determine the angular velocity of link (3)

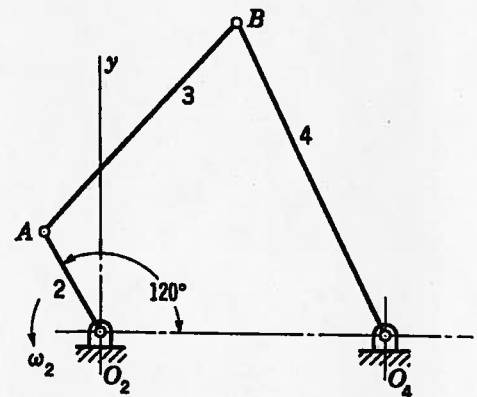


Question 2:

Crank (2) of the four-bar linkage shown rotates in the counter-clockwise sense at 50 rad/s angular velocity. Here, $O_2O_4 = 250$ mm, $O_2A = 100$ mm, $AB = 250$ mm and $O_4B = 300$ mm.

- Draw the given configuration of the mechanism to the scale of 1 cm = 50 mm.
- Using the transmission line concept, determine the angular velocity of the output link (4).

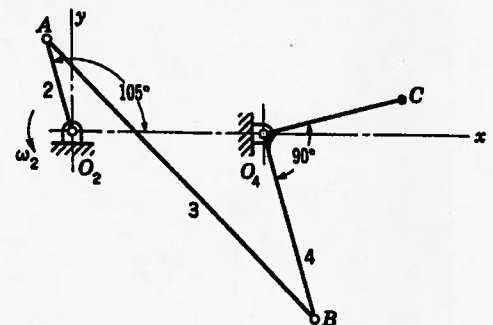
Hint: Measure the necessary lengths from the configuration diagram. Whenever we say length, it implies the actual length.



Question 3:

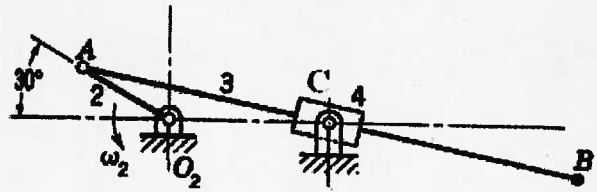
Crank (2) of the four-bar linkage shown rotates at 50 rad/s angular velocity in the CCW sense. BO_4C is the output link (4). Here, $O_2O_4 = 300$ mm, $O_2A = 100$ mm, $AB = 400$ mm, $O_4B = 300$ mm and $O_4C = 250$ mm.

- Draw the given configuration diagram to the scale of 1 cm = 50 mm.
- Using the transmission line concept, determine the angular velocity of the output link (4).
- Determine the velocity of the point C on link (4).



Question 4:

Crank (2) of the mechanism shown rotates in the CCW sense at 50 rad/s angular velocity. Turnion (4) rotates about a fixed pin at C. Link (3) slides through the turnion (4). Here, $O_2A = 75$ mm, $O_2C = 150$ mm and $AB = 300$ mm.



- Draw the configuration diagram to a scale of 1 cm = 25 mm.
- Analyzing the velocity components of A and C_3 along AC, determine the velocity of point C on link (3)
- Using the relative velocity V_{A/C_3} , determine the angular velocity of link (3)
- Determine the velocity of point B_3 on link 3

Question 5:

A circular cam (2) of 30 mm radius transmits oscillating motion to the follower (4) of the mechanism shown. Here, $O_2O_4 = 100$ mm and $O_2C = 20$ mm. Cam (2) rotates at 50 rad/s angular velocity in CW sense.

- Draw the full-size configuration diagram
- Determine the normal velocity component of the contact point A on the cam (2)
- Determine the angular velocity of the follower (4)

