

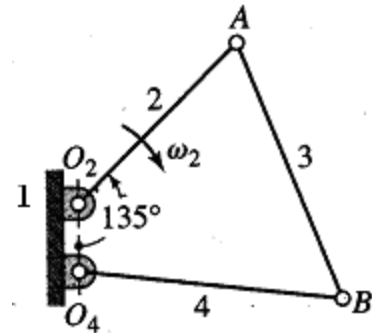
MECH 343/2 X: Theory of Machines 1, Fall 2011-12
Instructor: Dr C. Rajalingham

Assignment 5: (Lectures: Oct 04 & Oct 06)

Question 1:

Crank O_2A of a drag-link mechanism rotates at 50 rad/s in the clockwise sense. Here, $O_2O_4 = 100$ mm, $O_2A = 350$ mm, $AB = 425$ mm and $O_4B = 400$ mm. For the configuration shown, crank O_2A makes 135° with the line of centers O_2O_4 .

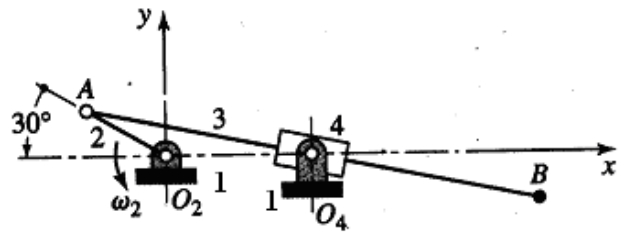
- Draw the configuration diagram using a scale of 1 cm = 100 mm
- Draw the velocity polygon to a scale of 1 cm = 10 m/s.
- Determine the angular velocities of the coupler AB and the drag-link O_4B



Question 2:

Crank O_2A of the mechanism, rotates at 50 rad/s in the counter-clockwise sense. Here, $O_2O_4 = 200$ mm, $O_2A = 100$ mm and $AB = 400$ mm. For the configuration shown, crank O_2A makes 150° with the line of centers O_2O_4 .

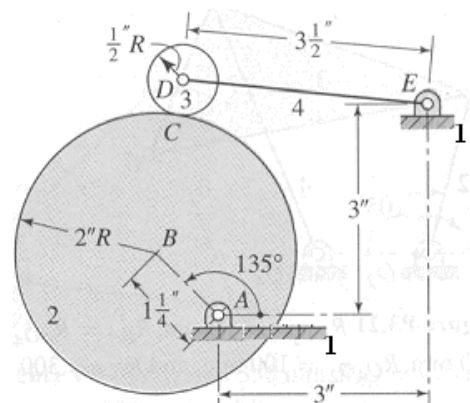
- Draw the configuration diagram using a scale of 1 cm = 50 mm
- Draw the velocity polygon to a scale of 1 cm = 2 m/s
- Determine
 - the angular velocity of link AB
 - the velocity of point B



Question 3:

The circular cam 2 rotates at 25 rad/s in the clockwise sense. Roller 3 rolls without slipping on the cam surface. The necessary dimensions are shown in Figure.

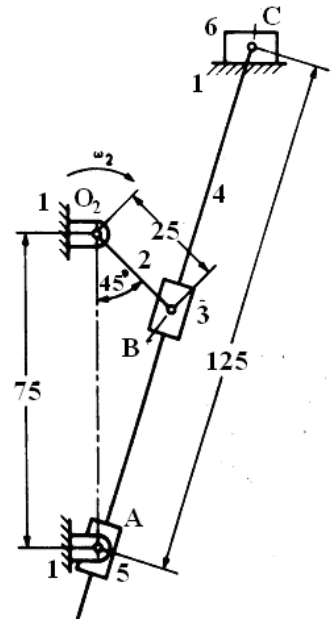
- Draw the configuration using a scale 1 cm = 0.5 in
- Draw the velocity polygon to a scale of 1 cm = 12 in/s
- Determine the angular velocities of the roller 3 and the follower 4



Question 4:

In the mechanism shown, the rotation of the crank O_2B imparts a reciprocating motion to slider C. For the configuration shown the slider moves at 3 m/s in the rightward direction.

- (a) Draw the configuration diagram to a scale of 1 cm = 25 mm
- (b) Draw the velocity Polygon to a scale of 1 cm = 0.5 m/s
- (c) Determine,
 - (i) the angular velocity of crank 2
 - (ii) the angular velocity of link 4
 - (iii) the velocity of sliding of collar 3 relative to link 4
 - (iv) the velocity of sliding of link 4 relative to collar 5



Question 5:

The cam profile 2 shown consists of four circular arcs. Here O_2A is perpendicular to O_2B . Cam, which rotates at 50 rad/s in counter-clockwise sense, imparts reciprocating motion to a flat footed follower 3. The dimensions are shown in Figure.

- (a) Draw a full size configuration diagram
- (b) Draw the velocity polygon to a scale of 1 cm = 0.25 m/s.
- (c) Determine
 - (i) the velocity of the follower
 - (ii) the velocity of rubbing at the contact point D

