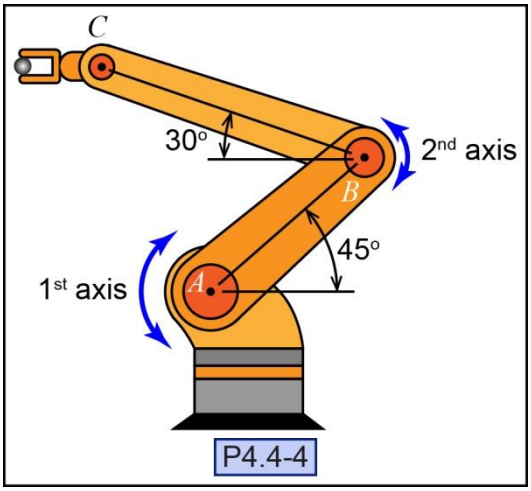
P4.4-4) Consider the articulated robot arm shown. It is desired that the robot be controlled to move joint C vertically upward with a speed of 0.5 m/s at the instant shown. Determine the angular velocities that the motors at joint A (driving arm AB) and joint B (driving arm BC) must have to achieve this motion. Let arm AB have length 1.7 m and arm BC have length 2.5 m.



Given:

Find:

Solution:

Determine the velocity of point B as a function of the angular speed of arm AB.

Draw $\mathbf{v}_B$ and $\boldsymbol{\omega}_{AB}$ on the figure.

$\mathbf{v}_B(\omega_{AB})$ = _____

Determine the velocity of point C as a function of the angular speed of arm AB and BC.

Draw $\mathbf{v}_C$ and $\boldsymbol{\omega}_{BC}$ on the figure.

$\mathbf{v}_C(\omega_{AB}, \omega_{BC})$ = _____

Use the information given with regards to $\mathbf{v}_C$ to solve for the unknown angular velocities.

$\boldsymbol{\omega}_{AB}$ = _____

$\boldsymbol{\omega}_{BC}$ = _____