MMAN2300 Engineering Mechanics 2
Part B: Rigid Body Dynamics
Problem solving session – 3
WEEK 9_S2_2018

Questions 1-4:

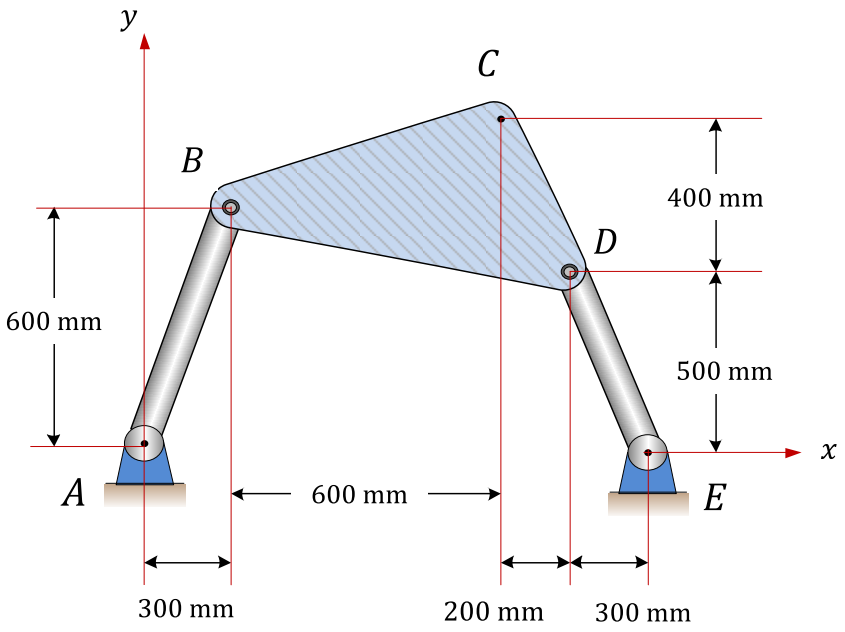
For the mechanism shown below, $\omega_{AB} = 4\,\text{rad/s}$ counter clockwise and $\alpha_{AB} = 12\,\text{rad/s}^2$ counter clockwise. Calculate:

(a) the angular velocity of *BCD*,

(b) the angular acceleration of *BCD*,

(c) the magnitude of the acceleration of point *C*,

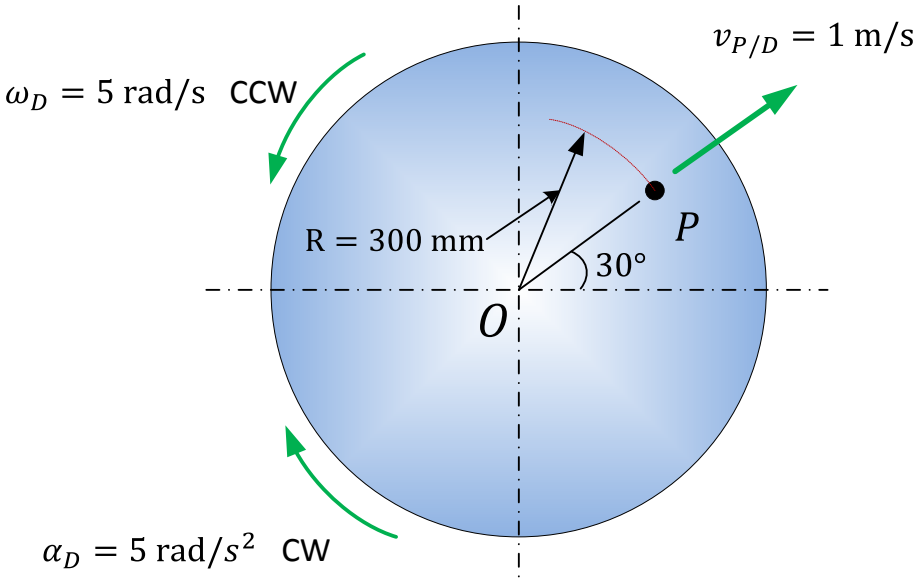
(d) the direction of the acceleration of point *C*.



$[\omega_{BCD} = 3.567\,\text{rad/s CW};\ \alpha_{BCD} = 39.53\ \text{rad/s}^2\ \text{CW};\ a_c = 34.42\,\text{m/s}^2]$

Questions 5-6:

An object, *P*, moves on a disc which rotates in a horizontal plane, as shown in the figure below. The disc rotates with an angular velocity of 5 rad/s and an angular acceleration of 5 rad/s^2. The directions of the angular velocity and the angular acceleration are shown in the figure. The object moves radially outward on the disc with a constant velocity relative to the disc of 1 m/s. Calculate the acceleration (magnitude and direction) of the object.



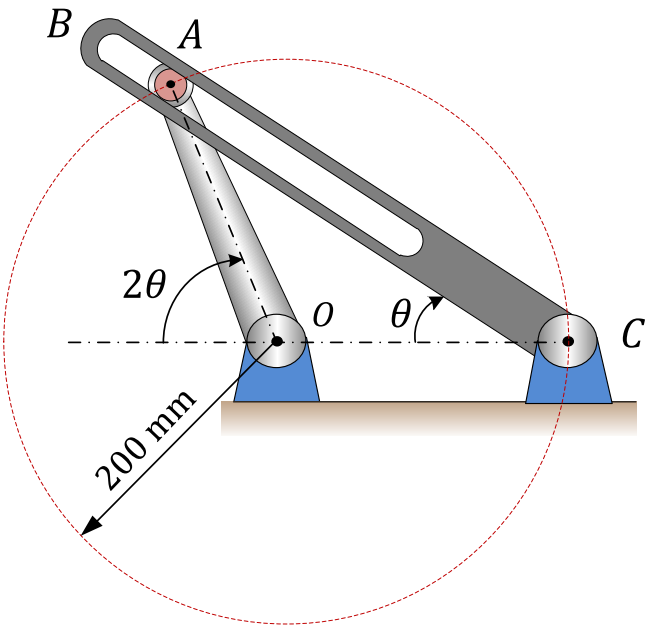
$[a_p = 11.335 \text{ m/s}^2]$

Questions 7-8:

The crank *OA* revolves clockwise with a constant angular velocity of 10 rad/s within a limited arc of its motion. For the position $\theta = 30^{\circ}$, determine:

(a) the angular velocity of the slotted link *CB*,

(b) the acceleration (magnitude) of point *A* as measured relative to the slot in *CB*.



$[\omega_{BC} = 5.0 \text{ rad/s CW};\ a_{A/CB} = 8.66 \text{ m/s}^2]$