ME 274 – Spring 2026 – Quiz05

Name SOLUTION

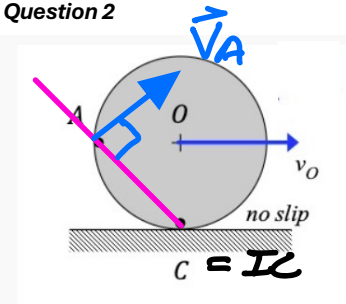
Question 1

A particle P moves with a velocity $\vec{v}$ and acceleration $\vec{a}$. These vectors are expressed in terms of the Cartesian components of: $\vec{v} = \left(-40\hat{i} + 30\hat{j}\right)\ m/s$ and $\vec{a} = \left(12\hat{i} + 10\hat{j}\right)\ m/s^2$. Indicate below the most accurate description of the rate of change in speed of P:

a. P is increasing in speed
b. P is moving with constant speed
c. P is decreasing in speed
d. More information is needed

$$\dot{v} = \vec{a}\cdot\hat{e}_t = (12\hat{i}+10\hat{j})\cdot\left(\frac{-40\hat{i}+30\hat{j}}{50}\right)$$
$$= -\frac{48}{5}\ m/s^2 < 0$$

Question 2



Choose the figure below that most accurately represents the velocity $\vec{v}_A$ of point A on the circumference of the disk.

a. Figure (a)
b. Figure (b)
c. Figure (c)
d. Figure (d)

Figure (a)

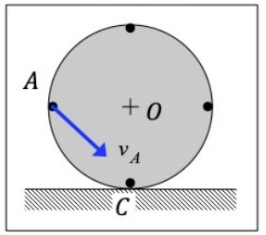


Figure (b)

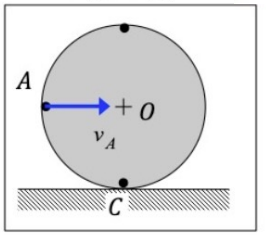


Figure (c)

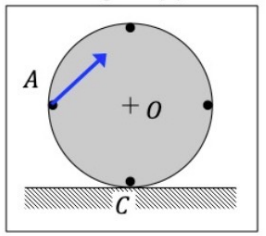
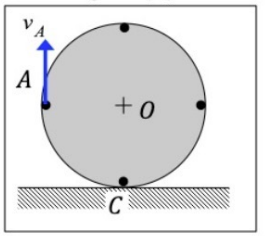


Figure (d)



Question 3

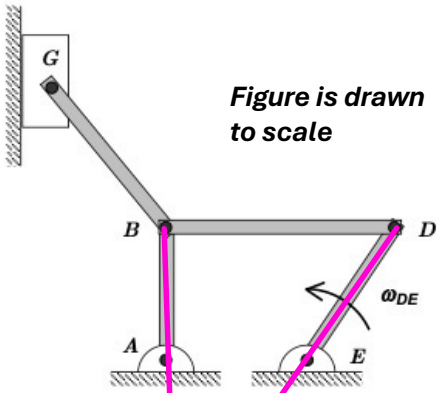


Figure is drawn to scale

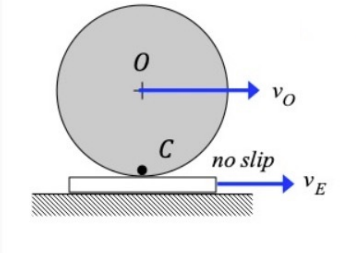
a. $|\omega_{BD}| > |\omega_{AB}|$
b. $|\omega_{BD}| = |\omega_{AB}|$
c. $|\omega_{BD}| < |\omega_{AB}|$
d. More information needed

C = IC_AB

$$v_B = |\vec{r}_{B/C}|\,\omega_{BD} = |\vec{r}_{B/A}|\,\omega_{AB} \Rightarrow \frac{\omega_{AB}}{\omega_{BD}} = \frac{|\vec{r}_{B/D}|}{|\vec{r}_{B/A}|} > 1$$

Question 4

A circular disk rolls without slipping to the right on a moving block with its center O having a speed of v_O. The block moves to the right with a speed of v_E, where $v_E > v_O$.



Choose the figure below that most accurately represents the velocity $\vec{v}_C$ of the contact point C on the disk.

a. Figure (a)
b. Figure (b)
c. Figure (c)
d. Figure (d)

No slip $\Rightarrow \vec{v}_C = \vec{v}_E$

Figure (a)

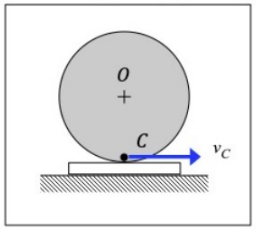


Figure (b)

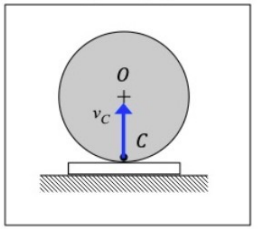


Figure (c)

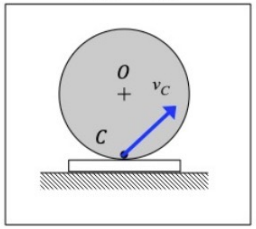
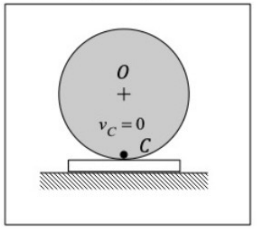



Figure (d)