

ĐÁP ÁN THI HỌC KỲ II - MÔN NGUYÊN LÝ MÁY

Bài 1:

$$\omega_3 = \omega_2; \quad \vec{v}_{B_2} = \vec{v}_{B_1} = \left\langle \begin{array}{l} \perp AB (\uparrow) \\ a\omega \end{array} \right\rangle$$

$$\vec{v}_{C_3} = 0; \quad \vec{v}_{C_2} = \vec{v}_{C_3} + \vec{v}_{C_2C_3} = \vec{v}_{C_2C_3} = \left\langle \begin{array}{l} // BC \\ ? \end{array} \right\rangle$$

$$\begin{array}{l} \vec{v}_{C_2} \\ // BC \\ ? \end{array} = \begin{array}{l} \vec{v}_{B_2} \\ \perp AB (\uparrow) \\ a\omega \end{array} \quad \vec{v}_{C_2B_2} = \left\langle \begin{array}{l} \perp BC \\ ? = BC\omega_2 \end{array} \right\rangle \Rightarrow \begin{cases} \vec{v}_{C_2B_2} = 0 \Rightarrow \omega_3 = \omega_2 = 0 \\ \vec{v}_{C_2} = \vec{v}_{C_2C_3} = \vec{v}_{B_2} = \left\langle \begin{array}{l} \perp AB (\uparrow) \\ a\omega \end{array} \right\rangle \end{cases} \quad \boxed{1 \text{ điểm}}$$

thuận

$$\Delta C_2 b_2 d_2 \sim \Delta C_2 B_2 D_2 \Rightarrow d_2 \equiv c_2 \equiv b_2 \Rightarrow \vec{v}_{D_2} = \vec{v}_{B_2} = \left\langle \begin{array}{l} \perp AB (\uparrow) \\ a\omega \end{array} \right\rangle \quad \boxed{0,5 \text{ điểm}}$$

$$\varepsilon_3 = \varepsilon_2; \quad \vec{a}_{B_2} = \vec{a}_{B_1} = \left\langle \begin{array}{l} \uparrow\uparrow \vec{BA} (\rightarrow) \\ a\omega^2 \end{array} \right\rangle$$

$$\vec{a}_{C_3} = 0; \quad |\vec{a}_{C_2C_3}^k| = 2\omega_2 v_{C_2C_3} = 0 \quad (\omega_2 = 0)$$

$$\vec{a}_{C_2} = \vec{a}_{C_3} + \vec{a}_{C_2C_3}^k + \vec{a}_{C_2C_3}^r = \vec{a}_{C_2C_3}^r = \left\langle \begin{array}{l} // BC \\ ? \end{array} \right\rangle$$

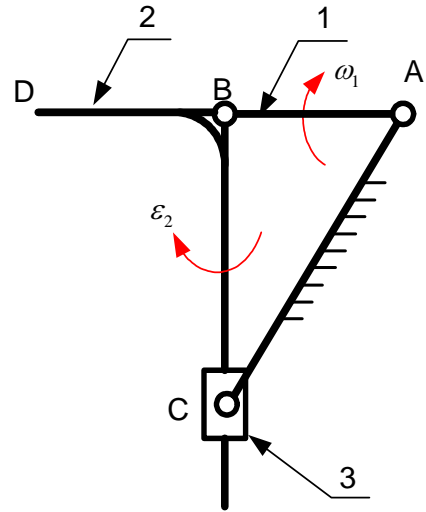
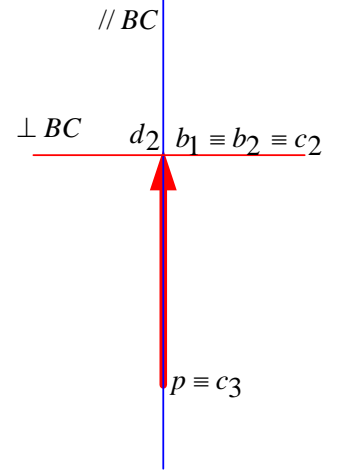
$$\vec{a}_{C_2} = \vec{a}_{B_2} + \vec{a}_{C_2B_2}^n + \vec{a}_{C_2B_2}^t \quad \boxed{1 \text{ điểm}}$$

$$\begin{array}{l} // BC \\ ? \end{array} \rightarrow \begin{array}{l} \uparrow\uparrow \vec{CB} \\ a\omega^2 \end{array} \quad \perp BC \quad BC\omega_2 = 0 \quad ? = BC\varepsilon_2$$

$$\Rightarrow \begin{cases} \vec{a}_{C_2B_2}^t = -\vec{a}_{B_2} = \left\langle \begin{array}{l} \leftarrow \\ a\omega^2 \end{array} \right\rangle \Rightarrow \varepsilon_3 = \varepsilon_2 = \left\langle \begin{array}{l} \curvearrowright \\ \frac{a\omega^2}{a\sqrt{3}} = \frac{\omega^2}{\sqrt{3}} \end{array} \right\rangle \quad \boxed{0,5 \text{ điểm}} \\ \vec{a}_{C_2} = 0 \end{cases}$$

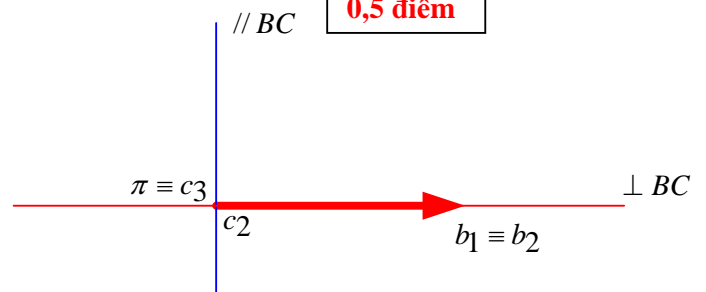
Họa đồ vận tốc

0,5 điểm

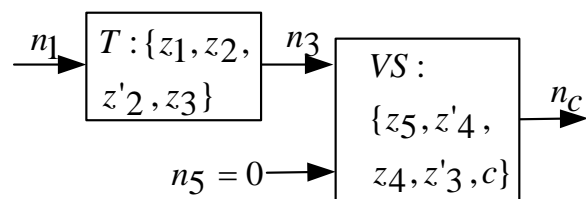
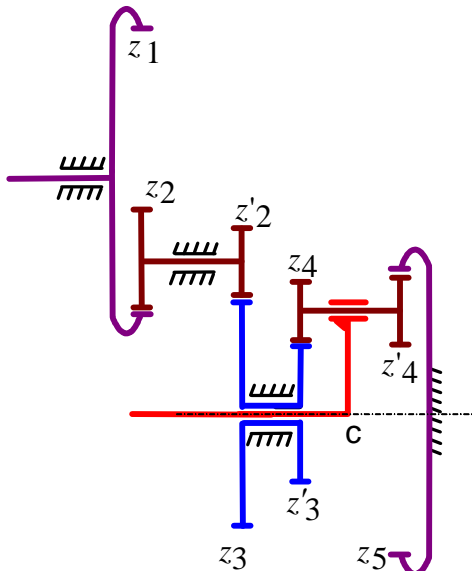


Họa đồ gia tốc

0,5 điểm



Bài 2:



$$a. T = \{z_1, z_2, z'_2, z_3\} \Rightarrow \frac{\omega_1}{\omega_3} = (-1)^1 \frac{z_2 z_3}{z_1 z'_2} = -\frac{30.60}{180.20} = -\frac{1}{2}$$

$$\Rightarrow \omega_3 = -2\omega_1 \quad \boxed{0,5 \text{ điểm}}$$

$$VS = \{z_5, z'_4, z_4, z'_3, c\} \Rightarrow \frac{\omega_3 - \omega_c}{\omega_5 - \omega_c} = (-1)^1 \frac{z_4 z_5}{z'_3 z'_4} = -\frac{18.180}{40.20} = -\frac{81}{20}$$

$$\Rightarrow \frac{(-2\omega_1) - \omega_c}{0 - \omega_c} = -\frac{81}{20} \Rightarrow \frac{\omega_1}{\omega_c} = -\frac{101}{40} \quad \boxed{1 \text{ điểm}}$$

$$b. \frac{\omega_1}{\omega_c} = -\frac{101}{40}; \frac{\omega_2}{\omega_c} = \frac{\omega_2}{\omega_1} \frac{\omega_1}{\omega_c} = \frac{z_1}{z_2} \left(-\frac{101}{40}\right) = \frac{180}{30} \left(-\frac{101}{40}\right) = -\frac{606}{40}; \quad \boxed{0,5 \text{ điểm}}$$

$$\frac{\omega_3}{\omega_c} = \frac{\omega_3}{\omega_2} \frac{\omega_2}{\omega_c} = \left(-\frac{z'_2}{z_3}\right) \left(-\frac{606}{40}\right) = \left(-\frac{20}{60}\right) \left(-\frac{606}{40}\right) = \frac{101}{20}; \quad \boxed{0,5 \text{ điểm}}$$

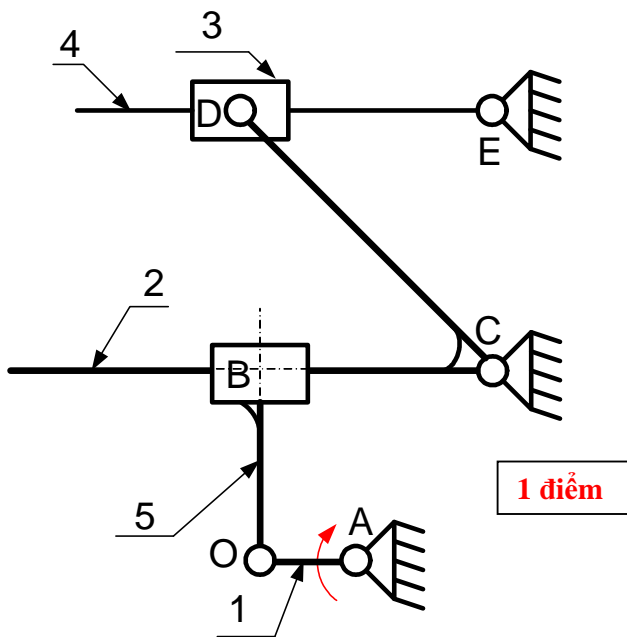
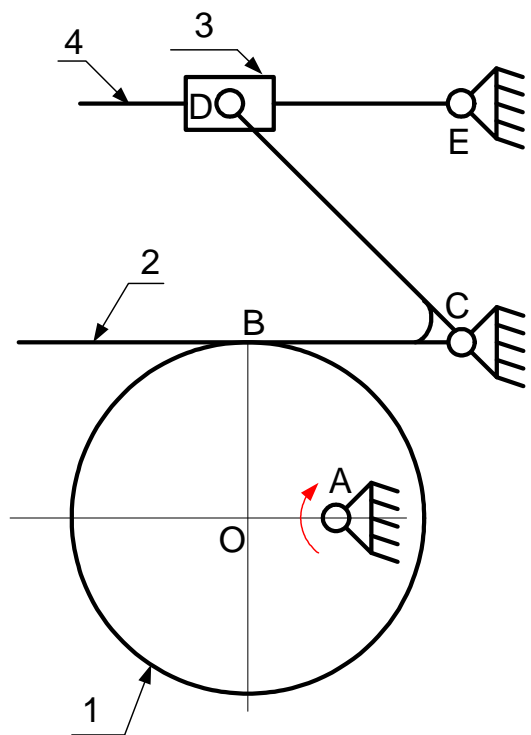
$$J_{td} = J_{z_1} \left(\frac{\omega_1}{\omega_c}\right)^2 + (J_{z_2} + J_{z'_2}) \left(\frac{\omega_2}{\omega_c}\right)^2 + (J_{z_3} + J_{z'_3}) \left(\frac{\omega_3}{\omega_c}\right)^2 \quad \boxed{0,5 \text{ điểm}}$$

$$= 0,1 \left(-\frac{101}{40}\right)^2 + (0,05 + 0,05) \left(-\frac{606}{40}\right)^2 + (0,1 + 0,05) \left(\frac{101}{20}\right)^2$$

$$J_{td} = 27,415 \text{ kgm}^2 \quad \boxed{1 \text{ điểm}}$$

Bài 3:

Có: $n = 4; p_4 = 1; p_5 = 5$, suy ra bậc tự do cơ cấu: $W = 3n - (p_4 + 2p_5) = 1$ $\boxed{1 \text{ điểm}}$



Cơ cấu toàn khớp thấp tương đương $\boxed{1 \text{ điểm}}$