

Đáp án Nguyên lý máy – HK2 năm 2012 – 2013

1. Bài 1:

a.

Cách 1:

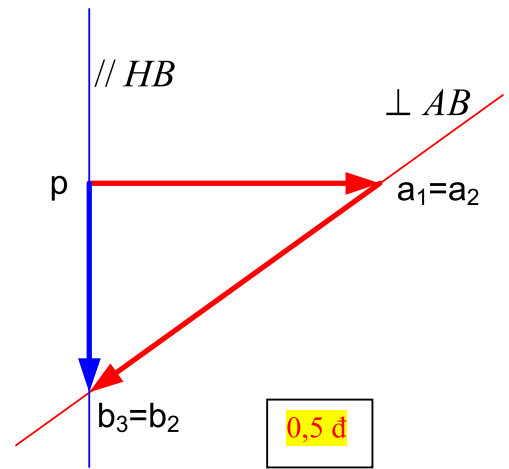
$$\vec{v}_{A_2} = \vec{v}_{A_1} = \begin{matrix} \rightarrow \\ v \end{matrix}; \vec{v}_{B_2} = \vec{v}_{B_3} = \begin{matrix} // HB \\ ? \end{matrix}$$

$$\vec{v}_{B_2} = \vec{v}_{A_2} + \vec{v}_{B_2A_2} \quad \boxed{1 \text{ đ}}$$

$// HB \quad \rightarrow \quad \perp BA$
 $? \quad v \quad ? = l\omega_2$

$$\vec{v}_3 = \vec{v}_{B_3} = \vec{v}_{B_2} = \begin{matrix} \downarrow \\ v \\ \sqrt{3} \end{matrix} \quad \boxed{0,5 \text{ đ}}$$

$$\vec{v}_{B_2A_2} = \begin{matrix} \perp AB \ (\swarrow) \\ \frac{2v}{\sqrt{3}} \end{matrix} \Rightarrow \omega_2 = \begin{matrix} \curvearrowright \\ \frac{v_{B_2A_2}}{AB} = \frac{2v}{\sqrt{3}l} \end{matrix} \quad \boxed{0,5 \text{ đ}}$$



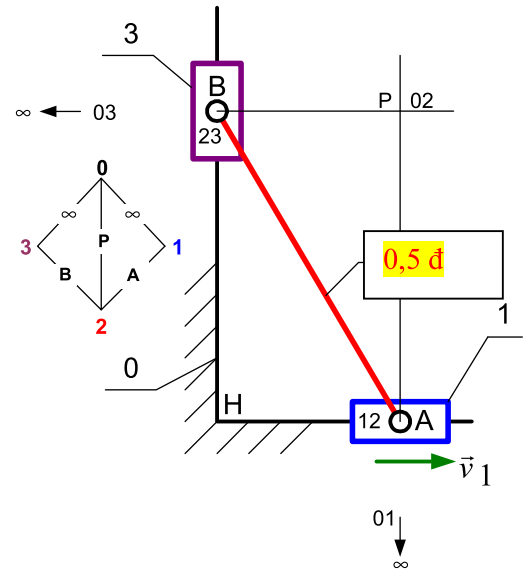
Cách 2:

P là tâm vận tốc tức thời trong chuyển động tương đối giữa khâu 2 và giá 0, nên cũng là tâm vận tốc/tâm quay tức thời của khâu 2.

$$\vec{v}_{A_2} = \vec{v}_{A_2} = \begin{matrix} \rightarrow \\ v \end{matrix} \Rightarrow \omega_2 = \begin{matrix} \curvearrowright \\ \frac{v_{A_2}}{AP} = \frac{2v}{\sqrt{3}l} \end{matrix} \quad \boxed{1 \text{ đ}}$$

$$\vec{v}_3 = \vec{v}_{B_3} = \vec{v}_{B_2} = \begin{matrix} \downarrow \\ PB \cdot \omega_2 = \frac{v}{\sqrt{3}} \end{matrix}$$

$\boxed{1 \text{ đ}}$

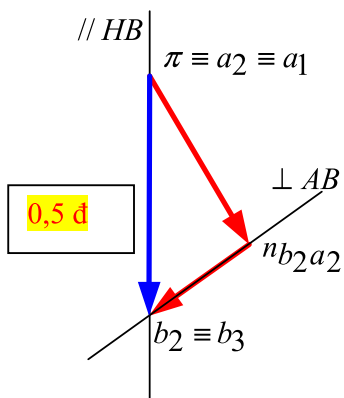


b.

$$\vec{a}_{A_2} = \vec{a}_{A_1} = 0; \vec{a}_{B_2} = \vec{a}_{B_3} = \begin{matrix} // HB \\ ? \end{matrix};$$

$$\vec{a}_{B_2} = \vec{a}_{A_2} + \vec{a}_{B_2A_2}^n + \vec{a}_{B_2A_2}^\tau \quad \boxed{0,5 \text{ đ}}$$

$// HB \quad \uparrow \uparrow BA \quad \perp AB$
 $? \quad 0 \quad l\omega_2^2 = \frac{4v^2}{3l} \quad ? = l\varepsilon$



$$\vec{a}_3 = \vec{a}_{B_3} = \vec{a}_{B_2} = \begin{matrix} // HB \ (\downarrow) \\ \frac{2}{\sqrt{3}} a_{B_2A_2}^n = \frac{8v^2}{3\sqrt{3}l} \end{matrix}$$

$$\vec{a}_{B_2A_2}^\tau = \begin{matrix} \perp AB \ (\swarrow) \\ \frac{1}{2} a_{B_2} = \frac{4v^2}{3\sqrt{3}l} \end{matrix} \Rightarrow \varepsilon_2 = \begin{matrix} \curvearrowright \\ \frac{a_{B_2A_2}^\tau}{AB} = \frac{4v^2}{3\sqrt{3}l^2} \end{matrix} \quad \boxed{0,5 \text{ đ}}$$

2. Bài 2:

a.

$$i_{4c} = \frac{\omega_4}{\omega_c} = -\frac{z_c}{z'_4} = -\frac{50}{40} = -\frac{5}{4} \quad \boxed{0,5 \text{ đ}}$$

$$\frac{\omega_3}{\omega_c} = (-1)^2 \frac{z_4 z_c}{z'_3 z'_4} = \frac{20 \cdot 50}{60 \cdot 40} = \frac{5}{12} \Rightarrow \omega_3 = \frac{5}{12} \omega_c \quad \boxed{0,5 \text{ đ}}$$

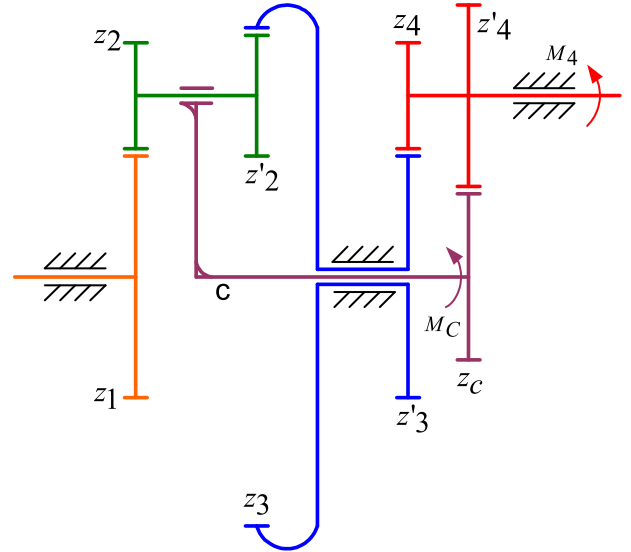
$$i_{13}^c = \frac{\omega_1 - \omega_c}{\omega_3 - \omega_c} = (-1)^1 \frac{z_2 z_3}{z_1 z'_2} = -\frac{20 \cdot 120}{60 \cdot 25} = -\frac{8}{5}$$

$$\Rightarrow \frac{\omega_1 - \omega_c}{\frac{5}{12} \omega_c - \omega_c} = -\frac{8}{5} \Rightarrow i_{c1} = \frac{\omega_c}{\omega_1} = \frac{15}{29} \approx 0,517 \quad \boxed{1 \text{ đ}}$$

$$i_{41} = \frac{\omega_4}{\omega_1} = \frac{\omega_4}{\omega_c} \frac{\omega_c}{\omega_1} = \left(-\frac{5}{4}\right) \frac{15}{29} = -\frac{75}{116} \approx -0,647 \quad \boxed{1 \text{ đ}}$$

b. $M_{tt} = M_c \frac{\omega_c}{\omega_1} + M_4 \frac{\omega_4}{\omega_1} = 30 \frac{15}{29} + 20 \left(-\frac{75}{116}\right) \approx 2,58 \text{ Nm}$

cùng chiều các tải moment M_c và M_4 . $\boxed{1 \text{ đ}}$



3. Bài 3:

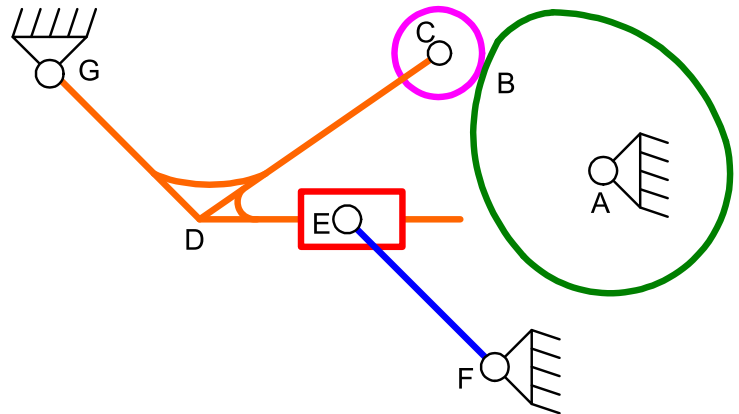
Chọn lựa 1:

$$n = 5; p_4 = 1; p_5 = 6; r_{tr} = 0; r_{th} = 0; w_{th} = 1$$

$\boxed{1 \text{ đ}}$

$$\Rightarrow W = 3n - (p_4 + 2p_5 - r_{tr} - r_{th}) - w_{th} = 1$$

$\boxed{1 \text{ đ}}$



Chọn lựa 2:

$$z \geq \frac{2(1-\xi)}{\sin^2 \alpha} \quad \boxed{1 \text{ đ}}$$

$$\Rightarrow \xi \geq 1 - \frac{z}{2} \sin^2 \alpha = 1 - \frac{14}{2} \sin^2 20^\circ = 0,181 \quad \boxed{1 \text{ đ}}$$