

$$\text{ĐỀ 2}$$

$$1> \{A\} \xrightarrow[\substack{\text{Quay} \\ X_A, 45^\circ}]{\text{Tính h\u00e0n}} \{C\} \xrightarrow[\substack{\text{Tính h\u00e0n} \\ C_P = [2, -3, 5]^T}]{\text{Quay}} \{B\}$$

$$A_T = \text{Rot}(X_A, 45^\circ) \cdot \text{Trans}(2, -3, 5).$$

$$= \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \sqrt{2}/2 & -\sqrt{2}/2 & 0 \\ 0 & \sqrt{2}/2 & \sqrt{2}/2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & \sqrt{2}/2 & -\sqrt{2}/2 & -4\sqrt{2} \\ 0 & \sqrt{2}/2 & \sqrt{2}/2 & 6 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$B_T = \begin{bmatrix} A_T & -A_T P_{B0} \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & -2 \\ 0 & \sqrt{2}/2 & \sqrt{2}/2 & 3 \\ 0 & -\sqrt{2}/2 & \sqrt{2}/2 & -5 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$B_C^T = \begin{bmatrix} 1 & 0 & 0 & -2 \\ 0 & \sqrt{2}/2 & \sqrt{2}/2 & 3 \\ 0 & -\sqrt{2}/2 & \sqrt{2}/2 & -5 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \sqrt{3}/2 & -1/2 & 0 & 4 \\ 1/2 & \sqrt{3}/2 & 0 & 0 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \sqrt{3}/2 & -1/2 & 0 & 2 \\ \sqrt{2}/4 & \sqrt{6}/4 & \sqrt{2}/2 & 3+2\sqrt{2} \\ -\sqrt{2}/4 & -\sqrt{6}/4 & \sqrt{2}/2 & -5+2\sqrt{2} \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$A_P = A_T B_P = \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & \sqrt{2}/2 & -\sqrt{2}/2 & -4\sqrt{2} \\ 0 & \sqrt{2}/2 & \sqrt{2}/2 & \sqrt{2} \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \\ -3\sqrt{2} \\ 2\sqrt{2} \\ 1 \end{bmatrix}$$

$$C_P = C_B^T B_P = \begin{bmatrix} \sqrt{3}/2 & \sqrt{2}/4 & -\sqrt{2}/4 & -\sqrt{3}-2\sqrt{2} \\ -1/2 & \sqrt{6}/4 & -\sqrt{6}/4 & 1-2\sqrt{6} \\ 0 & \sqrt{2}/2 & \sqrt{2}/2 & \sqrt{2}-4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} -\sqrt{3}-\frac{3}{2}\sqrt{2} \\ 1-\frac{3}{2}\sqrt{6} \\ 2\sqrt{2}-4 \\ 1 \end{bmatrix}$$

$$\{A\} \xrightarrow[\substack{\text{Tính h\u00e0n} \\ A_P = [4, 0, 4]^T}]{\text{Quay}} \{D\} \xrightarrow[\substack{\text{Quay} \\ Z_D, 30^\circ}]{\text{Tính h\u00e0n}} \{C\}$$

$$A_C^T = \text{Trans}(4, 0, 4) \cdot \text{Rot}(Z, 30^\circ)$$

$$= \begin{bmatrix} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \sqrt{3}/2 & -1/2 & 0 & 0 \\ 1/2 & \sqrt{3}/2 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \sqrt{3}/2 & -1/2 & 0 & 4 \\ 1/2 & \sqrt{3}/2 & 0 & 0 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$B_C^T = B_A^T A_C^T$$