Formulario

$$Q_{11}=\frac{E_1}{1-\nu_{12}\nu_{21}} \qquad Q_{22}=\frac{E_2}{1-\nu_{12}\nu_{21}}$$

$$Q_{12}=\frac{\nu_{12}E_2}{1-\nu_{12}\nu_{21}} \qquad Q_{66}=G_{12} \qquad \frac{\nu_{12}}{E_1}=\frac{\nu_{21}}{E_2}$$

$$\begin{Bmatrix}\bar{\alpha}_{11}\\ \bar{\alpha}_{22}\\ \bar{\alpha}_{12}\end{Bmatrix}=\begin{bmatrix}c^2 & s^2\\ s^2 & c^2\\ 2cs & -2cs\end{bmatrix}\begin{Bmatrix}\alpha_1\\ \alpha_2\end{Bmatrix} \qquad \begin{Bmatrix}\sigma_1\\ \sigma_2\\ \sigma_6\end{Bmatrix}=\begin{bmatrix}c^2 & s^2 & 2cs\\ s^2 & c^2 & -2cs\\ -cs & cs & c^2-s^2\end{bmatrix}\begin{Bmatrix}\bar{\sigma}_1\\ \bar{\sigma}_2\\ \bar{\sigma}_6\end{Bmatrix}$$

$$\overline{Q}_{11}=Q_{11}\cos^4\vartheta+Q_{22}\sin^4\vartheta+2(Q_{12}+2Q_{66})\cos^2\vartheta\sin^2\vartheta$$
$$\overline{Q}_{22}=Q_{22}\cos^4\vartheta+Q_{11}\sin^4\vartheta+2(Q_{12}+2Q_{66})\cos^2\vartheta\sin^2\vartheta$$
$$\overline{Q}_{12}=(Q_{11}+Q_{22}-4Q_{66})\cos^2\vartheta\sin^2\vartheta+Q_{12}(\cos^4\vartheta+\sin^4\vartheta)$$
$$\overline{Q}_{16}=(Q_{11}-Q_{12}-2Q_{66})\cos^3\vartheta\sin\vartheta-(Q_{22}-Q_{12}-2Q_{66})\sin^3\vartheta\cos\vartheta$$
$$\overline{Q}_{26}=(Q_{11}-Q_{12}-2Q_{66})\cos\vartheta\sin^3\vartheta-(Q_{22}-Q_{12}-2Q_{66})\sin\vartheta\cos^3\vartheta$$
$$\overline{Q}_{66}=(Q_{11}+Q_{22}-2Q_{12})\cos^2\vartheta\sin^2\vartheta+Q_{66}(\cos^2\vartheta-\sin^2\vartheta)^2$$

$$\bar{S}_{11}=S_{11}\cos^4\vartheta+S_{22}\sin^4\vartheta+(2S_{12}+S_{66})\cos^2\vartheta\sin^2\vartheta$$
$$\bar{S}_{22}=S_{22}\cos^4\vartheta+S_{11}\sin^4\vartheta+(2S_{12}+S_{66})\cos^2\vartheta\sin^2\vartheta$$
$$\bar{S}_{12}=(S_{11}+S_{22}-S_{66})\cos^2\vartheta\sin^2\vartheta+S_{12}(\cos^4\vartheta+\sin^4\vartheta)$$
$$\bar{S}_{16}=(2S_{11}-2S_{12}-S_{66})\cos^3\vartheta\sin\vartheta-(2S_{22}-2S_{12}-S_{66})\sin^3\vartheta\cos\vartheta$$
$$\bar{S}_{26}=(2S_{11}-2S_{12}-S_{66})\cos\vartheta\sin^3\vartheta-(2S_{22}-2S_{12}-S_{66})\sin\vartheta\cos^3\vartheta$$
$$\bar{S}_{66}=4(S_{11}+S_{22}-2S_{12})\cos^2\vartheta\sin^2\vartheta+S_{66}(\cos^2\vartheta-\sin^2\vartheta)^2$$