Sufficient Condition:-

Let $\frac{K}{\tau} = \tan\alpha =$ Constant

then show curve is cylindrical helix

Since $\frac{K}{\tau} = \tan\alpha = \frac{\sin\alpha}{\cos\alpha} = K\cos\alpha - \tau\sin\alpha = 0$

multiplying unit vector n on both side

$K n\cos\alpha - \tau n\sin\alpha = 0$

$\Rightarrow t'\cos\alpha + b'\sin\alpha = 0$

$\Rightarrow \frac{d}{ds}(t\cos\alpha + b\sin\alpha) = 0$

Integrating we get

$t\cos\alpha + b\sin\alpha = a =$ constant

Taking both side t, we get

$\Rightarrow \vec{t}\cdot\vec{t}\cos\alpha + \vec{t}\cdot\vec{b}\sin\alpha = \vec{t}\cdot\vec{a}$

$\because t\cdot t = 1$, $t\cdot b = 0$

$\cos\alpha = \vec{t}\cdot\vec{a}$

$$\boxed{\cos\alpha = \vec{t}\cdot\vec{a}}$$

This is the eqn of cylindrical helix

=x=.