

$$\sigma = (147)(258) \rightarrow \begin{array}{l} 3+3+1+1 \\ 2+4+1+1 \end{array} \text{ } \underbrace{\quad}_{\text{cycle}}$$

$$\tau = (14)(2578) \rightarrow \begin{array}{l} 3+3+1+1 \\ 2+4+1+1 \end{array}$$

Since cycle decomposition of σ, τ are different
 $\Rightarrow \sigma$ & τ are not conjugate to each other
 $\Rightarrow \nexists \eta \in S_8$ such that $\boxed{\eta^{-1} \sigma \eta = \tau}$

$$\Rightarrow \boxed{\text{No. of } \eta = 0}$$