Step-1

Note the following;

$$\begin{aligned} P(PA) &= P^2 A \\ P(P(PA)) &= P^3 A \\ &\vdots \\ P(P(...(PA))) &= P^n A \end{aligned}$$

When a Permutation Matrix P is multiplied by itself, the resultant matrix is also a Permutation Matrix.

Thus, P, P^2, P^3, ..., P^n are all Permutation Matrices.

Step-2

When we consider n by n Permutation Matrices, we know that there are only n! distinct Permutation Matrices.

Thus, if we go on multiplying by Permutation Matrices, there are bound to be some P^k and P^r such that $P^k = P^r$. Without loss of generality, let $k > r$. Thus, we have

$$\begin{aligned} P^r &= P^k \\ &= P^{r+k-r} \\ &= P^r P^{k-r} \end{aligned}$$

This clearly indicates that $P^{k-r} = I$.

Step-3

Thus, when we multiply A by P, as many as $k-r$ times, we get

$$\begin{aligned} P^{k-r} A &= IA \\ &= A \end{aligned}$$

Thus, the first row of the matrix $P^{k-r} A$ must be same as that of the matrix A.