Step-1

Given

A And B have the same Eigen values $\lambda_1, \lambda_2, ..., \lambda_n$ with the same independent Eigen vectors $x_1, x_2, ..., x_n$.

And any vector x is a combination $c_1 x_1 + c_2 x_2 + ... + c_n x_n$

Step-2

Then

$Ax = c_1 \lambda_1 x_1 + ... + c_n \lambda_n x_n$ Equals $Bx = c_1 \lambda_1 x_1 + ... + c_n \lambda_n x_n$ for all x

So $\boxed{A = B}$