Red given $U = [v_1 | v_2 | \ldots | v_m]$

$V = [u_1 | u_2 | \ldots | u_m]$

Hence

$$U^T A V = \Gamma$$

But because U, V - made of orthogonal vectors, hence

$$UU^T = U^T U = V^T V = VV^T = I$$

Hence

$$UU^T A VV^T = U\Gamma V^T$$

$$A = U\Gamma V^T$$

Hence proved