Step-1

Given that A is an m by n matrix of rank r and its reduced echelon form is R.

We have to describe exactly the reduced row echelon form of R^T (not A^T).

Step-2

Given that A is an m by n matrix of rank r and its reduced echelon form is R.

Therefore R has r independent rows (or R has r non zero rows). Then R^T has r independent columns. That is R^T has 'r' columns which are pivot columns.

Therefore R^T has 'r' non -zero columns and 'r' non- zero rows.

Thus $R^T R$ is in the form

$$R^T = \begin{bmatrix} I & 0 \\ 0 & 0 \end{bmatrix}$$,where I, is the identity matrix of r by r.