Step-1

We have $A=\begin{bmatrix}1 & 1 & 4\\ 1 & 2 & 2\\ 1 & 2 & 5\end{bmatrix}$

To find the cofactor matrix and the transpose, we follow

(1) We replace each entry of A by its co â€" factor:

$$\begin{bmatrix}\begin{vmatrix}2 & 2\\ 2 & 5\end{vmatrix} & \begin{vmatrix}1 & 2\\ 1 & 5\end{vmatrix} & \begin{vmatrix}1 & 2\\ 1 & 2\end{vmatrix}\\ \begin{vmatrix}1 & 4\\ 2 & 5\end{vmatrix} & \begin{vmatrix}1 & 4\\ 1 & 5\end{vmatrix} & \begin{vmatrix}1 & 1\\ 1 & 2\end{vmatrix}\\ \begin{vmatrix}1 & 4\\ 2 & 2\end{vmatrix} & \begin{vmatrix}1 & 4\\ 1 & 2\end{vmatrix} & \begin{vmatrix}1 & 1\\ 1 & 2\end{vmatrix}\end{bmatrix}$$

$$=\begin{bmatrix}6 & 3 & 0\\ -3 & 1 & 1\\ -6 & -2 & 1\end{bmatrix}$$

Step-2

(2) Multiplying each entry with the sign of its position

$$=\begin{bmatrix}(-1)^{1+1}6 & (-1)^{1+2}3 & (-1)^{1+3}0\\ (-1)^{2+1}(-3) & (-1)^{2+2}1 & (-1)^{2+3}1\\ (-1)^{3+1}(-6) & (-1)^{3+2}(-2) & (-1)^{3+3}1\end{bmatrix}$$

$$=\begin{bmatrix}6 & -3 & 0\\ 3 & 1 & -1\\ -6 & 2 & 1\end{bmatrix}$$

Step-3

(3) We transpose this matrix to get $C^T=\begin{bmatrix}6 & 3 & -6\\ -3 & 1 & 2\\ 0 & -1 & 1\end{bmatrix}$

So,

$$AC^T = \begin{bmatrix} 1 & 1 & 4 \\ 1 & 2 & 2 \\ 1 & 2 & 5 \end{bmatrix} \begin{bmatrix} 6 & 3 & -6 \\ -3 & 1 & 2 \\ 0 & -1 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

$$= 3I$$

$$= \det A.I$$

$$\Rightarrow \det A = \boxed{3}$$