Step-1

i) Given matrix

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

Given

$$C_{ij}=(-1)^{i+j}\det M_{ij}$$

Then $C_A=\begin{bmatrix}6 & -3\\ -1 & 2\end{bmatrix}$ and $C_A{}^T=\begin{bmatrix}6 & -1\\ -3 & 2\end{bmatrix}$

Step-2

Now

$$\begin{aligned}A.C_A{}^T &= \begin{bmatrix}2 & 1\\ 3 & 6\end{bmatrix}\begin{bmatrix}6 & -1\\ -3 & 2\end{bmatrix}\\ &= \begin{bmatrix}2(6)+1(-3) & 2(-1)+1(2)\\ 3(6)+6(-3) & 3(-1)+6(2)\end{bmatrix}\\ &= \begin{bmatrix}12-3 & -2+2\\ 18-18 & -3+12\end{bmatrix}\\ &= \begin{bmatrix}9 & 0\\ 0 & 9\end{bmatrix}\end{aligned}$$

Note that

$$\begin{aligned}\det A &= 12-3\\ &= 9\end{aligned}$$

Step-3

So, we get

$$A.C_A{}^T=\det A\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$$

$$=\det A\cdot I$$

Step-4

ii) $B=\begin{bmatrix}1&2&3\\4&5&6\\7&0&0\end{bmatrix}$

Then

$$C_B=\begin{bmatrix}0&42&-35\\0&-21&14\\-3&6&-3\end{bmatrix}$$

$$C_B{}^T=\begin{bmatrix}0&0&-3\\42&-21&6\\-35&14&-3\end{bmatrix}$$

Step-5

Now

$$B.C_B{}^T=\begin{bmatrix}1&2&3\\4&5&6\\7&0&0\end{bmatrix}\begin{bmatrix}0&0&-3\\42&-21&6\\-35&14&-3\end{bmatrix}$$

$$=\begin{bmatrix}84-105&-42+42&-3+12-9\\210-210&-105+84&-12+30-18\\0&0&-21\end{bmatrix}$$

Step-6

And

$$=\begin{bmatrix}-21&0&0\\0&-21&0\\0&0&-21\end{bmatrix}$$
$$=-21\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}$$

$$=-21I$$

And note that $\det B=\boxed{-21}$