If $A = \begin{pmatrix} 2 & 2 \\ 9 & 4 \end{pmatrix}$ and $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, then $10A^{-1}$ is equal to :

Solution: $|A - \lambda I| = 0$

$$\Rightarrow \begin{vmatrix} 2-\lambda & 2 \\ 9 & 4-\lambda \end{vmatrix} = 0$$

$$\Rightarrow (2-\lambda)(4-\lambda) - 18 = 0$$

$$\Rightarrow \lambda^2 - 6\lambda + 8 - 18 = 0 \quad \rightarrow \text{characteristic equation}$$

By Cayley – Hamilton theorem,

$$A^2 - 6A - 10I = 0$$

$$\Rightarrow A^{-1}A^2 - 6A^{-1}A - 10A^{-1}I = 0$$

$$\Rightarrow A - 6I - 10A^{-1} = 0$$

$$\Rightarrow 10A^{-1} = A - 6I$$

A. $A - 6I$

B. $4I - A$

C. $6I - A$

D. $A - 4I$

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