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AI25BTECH11001 - ABHISEK MOHAPATRA

Question: The matrix \mathbf{P} is the inverse of a matrix \mathbf{Q} . If \mathbf{I} denotes the identity matrix, which one of the following options is correct?

- a) $\mathbf{PQ} = \mathbf{I}$ but $\mathbf{QP} \neq \mathbf{I}$
- b) $\mathbf{QP} = \mathbf{I}$ but $\mathbf{PQ} \neq \mathbf{I}$
- c) $\mathbf{PQ} = \mathbf{I}$ and $\mathbf{QP} = \mathbf{I}$
- d) $\mathbf{PQ} - \mathbf{QP} = \mathbf{I}$

Solution: Let \mathbf{P} is inverse of a matrix \mathbf{Q} and $\mathbf{PQ} = \mathbf{I}$

Let there exist \mathbf{C} such that $\mathbf{QC} = \mathbf{I}$

$$\mathbf{QC} = \mathbf{I} \tag{1}$$

$$\Rightarrow \mathbf{PQC} = \mathbf{P} \Rightarrow \mathbf{C} = \mathbf{P} \tag{2}$$

so $\mathbf{PQ} = \mathbf{QP} = \mathbf{I}$. So, option (c) is correct.