Q.① If $g(x)$ is a curve which is obtained by the reflection of $f(x) = \dfrac{e^x - e^{-x}}{2}$ about the line $y = x$ then

A - $g(x)$ has more than one tangent parallel to x-axis

B - $g(x)$ has more than one tangent parallel to y-axis

C - $y = -x$ is a tangent to $f(x)$ at $(0,0)$

D - $g(x)$ has no extremum

Ans: D.

As $g(x)$ is a curve which is obtained by the reflection of $f(x) = \dfrac{e^x - e^{-x}}{2}$ on $y = x$

$\Rightarrow$ $g(x)$ is inverse of $f(x)$.

$\therefore$ $g(x) = \log\left(x + \sqrt{1 + x^2}\right) = f^{-1}(x)$

$\Rightarrow$ $g'(x) = \dfrac{1}{x + \sqrt{1+x^2}}\left(1 + \dfrac{2x}{2\sqrt{1+x^2}}\right) = \dfrac{1}{\sqrt{1+x^2}} \neq 0, \quad \forall\, x \in \mathbb{R}$

$\Rightarrow$ $g(x)$ has no tangent parallel to x-axis also $g'(x)$ is always defined, $\forall\, x \in \mathbb{R}$.

$\Rightarrow$ $g(x)$ has no tangent parallel to y-axis since $g'(x) > 0$

$\Rightarrow$ $g(x)$ has not any extremum.