

7. $\lim_{x \rightarrow 2} \left(\frac{\sqrt{1 - \cos \{2(x-2)\}}}{x-2} \right)$ [2011]

- (a) equals $\sqrt{2}$ (b) equals $-\sqrt{2}$
(c) equals $\frac{1}{\sqrt{2}}$ (d) does not exist

Solution: -

7. (d) $\lim_{x \rightarrow 2} \frac{\sqrt{1 - \cos \{2(x-2)\}}}{x-2} = \lim_{x \rightarrow 2} \frac{\sqrt{2} |\sin(x-2)|}{x-2}$

$$\text{L.H.L.} = \lim_{x \rightarrow 2^-} \frac{\sqrt{2} \sin(x-2)}{(x-2)} = -\sqrt{2}$$

$$\text{R.H.L.} = \lim_{x \rightarrow 2^+} \frac{\sqrt{2} \sin(x-2)}{(x-2)} = \sqrt{2}$$

Thus L.H.L. \neq R.H.L.

Hence, $\lim_{x \rightarrow 2} \frac{\sqrt{1 - \cos \{2(x-2)\}}}{x-2}$ does not exist.