Example 20 The unit vector perpendicular to the vectors $\hat{i} - \hat{j}$ and $\hat{i} + \hat{j}$ forming a right handed system is

(A) $\hat{k}$

(B) $-\hat{k}$

(C) $\dfrac{\hat{i} - \hat{j}}{\sqrt{2}}$

(D) $\dfrac{\hat{i} + \hat{j}}{\sqrt{2}}$

Solution (A) is the correct answer. Required unit vector is $\dfrac{\left(\hat{i} - \hat{j}\right) \times \left(\hat{i} + \hat{j}\right)}{\left|\left(\hat{i} - \hat{j}\right) \times \left(\hat{i} + \hat{j}\right)\right|} = \dfrac{2\hat{k}}{2} = \hat{k}$.