Ques: Find a unit vector that makes an angle of 90°,135°,45°with positive X,Y and Z axis respectively.

Soln : Given,
$\alpha = 90°$,
$\beta = 135°$,
$\gamma = 45°$.

i.e l=cos90°=0, m=cos135°= $\frac{-1}{\sqrt{2}}, n = cos45° = \frac{1}{\sqrt{2}}$

$$\implies \tilde{\mathbf{m}} = \begin{bmatrix} \cos 90° \\ \cos 135° \\ \cos 45° \end{bmatrix} \tag{1}$$

Also,we know that,

$\tilde{\mathbf{m}} = \frac{\tilde{\mathbf{m}}}{\|\mathbf{m}\|}$

$\|\mathbf{m}\| = \sqrt{0^2 + (\frac{-1}{\sqrt{2}})^2 + (\frac{1}{\sqrt{2}})^2}$

$$\implies \quad \|\mathbf{m}\| = 1 \tag{2}$$

Hence,from (1)and(2) we have the unit vector: $\tilde{\mathbf{m}} = \begin{bmatrix} \mathbf{0} \\ \frac{\mathbf{-1}}{\sqrt{\mathbf{2}}} \\ \frac{\mathbf{1}}{\sqrt{\mathbf{2}}} \end{bmatrix}$