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°= $\frac{1}{\sqrt{2}}$

$$\implies \mathbf{m} = \begin{pmatrix} \cos 90° \\ \cos 135° \\ \cos 45° \end{pmatrix} \qquad (0.0.1)$$

Also,we know that,

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

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

$$\implies \|\mathbf{m}\| = 1 \qquad (0.0.2)$$

Hence,from (0.0.1)and(0.0.2) we have the unit vector: $\mathbf{m} = \begin{pmatrix} 0 \\ \frac{-1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{pmatrix}$