

Q. No. 7: Find a vector \vec{r} of magnitude $3\sqrt{2}$ units which makes an angle of $\pi/4$ $\pi/2$ with y and z-axes, respectively.

Solution:

From the give,

$$m = \cos \pi/4 = 1/\sqrt{2}$$

$$n = \cos \pi/2 = 0$$

Therefore, $l^2 + m^2 + n^2 = 1$

$$l^2 + (1/2) + 0 = 1$$

$$l^2 = 1 - 1/2$$

$$l = \pm 1/\sqrt{2}$$

Hence, the required vector is:

$$\vec{r} = 3\sqrt{2} (l\hat{i} + m\hat{j} + n\hat{k})$$

$$\vec{r} = 3\sqrt{2} \left(\pm \frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j} + 0\hat{k} \right)$$

$$\vec{r} = \pm 3\hat{i} + 3\hat{j}$$