3. The component of a vector $\vec{r}$ along X-axis will have maximum value if

    1) $\vec{r}$ is along positive Y-axis
    2) $\vec{r}$ is along negative Y-axis
    3) $\vec{r}$ is along positive X-axis
    4) $\vec{r}$ make an angle of 45° with the X-axis

Sol. 3) $\vec{r}$ is along positive X-axis

Let $\vec{r}$ makes an angle θ with the positive x-axis component of r along X-axis.

$r_x = |r| \cos \theta$

$(r_x)_{\text{maximum}} = |r|(\cos \theta)_{\text{maximum}}$

$r_x = |r| \cos \theta$

$= |r| \cos 0° = |r|$ (∴ $\cos \theta$ is maximum of $\theta = 0°$)

$As \ \theta = 0°$

$\vec{r}$ is along positive x-axis