

9-9.2-40

EE24BTECH11052 - RONGALI CHARAN

Question: The area of the region bounded by the curve $y = \sqrt{16 - x^2}$ and x -axis is

- 1) 8π sq units
- 2) 20π sq units
- 3) 16π sq units
- 4) 256π sq units

Solution: The equation of conic $g(x)$ is given by :

$$g(x) = \mathbf{x}^T \mathbf{V} \mathbf{x} + 2\mathbf{u}^T \mathbf{x} + f = 0 \quad (4.1)$$

$$\mathbf{V} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \quad (4.2)$$

$$\mathbf{u} = 0 \quad (4.3)$$

$$f = -16 \quad (4.4)$$

as we know x -axis is represents as :

$$\mathbf{h} = \begin{pmatrix} x \\ 0 \end{pmatrix} \quad (4.5)$$

for finding point of intersection of conic with the line $g(\mathbf{h}) = 0$.

by solving we get two values of \mathbf{x}_1 and \mathbf{x}_2 as :

$$\mathbf{A} = \begin{pmatrix} 4 \\ 0 \end{pmatrix} \quad (4.6)$$

$$\mathbf{B} = \begin{pmatrix} -4 \\ 0 \end{pmatrix} \quad (4.7)$$

The area bounded by the curve $y = 16 - x^2$ and x -axis is given by:

$$\int_{-4}^4 (\sqrt{16 - x^2}) dx = 8\pi \quad (4.8)$$

Hence, the area bounded by the curve and the line is 8π sq units.

Region Bounded by $y = \sqrt{16 - x^2}$ and the x-axis is 8π sq.units

