

OBJECTIVE MATHEMATICS

Volume 2

Descriptive Test Series

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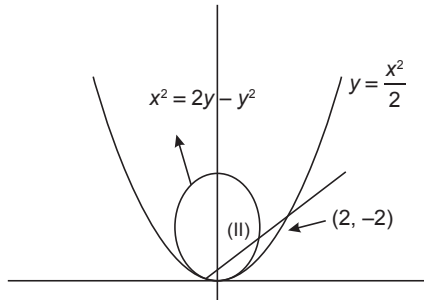
CHAPTER-9 : AREA UNDER THE CURVES

UNIT TEST-1

1. If the area of the region $S = \{(x, y) : 2y - y^2 \leq x^2 \leq 2y, x \geq y\}$ is equal to $\frac{n+2}{n+1} - \frac{\pi}{n-1}$, then the natural number n is equal to _____.
2. If the area of the region $\{(x, y) : |x^2 - 2| \leq y \leq x\}$ is A , then $6A + 16\sqrt{2}$ is equal to _____.

Hints and Solutions

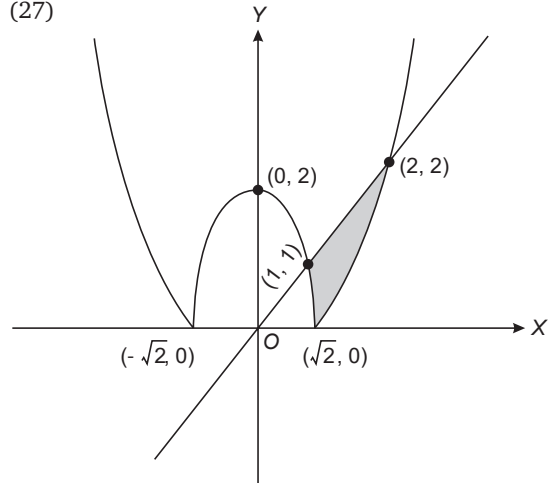
1. (5) $2y - y^2 \leq x^2 \leq 2y, x \geq y$



$$\begin{aligned} \text{Area} &= \int_1^2 (\sqrt{2y} - y) dy + \int_0^1 (\sqrt{2y} - \sqrt{2y - y^2}) dy \\ &= \frac{7 - 2^{\frac{5}{2}}}{6} + \frac{2^{\frac{7}{2}} - 3\pi}{12} \\ &= \frac{14 - 2^{\frac{7}{2}} + 2^{\frac{7}{2}} - 3\pi}{12} = \frac{7}{6} - \frac{\pi}{4} \end{aligned}$$

$n = 5$

2. (27)



$$\begin{aligned} A &= \frac{1}{2}(1+2) \times 1 - \int_1^{\sqrt{2}} (2 - x^2) dx - \int_{\sqrt{2}}^2 (x^2 - 2) dx \\ A &= \frac{9}{2} - \frac{8\sqrt{2}}{3} \end{aligned}$$

$$6A = 27 - 16\sqrt{2} \Rightarrow 6A + 16\sqrt{2} = 27$$