

C**MCQs with One Correct Answer**PROBLEM

On the interval $[0, 1]$ the function $x^{25}(1-x)^{75}$ takes its maximum value at the point **(1995S)**

- (a) 0 (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

SOLUTION

(b) Let $y = x^{25}(1-x)^{75}$

$$\begin{aligned}\Rightarrow \frac{dy}{dx} &= 25x^{24}(1-x)^{75} - 75x^{25}(1-x)^{74} \\ &= 25x^{24}(1-x)^{74}(1-x-3x) = 25x^{24}(1-x)^{74}(1-4x)\end{aligned}$$

For maximum value of y , $\frac{dy}{dx} = 0$

$$\Rightarrow x = 0, 1, 1/4, \quad x = 1/4 \in (0,1)$$

Also at $x = 0, y = 0$, at $x = 1, y = 0$, and at $x = 1/4, y > 0$

\therefore Max. value of y occurs at $x = 1/4$