96. For the function $f(x) = x + \frac{1}{x}$, $x \in [1, 3]$, the value of c for mean value theorem is

(a) 1 (b) $\sqrt{3}$ (c) 2 (d) none of these

Sol. **(b)** $f(x) = x + \frac{1}{x}$, which is continuous and differentiable.

So, by mean value theorem there exists atleast one $c \in (1, 3)$ such that

$$\because \quad f'(c) = \frac{f(b) - f(a)}{b - a}$$

$$\Rightarrow \quad 1 - \frac{1}{c^2} = \frac{\frac{10}{3} - 2}{3 - 1}$$

$$\Rightarrow \quad \frac{c^2 - 1}{c^2} = \frac{2}{3}$$

$$\Rightarrow \quad 3(c^2 - 1) = 2c^2$$

$$\Rightarrow \quad 3c^2 - 2c^2 = 3$$

$$\Rightarrow \quad c^2 = 3$$

$$\Rightarrow \quad c = \sqrt{3} \in (1, 3)$$