

Differential Equation - Class XII

Related Questions with Solutions

Questions

Question: 01

The solution of the differential equation, $x^2 \frac{dy}{dx} \cdot \cos \frac{1}{x} - y \sin \frac{1}{x} = -1$, where $y \rightarrow -1$ as $x \rightarrow \infty$ is

A. $y = \sin \frac{1}{x} - \cos \frac{1}{x}$

B. $y = \frac{x+1}{x \sin \frac{1}{x}}$

C. $y = \cos \frac{1}{x} + \sin \frac{1}{x}$

D. $y = \frac{x+1}{x \cos \frac{1}{x}}$

Solutions

Solution: 01

$$\frac{dy}{dx} - \frac{y}{x^2} \tan \frac{1}{x} = -\sec \frac{1}{x} \cdot \frac{1}{x^2} \cdot \quad IF = e^{-\int \frac{1}{x^2} \tan \frac{1}{x} dx} = \sec \frac{1}{x}$$
$$y \cdot \sec \frac{1}{x} = -\int \sec^2 \left(\frac{1}{x} \right) \frac{1}{x^2} dx = \tan \frac{1}{x} + c$$

if $y \rightarrow -1$ then $x \rightarrow \infty \Rightarrow c = -1 \Rightarrow y = \sin \frac{1}{x} - \cos \frac{1}{x}$

Correct Options

Answer:01

Correct Options: A