

## Differential Equation - Class XII

### Related Questions with Solutions

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#### Questions

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##### Question: 01

The solution of the equation  $x \frac{dy}{dx} + y = y^2 x^3 \cos x$  is

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

B.  $x(y + \sin x) + \cos x = C$

C.  $1 + x^2 y \sin x + y \cos x = Cxy$

D. none of these

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#### Solutions

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##### Solution: 01

Dividing by  $xy^2$ , the given equation can be rewritten as

$$\frac{1}{y^2} \frac{dy}{dx} + \frac{1}{x} \cdot \frac{1}{y} = x^2 \cos x$$

Put  $\frac{1}{y} = u$ , we have  $-\frac{1}{y^2} \frac{dy}{dx} = \frac{du}{dx}$

So,  $\frac{du}{dx} - \frac{1}{x}u = -x^2 \cos x$

which is a linear differential equation with I.F. =  $e^{\int \frac{1}{x} dx} = 1/x$ .

Thus, solution is  $\frac{d}{dx}(u/x) = -x \cos x$

On integrating both sides, we get

$$u/x = -[x \sin x + \cos x] + C$$

$$\Rightarrow \frac{1}{xy} + x \sin x + \cos x = C$$

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#### Correct Options

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Answer:01

Correct Options: A