

Previous Year Questions Related From These Concepts

Q1) Let $y = e^{x \sin x^3} + (\tan x)^x$, find $\frac{dy}{dx}$

[IIT JEE 1981]

Solution: We are given that $y = e^{x \sin x^3} + (\tan x)^x$

$$= u + v$$

where, $u = e^{x \sin x^3}$ and $v = (\tan x)^x$

now $\frac{du}{dx} = e^{x \sin x^3} \frac{d}{dx} (x \sin x^3) = e^{x \sin x^3} [3x^2 \cos x^3 + \sin x^3]$

$$v = (\tan x)^x \Rightarrow \log v = x \log \tan x$$

Differentiate w.r.t x , we get $\frac{1}{v} \frac{dv}{dx} = x \frac{1}{\tan x} \sec^2 x + \log \tan x$

$$\therefore \frac{dv}{dx} = (\tan x)^x \left(\frac{2x}{\sin 2x} + \log \tan x \right)$$

$$\text{Hence, } \frac{dy}{dx} = e^{x \sin x^3} (x \sin x^3 + 3x^2 \cos x^3) + (\tan x)^x \left(\frac{2x}{\sin 2x} + \log \tan x \right)$$

Ans