56. $\tan^{-1}(x^2+y^2)=a$

Sol. We have, $\tan^{-1}(x^2+y^2)=a$

$\therefore \quad x^2+y^2=\tan a$

On differentiating both sides w.r.t x, we get

$$2x+2y\frac{dy}{dx}=0$$

$$\Rightarrow \quad \frac{dy}{dx}=-\frac{2x}{2y}=-\frac{x}{y}$$

$$\Rightarrow \quad y^2=y\cdot e^{\frac{x}{y}}-x\cdot\frac{dy}{dx}\cdot e^{\frac{x}{y}}$$

$$\Rightarrow \quad \frac{dy}{dx}=\frac{y\left(e^{\frac{x}{y}}-y\right)}{x\cdot e^{\frac{x}{y}}}$$

$$=\frac{e^{\frac{x}{y}}-y}{\frac{x}{y}e^{\frac{x}{y}}}$$

$$=\frac{x-y}{x\cdot\log x} \qquad \left[\because x=e^{x/y}\Rightarrow \log x=\frac{x}{y}\right]$$

Hence proved.