Class – 12th   **Chapter-7**   **Subject Maths**

Worksheet-33   Differentiation

Differentiate the following functions with respect to x (Q 1-8)

1. $\sin^{-1}(x\sqrt{x}); \quad 0 \le x \le 1$

2. $\dfrac{\cos^{-1} x/2}{\sqrt{2x+7}}; \quad -2 < x < 2$

3. $\cot^{-1}\left\{\dfrac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right\}; \quad 0 < x < \dfrac{\pi}{2}$

4. $x^3.e^x.\sin x$

5. $\log\left(\dfrac{x}{a^x}\right)$

6. $(x\log x)^{\log x}$

7. $x^{x^2-3} + (x-3)^{x^2}; \quad x > 3$

8. $\sin^{-1} x + \sin^{-1}\sqrt{1-x^2}$

9. If $\log x = \tan^{-1}\left(\dfrac{y-x^2}{x^2}\right)$, then find $\dfrac{dy}{dx}$

10. If $y = 12(1-\cos t), \quad x = 10(t-\sin t)$, then find $\dfrac{dy}{dx}$

11. If $\cos^{-1}\left(\dfrac{x^2-y^2}{x^2+y^2}\right) = \tan^{-1} a$, then prove that $\dfrac{dy}{dx} = \dfrac{y}{x}$

12. If $\sin y = x\sin(a+y)$, then prove that $\dfrac{dy}{dx} = \dfrac{\sin^2(a+y)}{\sin a}$

13. If $y = (\sin x - \cos x)^{(\sin x - \cos x)}$, then find $\dfrac{dy}{dx}$.

14. If $y = \sin(\sin x)$, then show that

$$\dfrac{d^2 y}{dx^2} + \tan x.\dfrac{dy}{dx} + y\cos^2 x = 0.$$