ATOMIC ENERGY EDUCATION SOCIETY, MUMBAI

CLASS: XII(MATHS) **WORKSHEET: MODULE 4/4**

CHAPTER-5 **TOPIC: CONTINUITY AND DIFFERENTIABILITY**

1) Find $\frac{d^2y}{dx^2}$ if x = $a\left(\cos\theta + \log\tan\frac{\theta}{2}\right)$, y = $\sin\theta$

2) Find $\frac{dy}{dx}$ if x = $\sqrt{a^{\sin^{-1}t}}$, y = $\sqrt{a^{\cos^{-1}t}}$

3) Differentiate $x\sin x$ w.r. to $x\cos x$

4) If y = $\left(\tan^{-1}x\right)^2$ show that $(1+x^2)^2\frac{d^2y}{dx^2} + 2x(1+x^2)\frac{dy}{dx} - 2 = 0$

5) If y = $a\cos(\log x) + b\sin(\log x)$ show that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$

6) If y = $\left(\sin^{-1}x\right)^2$ show that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 2$

7) If $\sqrt{1-x^2}$ + $\sqrt{1-y^2}$ = a(x – y), show that $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$

8) If x = 2 log (cosx) + 3 log (sinx) , prove that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$

9) If x = a (cost + t sint) and y = a (sint – t cost) , $0 < t < \frac{\pi}{2}$, $find\ \frac{d^2x}{dt^2}$, $\frac{d^2y}{dt^2}$ $and\ \frac{d^2y}{dx^2}$

10) Differentiate $tan^{-1}\left[\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right]$ w. r. to $cos^{-1}x^2$

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