**ASSIGNMENT NO.- 4 [Ch-5 (Continuity and Differentiability)]**

**Class -XII**

1. If $f\left(x\right)=\left\{\begin{array}{c}\frac{\sin(\left(a+1\right)x+2\sin(x))}{x} , x<0\\2 , x=0\\\frac{\sqrt{1+bx}-1}{x} , x>0\end{array}\right.$ is continuous at $x=0$, then find the values of $a$ and $b.$

2. If the function $f\left(x\right)=\left\{\begin{array}{c}\frac{x^{3}-27}{x-3} ,x\ne 3\\k , x=3\end{array}\right.$ is continuous at $x=3$,find $k.$

3. Determine the value of $k$ so that the function $f\left(x\right)=\left\{\begin{array}{c}\frac{k\cos(2x)}{π-4x} ,if x\ne \frac{π}{4}\\5 ,if x=\frac{π}{4}\end{array}\right.$ is continuous at

 $x=\frac{π}{4}.$

4. Find the values of $a$ and $b$ such that the function defined by $f\left(x\right)=\left\{\begin{array}{c}5 ,if x\leq 2\\ax+b ,if 2<x<10\\21 ,if x\geq 10\end{array}\right.$

 is a continuous function.

5. Differentiate $\sqrt{tan\sqrt{x}}$ w.r.t. $x.$

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

7. If $y=cos^{-1}\left(\frac{2^{x+1}}{1+4^{x}}\right)$ ,find $\frac{dy}{dx}$.

8. If $\sqrt{\sin(x+\sqrt{\sin(x)+\sqrt{\sin(x)+ ……….\infty }})}$ ,then show that $\frac{dy}{dx}=\frac{\cos( x)}{2y-1}$.

9. If $(\cos(x))^{y}=(\cos(y))^{x}$,find $\frac{dy}{dx}.$

10. If $x=a sec^{3}θ$ and $y=a tan^{3}θ$ ,find $\frac{dy}{dx}$ at $θ=\frac{π}{3}.$

11. If $y=(x+\sqrt{1+x^{2}})^{n}$ ,then show that $\left(1+x^{2}\right)\frac{d^{2}y}{dx^{2}}+x\frac{dy}{dx}=n^{2}y.$

12. If $y=e^{m sin^{-1}x }$,then prove that $\left(1-x^{2}\right)\frac{d^{2}y}{dx^{2}}-x\frac{dy}{dx}-m^{2}y=0.$

13. Verify Rolle’s Theorem for the function $f\left(x\right)=\sin(2x)$ in $\left[0,\frac{π}{2}\right].$

14. Verify Langrange’s Mean Value Theorem for $f\left(x\right)=\frac{1}{4x-1}$ on [1,4].

15. Verify Rolle’s Theorem for the function $f\left(x\right)=\sin(x)+\cos(x-1)$ in the interval $\left[0,\frac{π}{2}\right].$