Practice Assignment-I

Very Short Answer Type Questions

1. At the point $(2,1)$, find the slope of the curve $x^6y^6 = 64$.
2. Find the derivative of $\sin^{-1}\left(x^3\right)$.
3. Evaluate $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$.
4. If "c" is a number that satisfies the conclusions of the Mean Value theorem for $x^3 - 2x^2$ on the interval $[0,2]$, find the value of "c".
5. If $f(x) = \sqrt{9-x};\ g(x) = x^3 + 1$, find $f \circ g(x)$.
6. If $f(x) = (x+1)e^x$, find the intervals in which the function is increasing..
7. Write the equation of the tangent to the curve $x^3 - 3x + 2$ at the point $(2,4)$.
8. Find the stationary points of the function $f(x) = (x-2)\frac{2}{3}(2x+1)$
9. Find the maximum value of the function $f(x) = \sin 2x$ on the interval $\left[0, \frac{\pi}{2}\right]$.
10. If $f(x) = x^4$, defined from $R \to R$, is this function one – one ?
11. If given that $f(x) = 16x^2 + 8x - 14$, is an invertible function, find its inverse.
12. Differentiate $\cos\left(x^x\right)$ with respect to x^x.
13. Find the slope of the tangent to the curve represented by $x = t^2 + 3t - 8; y = 2t^2 - 2t - 5$ at $(2,-1)$.
14. If $y = \tan^{-1}\frac{4x}{1+5x^2} - \tan^{-1}\frac{2-3x}{3+2x}$, show that $\frac{dy}{dx} = \frac{5}{1+25x^2}$.
15. Differentiate $\log x$ with respect to e^x.
16. Differentiate $\tan^{-1}\frac{2x}{1-x^2}$ with respect to $\sin^{-1}\frac{2x}{1+x^2}$.
17. If $y = e^{x+e^{x+e^{x+\ldots\ldots\infty}}}$, prove that $\frac{dy}{dx} = \frac{y}{1-y}$.

18. If $y=\sqrt{\cos x+\sqrt{\cos x+\sqrt{\cos x+....\infty}}}$, prove that $\frac{dy}{dx}=\frac{\sin x}{1-2y}$.

19. If $y=\sqrt{x}+\frac{1}{\sqrt{x}}$, show that $2x\frac{dy}{dx}+y=2\sqrt{x}$.

20. If $y=\sec^{-1}\left(\frac{x+1}{x-1}\right)+\sin^{-1}\left(\frac{x-1}{x+1}\right)$, show that $\frac{dy}{dx}=0$.

21. Differentiate $\tan^{-1}\left(\frac{x^{\frac{1}{3}}+a^{\frac{1}{3}}}{1-x^{\frac{1}{3}}a^{\frac{1}{3}}}\right)$ with respect to "x"

22. If $y=\sin^2 x^2$, find $\frac{dy}{dx}$.

23. If $y=\sqrt{x+y}$, prove that $\frac{dy}{dx}=\frac{1}{2y-1}$.

24. Find $\frac{dy}{dx}$, if $x=a\log t; y=b\sin t$.

25. Find $\frac{dy}{dx}$, if $x=\sqrt{\sin 2\theta}; y=\sqrt{\cos 2\theta}$.

26. If $x=at^2, y=2at$ find $\frac{d^2y}{dx^2}$.

27. Show that the function $f(x)=2x+3$ is continuous at $x=-4$.

28. Show that the function $|x-4|$ is a continuous function.

29. Show that the function $f(x)=\begin{cases}\frac{x}{\sin 3x}, & x\neq 0\\ 3, & x=0\end{cases}$ is discontinuous at x=0

30. If the function $f(x)=\begin{cases}\frac{\sin^2 kx}{x^2}, & x\neq 0\\ 1, & x=0\end{cases}$, is continuous at x=0, find "k".

31. Show that the function $f(x)=\sin|x|$ is a continuous function.

32. Show that the function $f(x)=\frac{1}{x-5}$ is a continuous function.

33. If $\tan^{-1}3+\tan^{-1}x=\tan^{-1}8$, then find x.

34. Show that the function $f(x)=\sin^2 x+x^2-2x$ is continuous at x=0.

35. Evaluate a) $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$ b) $\tan^{-1}\left(\tan\frac{3\pi}{4}\right)$

36. Find the Principal value of $\cot^{-1}\left(-\sqrt{3}\right)$.

37. Simplify $\sin^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)$.

38. Find the value of a) $\cot\left(\tan^{-1}a+\cot^{-1}a\right)$ b) $\cos\left(\sec^{-1}x+\operatorname{cosec}^{-1}x\right), |x|\geq 1$

39. Find the value of $\cos^{-1}\left(\cos\frac{5\pi}{3}\right)+\sin^{-1}\left(\sin\frac{5\pi}{3}\right)$.

40. The function $f(x)=\begin{cases}\frac{\sin 3x}{x}, & x\neq 0\\ \frac{k}{2}, & x=0\end{cases}$ is continuous at "x = 0". Find "k"

41. Differentiate $\cos^{-1}\left(\frac{2x}{1+x^2}\right), -1<x<1$ with respect to "x"

42. Differentiate $\tan^{-1}\left(\sqrt{1+x^2}-x\right), x\in R$ with respect to "x"

43. Differentiate with respect to "x" : $\tan^{-1}\left(\frac{a+x}{1-ax}\right)$

44. Differentiate with respect to "x" : $\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)$.

45. If $\sin y=x\sin(a+y)$, find $\frac{dy}{dx}$.