HOLIDAY ASSIGNMENT – 1

STD. – XII SUB – MATHS

1. Discuss the continuity of the function :

$f(x) = 1 + x^2, 0 \leq x \leq 1$

$= 2 - x, x > 1$

at x = 1 .

2. Differentiate the function with respect to x .

$f(x) = \tan(x^0 + 45^0) + \sin(\log x)$.

3. Differentiate the following with respect to x :

(a) $y = \sin^{-1}\left\{\frac{\sin x + \cos x}{\sqrt{2}}\right\}$.

(b) $y = (\log x)^x + x^{\log x}$.

(c) $x = b\sin^2\theta$ and $= a\cos^2\theta$.

4. Differentiate $\sin^{-1}\sqrt{1-x^2}$ with respect to $\cos^{-1} x$.

5. If $y = \frac{x}{x+2}$, prove that $x.\frac{dy}{dx} = (1-y)y$.

6. If $x.\sqrt{1+y} + y.\sqrt{1+x} = 0$, prove that $(1+x)^2.\frac{dy}{dx} + 1 = 0$.

7. If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$.

8. If $x = a\cos\theta + b\sin\theta$, $y = a\sin\theta - b\cos\theta$, prove that ,

$y^2.y_2 - x.y_1 + y = 0$.

9. If $y = (\sin^{-1} x)^2$, prove that $(1-x^2).y_2 - xy_1 - 2 = 0$.

10. Differentiate $\cos(\sqrt{x})$ with respect to x from first principle .

HOLIDAY ASSIGNMENT – 2

STD. – XII SUB – MATHS

1. Find the values of K so that the function :

$f(x) = Kx + 5 , x \leq 2$

$= x - 1 , \; x > 2$

is continuous at x = 2.

2. Differentiate the function with respect to x .

$f(x) = x.\tan 2x + 5^x + (\tan^2 x)^3$.

3. Differentiate the following with respect to x :

(a) $y = \sin^{-1}\left\{\frac{\sqrt{1+x} \, + \, \sqrt{1-x}}{2}\right\}$.

(b) $y = x^{\frac{1}{x}} + \cos(x^x)$.

(c) $x = a.\sin 2t(1 + \cos 2t)$, $y = b\cos 2t(1 - \cos 2t)$.

4. Differentiate $\tan^{-1}\left(\frac{1-x}{1+x}\right)$ with respect to $\sqrt{1 - x^2}$.

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

6. If $x^{13}.y^7 = (x + y)^{20}$, prove that $\frac{dy}{dx} = \frac{y}{x}$.

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

8. If $\log y = \tan^{-1} x$, prove that ,

$(1 + x^2).y_2 + (2x - 1)y_1 = 0$.

9. If $x = a\cos\theta$, $y = b\sin\theta$, prove that , $\frac{dy}{dx} = -\frac{b^4}{a^2 y^3}$.

10. Differentiate $x.e^x$ from first principle .

HOLIDAY ASSIGNMENT – 3

STD. – XII SUB – MATHS

1. Find f $'(2)$, when $f(x) = x^2 + 7x + 4$.

2. Differentiate the function with respect to x .

$f(x) = \log_3 x + \log(\tan^{-1} x)$.

3. Differentiate the following with respect to x :

(a) $y = \tan^{-1}\left(\frac{a+b\tan x}{b-a\tan x}\right)$.

(b) $x^5 + y^5 = 5xy$ . .

(c) $y = \log(x^x + cosec^2 x)$.

4. Differentiate $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ with respect to $\tan^{-1} x$.

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

6. If $f(x) = (1+x)(1+x^2)(1+x^4)(1+x^8)$, find $f'(1)$.

7. If $\cos\frac{x}{2}.\cos\frac{x}{4}.\cos\frac{x}{8} \ldots \ldots = \frac{\sin x}{x},$ prove that ,
$\frac{1}{4}\sec^2\frac{x}{2} + \frac{1}{16}\sec^2\frac{x}{4} + \ldots \ldots \ldots = cosec^2 x - \frac{1}{x^2}$.

8. If $y = \{x + \sqrt{x^2+1}\}^m$, prove that ,

$(1+x^2).y_2 + xy_1 - m^2 y = 0$.

9. If $x = a\cos^3\theta , y = a\sin^3\theta$, find $\frac{d^2y}{dx^2}$ at $x = \frac{\pi}{6}$.

10. Differentiate $\tan^{-1} x$ with respect to x from first principle .

ASSIGNMENT : 4 & 5

SOLVE THE QUESTIONS FROM NCERT MISC.EXERCISE (DIFFERENTIATION)