

## ASSIGNMENT : DIFFERENTIABILITY

Q.1 Find values of a and b for which the function defined is differentiable at  $x=1$

$$F(x) = \begin{cases} x^2 + 3x + a; & x \leq 1 \\ bx + 2 & ; x > 1 \end{cases} \quad \text{Ans. } a=3, b=5$$

Q.2 For what value of K, the function defined as :

$$F(x) = \begin{cases} k(x^2 + 2); & x \leq 0 \\ 4x + 6; & x > 0 \end{cases} \quad \text{is continuous at } x=0 \quad \text{Ans. } K=3$$

And hence check its differentiability at  $x=0$

Q.3 Show what  $F(x)$  is continuous but not diff'ble at  $x=0$

$$F(x) = \begin{cases} x \sin\left(\frac{1}{x}\right); & x \neq 0 \\ 0; & x = 0 \end{cases}$$

Q.4 Show that  $F(x)$  is diff'ble at  $x=0$

$$F(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right); & x \neq 0 \\ 0; & x = 0 \end{cases}$$

Q.5 If  $F(2) = 4$  and  $F'(2) = 1$  then show that

$$\lim_{x \rightarrow 2} \frac{xf(2) - 2f(x)}{x - 2} = 2$$

Q.6 Redefine the function and discuss its continuity and differentiability for  $F(x) = |x+1| + |x-1|$  Also draw its graph and explain.

Q.7 Find the value of a and b if the function defined by

$$F(x) = \begin{cases} \frac{1}{|x|}; & |x| > 1 \\ ax^2 + b; & |x| < 1 \end{cases} \quad \text{is continuous and Differentiable} \quad \text{Ans } a=1/2, b=3/2$$

Q.8 Find the set of points where  $F(x) = |2x-1| \sin x$

Q.9 Check the diff'ble of Function  $F(x) = [x]$  at point  $x=2$

Q.10 Draw graph of following function and discuss its continuity and Diff'ble

(a)  $y = |\sin x|$       (b)  $y = \sin |x|$       (c)  $y = |\cos x|$       (d)  $y = \cos |x|$

(e)  $y = |\log x|$       (f)  $y = \sin^{-1} x$       (g)  $y = \cos^{-1} x$