ATOMIC ENERGY EDUCATION SOCIETY, MUMBAI

CLASS: XII(MATHS) **HANDOUT: MODULE 2/4**

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

1) DIFFERENTIABILITY

A function f(x) is said to be differentiable at a point x = a if the

Left hand derivative (at x = a) = Right hand derivative at (x = a)

i.e LHD $_{\text{at } x = a}$ = RHD $_{\text{at } x = a}$

Here LHD = $\lim_{h\to 0-}\frac{f(a+h)-f(a)}{h}$ and RHD = $\lim_{h\to 0+}\frac{f(a+h)-f(a)}{h}$

Every differentiable function is continuous but every continuous function is is not differentiable

The process of finding the derivative is called differentiation

2) RULES OF DIFFERENTIATION

1) If y = $f(x) \pm g(x) then\ \frac{dy}{dx} = \frac{d}{dx}f(x) \pm \frac{d}{dx}g(x)$

2) If y = f(x) g(x) then $\frac{dy}{dx} = f'(x)g(x) + g'(x)f(x)$ (Product rule)

3) Let y = $\frac{f(x)}{g(x)}, g(x) \neq 0$ then $\frac{dy}{dx} = \frac{g(x)f'(x)-f(x)\,g'(x)}{(g(x))^2}$

4) Chain Rule : Let y = f(t) , t = g(x) then $\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx}$ when $\frac{dy}{dt}\ and\ \frac{dt}{dx}$ both exists.

3) DIFFERENTIATION OF IMPLICIT FUNCTIONS

If the dependent variable y and independent variable x are complex in an equation that y cannot be written explicitly as function of x then f(x) is said to be an implicit function. To find the derivative of such functions we use the following steps

Step:1 – Differentiate both the sides of the equation w.r.to x (Independent variable)

Step : 2 – Use chain Rule

Step :3 – Use product rule , quotient rule (if required)

Step:4 – Combined the $\frac{dy}{dx}$ terms and simplify

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