INTERNATIONAL INDIAN SCHOOL BURAIDAH

Worksheet for the Academic Year 2023-24

CLASS:12 SUBJECT: MATHEMATICS DATE: 21/O5/23

LESSON : CONTINUITY AND DIFFERENTIABILITY

LEVEL – 1

1) Is the function f(x) = x ; $x \geq 1$

5 ; $x < 1$, continuous at x = 0, 1, 2 ?.

2) Find the value of k , if f(x) = $2x^2 + k$; $x \geq 0$

$-2x^2$; $x < 0$, is continuous at x = 0 .

3) Differentiate w. r. to x

i) $\sin(x^{10})$ $ii)\ \log(7x + 10)$ $iii)\ e^{\sin x}$ $iv)\ 7^{x^2}$ $v)\ \sin\ (logx)$

4) Differentiate: $e^{-x^2} \log(cosx)\ w.r.to\ x$

5) If y = log ($\sqrt{x} + \frac{1}{\sqrt{x}}$), $find\ \frac{dy}{dx}$.

LEVEL - 2

6) Show that the function f(x) = $x^3 + 3$; $x \neq 0$

$3 - 7x$; $x = 0$, is continuous at x = 0

7) Find the value of a , if f(x) = $\frac{sin^2 ax}{x^2}$; x $\neq$ 0

1 ; x = 0, is continuous at x = 0 .

8) Differentiate w. r. to x

i) $\sqrt{\frac{1-x}{1+x}}$ ii) $sin^3(sinx^7)$ iii) log tan($\frac{\pi}{4} + \frac{x}{2}$) iv) $cot^{25}(e^{3x})$ v) $\frac{2^x}{x - \log x}$

9) If y = $cosx^{secx} + x^{logx}$, $find\ \frac{dy}{dx}$.

10) If $x = b^2 sin^2\theta$, $y = a^3 cos^2\theta$, $find\ \frac{dy}{dx}$.

11) Differentiate $\tan^{-1} \frac{\sqrt{1+x^2}}{x}\ w.r.to\ x$

12) Differentiate $e^{tanx}\ w.r.to\ .sinx$

LEVEL -3

13) Discuss the continuity of the function f(x) = $\frac{1-x^m}{1-x}$; $x \neq 1$

$m-1$; $x = 1$, at x = 1

14) Show that the function $f(x) = Ix - 2I + Ix - 3\ I$ is continuous but not differentiable at x = 2 and x = 3

15) If x = a$(\theta - \sin\theta)$ $and\ y = a(1 + \cos\theta)$, find $\frac{d^2y}{dx^2}$.

16) If y= $(\cot^{-1} x)^2$,then show that $(x^2+1)^2 \frac{d^2y}{dx^2} + 2x(x^2 + 1)\frac{dy}{dx} = 2$

LEVEL – 4

17) Show that the function f(x) = $\frac{1-cos2x}{2x^2}$; $x \neq 0$

$1 + 3x$; $x = 0$, is continuous at x = 0

18) Find the value of a and b , if f(x) = $3ax + b$; $x > 1$

11 x = 1

5ax – 2b x < 1 , is continuous at x = 1

19) Differentiate $\tan^{-1}(\frac{\sqrt{1-x^2}}{x})$ $w.r.to$ $\cos^{-1}(2x\sqrt{1-x^2})$

20) If $e^x + e^y = e^{x+y}$: prove that $\frac{dy}{dx} + e^{y-x} = 0$

21) If $x^m y^n = (x+y)^{m+n}$: prove that $\frac{dy}{dx} = \frac{y}{x}$.
