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XII TEST NO: 4

CHAPTER: DIFFERENTIATION & CONTINUITY

QNo: 1 → value of 'a' for which $f(x) = \begin{cases} \frac{1-\cos(4x)}{x^2} & ; x<0 \\ a & ; x=0 \\ \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}}-4} & ; x>0 \end{cases}$ is continuous at $x=0$ is

(A) 3 (B) 4 (C) 6 (D) none of these

QNo 2 → value of a & b for which $f(x) = \begin{cases} \frac{1-\sin^3 x}{3\cos^2 x} & ; x<\frac{\pi}{2} \\ a & ; x=\frac{\pi}{2} \\ \frac{b(1-\sin x)}{(\pi-2x)^2} & ; x>\frac{\pi}{2} \end{cases}$ is continuous at $x=\frac{\pi}{2}$ are

(A) $a=2, b=\frac{1}{4}$ (B) $a=2, b=4$

(C) $a=\frac{1}{2}, b=4$ (D) none of these

QNo: 3 → value of a & b so that $f(x) = \begin{cases} x+a\sqrt{2}\sin x & ; 0\le x<\pi/4 \\ 2x\cot x+b & ; \frac{\pi}{4}\le x<\frac{\pi}{2} \\ a\cos(2x)-b\sin x & ; \frac{\pi}{2}<x\le\pi \end{cases}$ becomes continuous on $[0,\pi]$

(A) $a=-\frac{\pi}{6}, b=-\frac{\pi}{12}$ (B) $a=\frac{\pi}{6}, b=\frac{\pi}{12}$ (C) $a=-\frac{\pi}{6}, b=\frac{\pi}{12}$

(D) $a=\frac{\pi}{6}, b=-\frac{\pi}{12}$

QNo. 4 → value of a & b so that $f(x) = \begin{cases} x^2 & ; x\le c \\ ax+b & ; x>c \end{cases}$ is differentiable at $x=c$ are

(A) $a=2c, b=c^2$ (B) $a=-2c, b=-c^2$

(C) $a=2c, b=-c^2$ (D) $a=-2c, b=c^2$

QNo. 5 → At what points on the curve $y=12(x+1)(x-2)$; $x\in[-1,2]$, the tangent is parallel to x-axis (using Rolle's theorem)

(A) $(2,27)$ (B) $(\frac{1}{2},-27)$ (C) $(-\frac{1}{2},27)$ (D) $(-\frac{1}{2},-\frac{1}{27})$

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Qn 6 → At what point on the parabola $y=(x-4)^2$, the tangent is parallel to the chord joining the points (4,0) & (5,1)

(A) $(\frac{9}{2},4)$ (B) $(9,\frac{1}{4})$ (C) $(\frac{9}{4},2)$ (D) none of these

Qn. 7 → Derivative of $\log\left[\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)\right]$ is

(A) $\cos x$ (B) $\sec x$ (C) $\operatorname{cosec} x$ (D) $\tan x$

Qn 8 → Derivative of $y=\left[x+\sqrt{x^2+a^2}\right]^n$ is

(A) $\frac{dy}{dx}=\frac{y}{\sqrt{x^2+a^2}}$ (B) $\frac{dy}{dx}=\frac{n^2y}{\sqrt{x^2+a^2}}$ (C) $\frac{dy}{dx}=\frac{ny}{x^2+a^2}$

(D) $\frac{dy}{dx}=\frac{ny}{\sqrt{x^2+a^2}}$

Qns 9 → derivative of $\log\sqrt{\frac{1+\tan x}{1-\tan x}}$ is

(A) $\sec x$ (B) $\cos(2x)$ (C) $\sec(2x)$ (D) $\operatorname{cosec}(2x)$

Qns 10 → If $y=\tan^{-1}\left(\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right)$; $-1<x<1$, then $\frac{dy}{dx}=$

(A) $\frac{-x}{\sqrt{1-x^4}}$ (B) $\frac{x}{\sqrt{1-x^4}}$ (C) $\frac{x^2}{\sqrt{1-x^4}}$ (D) $\frac{-2x}{\sqrt{1-x^4}}$

Qn 11 → Derivative of $\cot^{-1}\left(\frac{\sqrt{1+\sin x}-\sqrt{1-\sin x}}{\sqrt{1+\sin x}+\sqrt{1-\sin x}}\right)$; $0<x<\frac{\pi}{2}$ is

(A) 2 (B) $\frac{1}{2}$ (C) $-\frac{1}{2}$ (D) none of them

Qn. 12 → If $\sqrt{1-x^6}+\sqrt{1-y^6}=a(x^3-y^3)$ then $\frac{dy}{dx}=$

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(A) $\frac{x^2}{y^2}\sqrt{\frac{1-x^6}{1-y^6}}$ (B) $\frac{x^2}{y^2}\sqrt{\frac{1-y^6}{1-x^6}}$ (C) $\frac{y^2}{x^2}\sqrt{\frac{1-x^6}{1-y^6}}$ (D) none of these

Qu 13 → If $x^m y^n = (x+y)^{m+n}$ then $\frac{dy}{dx}$ at (4,2) is

(A) 2 (B) $\frac{1}{2}$ (C) 4 (D) 0

Qu. 14 → If $y = (\tan x)^{(\tan x)^{(\tan x)^{\cdots\infty}}}$, then $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$ is

(A) 1/2 (B) 1 (C) ∞ (D) 2

Qu. 15 → If $x = \sqrt{a^{\sin^{-1}t}}$, $y = \sqrt{a^{\cos^{-1}t}}$ then $\frac{dy}{dx}$ =

(A) $\frac{y}{x}$ (B) $-\frac{x}{y}$ (C) $-\frac{y}{x}$ (D) $\frac{y}{x}$

Qu 16 → Derivative of $\cos^{-1}(4x^3-3x)$ w.r.t $\tan^{-1}\left(\frac{\sqrt{1-x^2}}{x}\right)$ is

(A) 2 (B) -3 (C) 3x (D) 3

Qu: 17 → $y = e^{a\cos^{-1}x}$ Satisfies the equation

(A) $\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$ (B) $(1-x^2)\frac{d^2y}{dx^2} - \frac{dy}{dx} - a^2y = 0$

(C) $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$ (D) $(1-x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} - a^2y = 0$

Qu 18 → $x = 2\cos t - \cos(2t)$, $y = 2\sin t - \sin(2t)$ then $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{2}$ is

(A) $-\frac{3}{2}$ (B) $\frac{3}{2}$ (C) -2 (D) 0

Qu 19 → If $x = a(\cos\theta + \theta\sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$ then $\frac{d^2y}{dx^2}$ at $\theta = \pi/3$

(A) $\frac{24}{\lambda}$ (B) $\frac{24}{a}$ (C) $\frac{24}{a\lambda}$ (D) $\frac{3\sqrt{3}}{8\lambda}$

Qu 20 → If $f(x) = (1+x)(1+x^2)(1+x^4)(1+x^8)$, then $f'(1)$ is equal to

(A) 124 (B) 130 (C) 154 (D) none of these