



RISE OF NATION ACADEMY

"We Create the Impeccable Creature"

Test Paper

Standard – XII

Subject – Mathematics

Topic – Continuity and Differentiability

Date – 07/08/2019

Time – 01:30 hrs.

Max. Marks -

Min. Marks –

Q.1 Discuss the continuity of the function f, where f is defined by $f(x) = \begin{cases} -2, & \text{if } x \leq -1 \\ 2x, & \text{if } -1 < x \leq 1. \\ 2, & \text{if } x > 1 \end{cases}$

Q.2 if $f(x) = \frac{\sqrt{2}\cos x - 1}{\cot x - 1}$, $x \neq \frac{\pi}{4}$. then find the value of $f\left(\frac{\pi}{4}\right)$, so that $f(x)$ becomes continuous at $x = \frac{\pi}{4}$.

Q.3 Show that the function $f(x) = \begin{cases} \frac{1}{e^x - 1} \\ \frac{1}{e^x + 1} \\ 0 \end{cases}$, when $x \neq 0$, when $x = 0$ is discontinuous at $x = 0$.

Q.4 Discuss the continuity of $f(x) = |\sin x + \cos x|$ at $x = \pi$.

Q.5 if $f(x) = \begin{cases} \frac{\sqrt{1+kx} - \sqrt{1-kx}}{x}, & \text{for } -1 \leq x \leq 0 \\ 2x^2 + 3x - 2, & \text{for } 0 \leq x \leq 1 \end{cases}$ is continuous at $x = 0$, then k is equal to?

Q.6 Determine the value of k for which the following function is continuous at $x = 3$.

$$f(x) = \begin{cases} \frac{(x+3)^2 - 36}{x-3}, & x \neq 3 \\ k, & x = 3 \end{cases}$$

Q.7 Find the value of k for which the function $f(x) = \begin{cases} \frac{x^2 + 3x - 10}{x-2}, & x \neq 2 \\ k, & x = 2 \end{cases}$ is continuous at $x = 2$.

Q.8 Find the value of k for which $f(x) = \begin{cases} \frac{\sqrt{1+kx} - \sqrt{1-kx}}{x}, & \text{if } -1 \leq x < 0 \\ \frac{2x+1}{x-1}, & \text{if } 0 \leq x \leq 1 \end{cases}$ is continuous at $x = 0$.

Q.9 Let $f(x) = \begin{cases} \frac{1-\cos 4x}{x^2}, & \text{if } x < 0 \\ a, & \text{if } x = 0 \\ \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}-4}}, & \text{if } x > 0 \end{cases}$ for what value of a, f is continuous at $x = 0$?

Q.10 Find the value of p and q for which $\begin{cases} \frac{1-\sin^3 x}{3\cos^2 x}, & \text{if } x < \frac{\pi}{2} \\ p, & \text{if } x = \frac{\pi}{2} \\ \frac{q(1-\sin x)}{(\pi-2x)^2}, & \text{if } x > \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$.

Q.11 Differentiate $\sin 5x \cdot \cos 7x$ w.r.t. x .

Q.12 if $f(x) = \sin 2x - \cos 2x$, then find $f'(\frac{\pi}{6})$.

Q.13 if $f(x) = |\cos x|$, then find $f'(\frac{3\pi}{4})$.

Q.14 Differentiate $\sqrt{\tan \sqrt{x}}$ w. r. t. x .

Q.15 Show that the function $f(x) = |x - 5|$ is continuous but not differentiable at $x = 5$.

Q.16 if $y = [x + \sqrt{x^2 + a^2}]^n$, then prove that $\frac{dy}{dx} = \frac{ny}{\sqrt{x^2 + a^2}}$.

Q.17 if $\sin y = x \cos(a + y)$, then show that, $\frac{dy}{dx} = \frac{\cos^2(a+y)}{\cos a}$. Also, show that $\frac{dy}{dx} = \cos a$, when $x = 0$.

Q.18 Find $\frac{dy}{dx}$ at $x = 1, y = \frac{\pi}{4}$, if $\sin^2 y + \cos xy = k$.

Q.19 Differentiate $\cot^{-1}(\frac{1-x}{1+x})$ w. r. t. x .

Q.20 If $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$, then prove that $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$.

Q.21 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.

Q.22 Differentiate $y = \log_{\cos x} \sin x$ w. r. t. x .

Q.23 if $y = x^{x^x}$, then find $\frac{dy}{dx}$.

Q.24 if $y = \log x^x$, then the value of $\frac{dy}{dx}$ is.

Q.25 if $y = x^{\sin x} + (\sin x)^{\cos x}$, then find $\frac{dy}{dx}$.

Q.26 if $x = \cos\theta - \cos 2\theta$ and $y = \sin\theta - \sin 2\theta$, then find $\frac{dy}{dx}$.

Q.27 if $x = a \sec^3\theta$ and $y = a \tan^3\theta$, then find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{3}$.

Q.28 if $x = a \sin 2t(1 + \cos 2t)$ and $y = b \cos 2t(1 - \cos 2t)$, find the values of $\frac{dy}{dx}$ at $t = \frac{\pi}{4}$ and $t = \frac{\pi}{3}$.

Q.29 if $x = \frac{\sin^3 t}{\sqrt{\cos 2t}}$ and $y = \frac{\cos^3 t}{\sqrt{\cos 2t}}$, then find $\frac{dy}{dx}$.

Q.30 Differentiate $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ w. r. t. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$, when $x \neq 0$.