Multiple Choice Questions

[MHT-CET 2022]
(online shift)
(Memory Based Questions)

1. $f(x) = \frac{e^{x^2} - \cos x}{x^2}$, if $x \neq 0$ is continuous at $x = 0$, then $f(0) =$ .....

   a) $\frac{2}{3}$ b) $-\frac{3}{2}$ c) $\frac{1}{2}$ d) $\frac{3}{2}$

2. If $f(x) = \frac{1-\cos 4x}{x^2}$ if $x < 0$

   $= a$ if $x = 0$

   $= \frac{\sqrt{x}}{\sqrt{16+\sqrt{x}} - 4}$ if $x > 0$

   is continuous at $x = 0$, then $a =$ .....

   a) 8 b) 4 c) 2 d) 16

3. If $f(x) = \begin{cases} \frac{x-4}{|x-4|} + a & \text{Fox } x < 4 \\ a+b & \text{For } x = 4 \text{ is continuous at } x = 4, \text{ find } a \text{ and } b \\ \frac{x-4}{|x-4|} + b & \text{Fox } x > 4 \end{cases}$

   a) $a = 1, b = 1$ b) $a = -1, b = 1$ c) $a = 1, b = -1$ d) $a = 0, b = 0$

4. If $f(x) = \frac{x}{2} - 1$, then on the interval $[0, \pi]$, where [.] represents greatest integer function.

   a) $\tan [f(x)]$ and $\frac{1}{f(x)}$ are both continuous

   b) $\tan [f(x)]$ is discontinuous and $\frac{1}{f(x)}$ is continuous

   c) $\tan [f(x)]$ and $\frac{1}{f(x)}$ are both discontinuous

   d) $\tan [f(x)]$ is continuous but $\frac{1}{f(x)}$ is not continuous

5. If $f(x) = \log(\sec^2 x)^{\cot^2 x}$ For $x \neq 0$
$= k + 1$ For $x = 0$
is continuous at $x = 0$, then the value of k is
a) 1 b) 0 c) e^{-1} d) e

6. If the function $f(x)$ is continuous on its domain $[-2, 2]$ where

$$f(x) = \begin{cases} \frac{\sin ax}{x} + 3 & ; -2 \leq x < 0 \\ x + 5 & ; 0 \leq x \leq 1 \\ \sqrt{x^2 + 8} - b & ; 1 < x \leq 2 \end{cases}$$

then $7a + b + 1$ is equal to
a) 11 b) 10 c) 12 d) 14

7. The function $f(x) = [x]^2 - [x^2]$ (where $[x]$ is the greatest integer less than or equal to x), is discontinuous at
a) all integers except 0 and 1 b) all integers except 1
c) all integers d) all integers except 0

8. Let $f(x) = 15 - |x - 10|$; $x \in R$. Then the set of all values of x, at which the function $g(x) = f(f(x))$ is not differentiable is
a) {10, 15} b) {10} c) {5, 10, 15, 20} d) {5, 10, 15}

9. The function defined by

$$f(x) = \begin{cases} 5 & ; \text{ if } x \leq 1 \\ a + bx & ; \text{ if } 1 < x < 3 \\ b + 5x & ; \text{ if } 3 \leq x < 5 \\ 30 & ; \text{ if } x \geq 5 \end{cases}$$

Then f is
a) not continuous for any values of a and b
b) continuous if $a = 0$ and $b = 5$
c) continuous if $a = -5$ and $b = 10$
d) continuous if $a = 5$ and $b = 5$

10. If

$$f(x) = \begin{cases} ax^2 + bx + 1 & \text{if } |2x - 3| \geq 2 \\ 3x + 2 & \text{if } \frac{1}{2} < x < \frac{5}{2} \end{cases}$$

is continuous on its domain, then $a + b$ has the value
a) $\frac{13}{5}$ b) $\frac{1}{5}$ c) $\frac{31}{5}$ d) $\frac{23}{5}$

If $f(x)$ is continuous for $0 \le x \le \pi$, then

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

17. If $f(x) = \frac{1-\sin x+\cos x}{1+\sin x+\cos x}$, for $x \neq \pi$ is continuous at $x = \pi$. Then the value of $f(\pi)$ is

a) $\frac{-1}{2}$ b) -1 c) 1 d) $\frac{1}{2}$

18. If the function

$$f(x) = \begin{cases} -2\sin x & -\pi \le x \le \frac{-\pi}{2} \\ a\sin x + b & \frac{-\pi}{2} < x < \frac{\pi}{2} \\ \cos x & \frac{\pi}{2} \le x \le \pi \end{cases}$$

is continuous in $[-\pi, \pi]$ then the values of a and b are

a) $a = 2, b = 3$ b) $a = 3, b = 3$ c) $a = 2, b = 2$ d) $a = 3, b = 2$

19. If the function

$$f(x) = \begin{cases} 3ax + b & \text{For } x < 1 \\ 11 & x = 1 \\ 5ax - 2b & x > 1 \end{cases}$$

is continuous at $x = 1$. Then the values of a and b are

a) $a = 2, b = 3$ b) $a = 3, b = 3$ c) $a = 2, b = 2$ d) $a = 3, b = 2$

20. If $f(x) = \begin{cases} \frac{\sin^3(\sqrt{x}) \cdot \log(1+3x)}{(\tan^{-1}\sqrt{x})^2 (e^{5/\sqrt{3}} - 1)x} & x \neq 0 \\ a & x = 0 \end{cases}$

is continuous in [0, 1] then a equals to

a) 0 b) $\frac{3}{5}$ c) 2 d) $\frac{5}{3}$

21. If $f(x) = \begin{cases} ax + 3 & x \le 2 \\ a^2x - 1 & x > 2 \end{cases}$

Values of a for which f is continuous for all x are

a) 1 and -2 b) 1 and 2 c) -1 and 2 d) -1 and -2

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22. If $f(x) \begin{cases} 6\beta - 3\alpha x & \text{if } -4 \le x < -2 \\ 4x+1 & \text{if } -2 \le x \le 2 \end{cases}$

28. If the function

$$f(x)=\begin{cases}\dfrac{\log 10+\log(0.1+2x)}{2x} & \text{if } x\neq 0\\ K & \text{if } x=0\end{cases}$$

is continuous at $x = 0$ then $K + 2 =$

a) 2 b) 12 c) 11 d) 10

29. The points of discontinuity of the function

$$f(x)=\begin{cases}\dfrac{1}{x-1} & \text{if } 0\le x\le 2\\ \dfrac{x+5}{x+3} & \text{if } 2<x\le 4\end{cases}$$

in its domain are

a) $x = 2$ only b) $x = 1, x = 2$ c) $x = 0, x = 2$ d) $x = 4$ only

30. If $f(x)=\begin{cases}\dfrac{|x|}{x} & \text{For } x\neq 0\\ 1 & \text{For } x=0\end{cases}$

Then the function is

a) neither continuous nor differentiable at $x = 0$

b) continuous and differentiable at $x = 0$

c) continuous but not differentiable at $x = 0$

d) differentiable but not continuous at $x = 0$

31. Let f be the function defined by ..

$$f(x)=\begin{cases}\dfrac{x^2-1}{x^2-2|x-1|-1} & x\neq 1\\ \dfrac{1}{2} & x=1\end{cases}$$

a) The function is continuous for all values of x

b) The function is continuous only for $x > 1$

c) The function is continuous at $x = 1$

d) The function is not continuous at $x = 1$

32. If $f(x)=\dfrac{1}{1-x}$, the number of points of discontinuity of $f\{f[f(x)]\}$ is

a) 2 b) 1 c) 0 d) infinite