

Questions

CRT-09

Max. Marks : 25

Time : 60 Minutes

Topics : Continuity & Differentiability (Ex.3 A to Ex.3 C)

By **O.P. GUPTA**
INDIRA AWARD WINNER
M.+91 9650350480

■ The O.P. GUPTA Classes, 1st Floor, Opp. HP Petrol Pump, Thana Road, Najafgarh, New Delhi.

Q01. (a) Discuss the continuity of $f(x) = [x]$ at integral points. [1×5 = 5]

(b) Find the number of points of discontinuity for $f(x) = \frac{1}{\log|x|}$.

(c) At what points, the function $f(x) = \frac{1}{x - [x]}$ is discontinuous?

(d) What are the point (s) of non-differentiability for $f(x) = |2x + 3|$?

(e) For what value of λ , $f(x) = \begin{cases} \frac{\log(1+ax) - \log(1-bx)}{x}, & \text{if } x \neq 0 \\ \lambda, & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$?

Q02. (a) Discuss the continuity of $f(x) = |x|$ at $x = 0$. [2×2 = 4]

(b) Find Right Hand Limit at $x = 0$ for the function $f(x) = \begin{cases} \frac{e^{1/x} - 1}{e^{1/x} + 1}, & \text{if } x \neq 0 \\ -1, & \text{if } x = 0 \end{cases}$. Hence write whether the function $f(x)$ is continuous at $x = 0$ or not?

Q03. Prove that the **greatest integer function**, $f(x) = [x]$ is not differentiable at $x = 3$. [3×2 = 6]

Q04. Prove that $f(x) = \begin{cases} \frac{x}{|x| + 2x^2}, & x \neq 0 \\ k, & x = 0 \end{cases}$ remains discontinuous at $x = 0$, regardless the choice of k .

Q05. Determine the value of μ ; if possible, so that the following function $f(x)$ is continuous at $x = 0$:

$$f(x) = \begin{cases} \frac{\sqrt{x}}{\sqrt{25 + \sqrt{x}} - 5}, & \text{when } x > 0 \\ \mu, & \text{when } x = 0 \\ \frac{1 - \cos 2\sqrt{5}x}{x^2}, & \text{when } x < 0 \end{cases} \quad [5 \times 2 = 10]$$

Q06. If $f(x) = \frac{\tan\left(\frac{\pi}{4} - x\right)}{\cot 2x}$ for $x \neq \frac{\pi}{4}$, find the value which can be assigned to $f(x)$ at $x = \frac{\pi}{4}$ so that the function $f(x)$ becomes continuous at every point in $\left[0, \frac{\pi}{2}\right]$.

HINTS & ANSWERS

For the **Complete Solutions with Detailed Explanation**,

Please visit **YouTube Channel – MATHEMATICIA By O.P. GUPTA**

& check **Playlist XII – Class Room Test (CRT By O.P. GUPTA)**

Or, just **CLICK HERE**

❖ Dear Student/Teacher,

I would urge you for a little favour.

Please notify me about any error (s) which you notice in this (or other Maths) work. It would be beneficial for all the future learners of Maths like us. Any constructive criticism will be well acknowledged.

Please find below my contact info when you decide to offer your valuable suggestions.

I am looking forward for a response.

Moreover, I would wish **if you inform your friends/students** about my efforts for Maths so that they may also be benefited.

Let's learn Maths with smile :-)

☞ For any clarification(s), please contact :

O.P. GUPTA, Math Mentor

[Maths (Hons.), E & C Engg., Indira Award Winner]

WhatsApp @ +91-9650 350 480

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