

11B(36-37)

EE24BTECH11055 - Sai Akhila Reddy Turpu

- 36) For $x \in \mathbb{R}$, $f(x) = |\log 2 - \sin(x)|$ and $g(x) = f(f(x))$, then (JEE M 2016)
- $g' = -\cos(\log 2)$
 - g is differentiable at $x = 0$ and $g'(0) = -\sin(\log 2)$
 - g is not differentiable at $x = 0$
 - $g' = \cos(\log 2)$
- 37) $\lim_{x \rightarrow \infty} \left(\frac{(n+1)(n+2)\dots 3n}{n^{2n}} \right)^{\frac{1}{n}}$ is equal to: (JEE M 2016)
- $\frac{9}{e^2}$
 - $3 \log 3 - 2$
 - $\frac{18}{e^4}$
 - $\frac{27}{e^2}$
- 38) Let $p = \lim_{x \rightarrow 0^+} \left(1 + \tan^2(\sqrt{x}) \right)^{\frac{1}{2x}}$ then $\log p$ is equal to: (JEE M 2016)
- $\frac{1}{2}$
 - $\frac{1}{4}$
 - 2
 - 1
- 39) $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\cot(x) - \cos(x)}{(\pi - 2x)^3}$ equals (JEE M 2017)
- $\frac{1}{4}$
 - $\frac{1}{24}$
 - $\frac{1}{16}$
 - $\frac{1}{8}$
- 40) For each $t \in \mathbb{R}$, let $[t]$ be the greatest integer less than or equal to t . Then $\lim_{x \rightarrow 0^+} x \left(\left[\frac{1}{x} \right] + \left[\frac{2}{x} \right] + \dots + \left[\frac{15}{x} \right] \right)$ (JEE M 2018)
- is equal to 15
 - is equal to 120
 - does not exist (in \mathbb{R})
 - is equal to 0
- 41) For $S = \{t \in \mathbb{R} : f(x) = |x - \pi|(e^{|x|} - 1) \sin(|x|) \text{ is not differentiable at } t\}$. Then the set S is equal to: (JEE M 2018)
- 0
 - π
 - $0, \pi$
 - \emptyset (an empty set)
- 42) $\lim_{y \rightarrow 0} \frac{\sqrt{1 + \sqrt{1 + y^4}} - \sqrt{2}}{y^4}$ (JEE M 2019- 9 Jan(M))
- exists and equals $\frac{1}{4\sqrt{2}}$
 - exists and equals $\frac{1}{2\sqrt{2}(\sqrt{2}+1)}$
 - exists and equals $\frac{1}{2\sqrt{2}}$
 - does not exist

43) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ is a function defined as

(JEE M 2019- 9 Jan(M))

$$f(x) = \begin{cases} 5, & \text{if } x \leq 1 \\ a + bx, & \text{if } 1 < x < 3 \\ b + 5x, & \text{if } 3 \leq x < 5 \\ 30, & \text{if } x \geq 5 \end{cases} \quad (43.1)$$

- a) continuous if $a = 5$ and $b = 5$
 b) continuous if $a = -5$ and $b = 10$
 c) continuous if $a = 0$ and $b = 5$
 d) not continuous for any values of a and b
- 44) If the function f defined on $\left(\frac{\pi}{3}, \frac{\pi}{6}\right)$ by

$$f(x) = \begin{cases} \frac{\sqrt{2} \cos x - 1}{\cot x - 1}, & x \neq \frac{\pi}{4} \\ k, & x = \frac{\pi}{4} \end{cases} \quad (44.1)$$

(JEE M 2019- 9 April(M))

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

45) Let $f(x) = 15 - |x - 10|$, $x \rightarrow \mathbb{R}$. Then the set of all values of x , at which the function, $g(x) = f(f(x))$ is not differentiable, is:

(JEE M 2019- 9 April(M))

- a) {5, 10, 15} c) {5, 10, 15, 20}
 b) {10, 15} d) {10}