

FUNCTIONS

SRUJANA-EE24BTECH11042

SECTION-A(D)

- 2) Let $g(x)$ be a function defined on $[-1, 1]$. If the area of the equilateral triangle with two of its vertices at $(0, 0)$ and $[x, g(x)]$ is $\frac{\sqrt{3}}{4}$, then the function $g(x)$ is (1989-2 Marks)
- a) $g(x) = \pm \sqrt{1-x^2}$ c) $g(x) = -\sqrt{1-x^2}$
 b) $g(x) = \sqrt{1-x^2}$ d) $g(x) = \sqrt{1+x^2}$
- 3) If $f(x) = \cos[\pi^2]x + \cos[-\pi^2]x$, where $[x]$ stands for the greatest integer function, then (1991-2 Marks)
- a) $f\left(\frac{\pi}{2}\right) = -1$ c) $f(-\pi) = 0$
 b) $f(\pi) = 1$ d) $f\left(\frac{\pi}{4}\right) = 1$
- 4) If $f(x) = 3x - 5$, then $f^{-1}(x)$ (1998-2 Marks)
- a) is given by $\frac{1}{3x-5}$
 b) is given by $\frac{x+5}{3}$
 c) does not exist because f is not one-one
 d) does not exist because f is not onto
- 5) If $g(f(x)) = |\sin|x|$ and $f(g(x)) = (\sin \sqrt{x})^2$, then (1998-2 Marks)
- a) $f(x) = \sin x^2, g(x) = \sqrt{x}$
 b) $f(x) = \sin x, g(x) = |x|$
 c) $f(x) = x^2, g(x) = \sin \sqrt{x}$
 d) f and g cannot be determined
- 6) Let $f : (0, 1) \rightarrow R$ be defined by $f(x) = \frac{b-x}{1-bx}$, where b is a constant such that $0 < b < 1$. Then
- a) f is not invertible on $(0, 1)$
 b) $f \neq f^{-1}$ on $(0, 1)$ and $f^1(b) = \frac{1}{f^1(0)}$
 c) $(c)f = f^{-1}$ on $(0, 1)$ and $f^1(b) = \frac{1}{f^1(0)}$
 d) f^{-1} is differentiable $(0, 1)$
- 7) Let $f : (-1, 1) \rightarrow IR$ be such that $f(\cos 4\theta) = \frac{2}{2-\sec^2 \theta}$ for $\theta \in \left(0, \frac{\pi}{4}\right) \cup \left(\frac{\pi}{4}, \frac{\pi}{2}\right)$. Then the value(s) of $f\left(\frac{1}{3}\right)$ is are
- a) $1 - \sqrt{\frac{3}{2}}$ c) $1 - \sqrt{\frac{2}{3}}$
 b) $1 + \sqrt{\frac{3}{2}}$ d) $1 + \sqrt{\frac{2}{3}}$
- 8) The function $f(x) = 2|x| + |x+2| - 2|x|$ has local minimum or local maximum at $x =$ (JEE Adv.2013)
- a) -2 b) $-\frac{2}{3}$ c) 2 d) $\frac{2}{3}$
- 9) Let $f : \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \rightarrow R$ be given by $f(x) = (\log(\sec x + \tan x))^3$. Then (JEE Adv.2014)
- a) $f(x)$ is an odd function
 b) $f(x)$ is one-one function
 c) $f(x)$ is an onto function
 d) $f(x)$ is an even function
- 10) Let $a \in R$ and let $f : R \rightarrow R$ be given by $f(x) = x^5 - 5x + a$. Then (JEE Adv.2014)
- a) $f(x)$ has three real roots if $a > 4$
 b) $f(x)$ has only real root if $a > 4$
 c) $f(x)$ has three real roots if $a < -4$
 d) $f(x)$ has three real roots if $-4 < a < 4$
- 11) Let $f(x) = \sin\left(\frac{\pi}{6}\left(\frac{\pi}{2}\sin x\right)\right)$ for all $x \in R$ and $g(x) = \frac{\pi}{2}\sin x$ for all $x \in R$. Let $(f \circ g)(x)$ denote $f(g(x))$ and $(g \circ f)(x)$ denote $g(f(x))$. Then which of the following are true? (JEE Adv 2015)
- a) Range of f is $\left[-\frac{1}{2}, \frac{1}{2}\right]$
 b) Range of $f \circ g$ is $\left[-\frac{1}{2}, \frac{1}{2}\right]$
 c) $\lim_{x \rightarrow 0} \frac{f(x)}{g(x)} = \frac{\pi}{6}$
 d) There is an $x \in R$ such that $(g \circ f)(x) = 1$

SECTION-A(E)

- 1) Find the domain and the range of the function $f(x) + \frac{x^2}{1+x^2}$. Is the function one one? (1978)
- 2) Draw the graph of $y = |x|^{\frac{1}{2}}$ for $-1 \leq x \leq 1$. (1978)
- 3) If $f(x) = x^9 - 6x^8 - 2x^7 + 12x^6 + x^4 - 7x^3 + 6x^2 + x - 3$ find $f'(x)$ (1979)
- 4) Consider the following relations in the set of real numbers R .
 $R = \{(x, y) : x \in R, y \in R, x^2 + y^2 \leq 25\}$ $R^1 = \{(x, y) : x \in R, y \in R, y \geq \frac{4}{9}x^2\}$
 Find the domain and the range of $R \cap R^1$. Is the relation $R \cap R^1$ a function? (1979)

- 5) Let A and B be two sets each with a finite number of elements. Assume that there is an injective mapping from A to B and that there is an injective mapping from B to A . Prove that there is a bijective mapping from A to B . (1981-2Marks)