FUNCTIONS

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EE24BTECH11042

SECTION-A(D)
MCQs with One or More than One Correct Answer(2-11)

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) $g(x) = \pm\sqrt{1-x^2}$ (b) $g(x) = \sqrt{1-x^2}$
(c) $g(x) = -\sqrt{1-x^2}$ (c) $g(x) = \sqrt{1+x^2}$

3 . If $f(x) = \cos[\pi^2]x + cos[-\pi^2]x$, where [x] stands for the greatest integer function , then

(1991-2Marks)

(a) $f(\frac{\pi}{2}) = -1$ (b) $f(\pi) = 1$
(C) $f(-\pi) = 0$ (d) $f(\frac{\pi}{4}) = 1$

4 . If $f(x) = 3x - 5$,then $f^{-1}(x)$

(1998-2Marks)

(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

(1998-2Marks)

(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 $f : (0,1) \to R$ 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)$f = f^{-1}$ on (0,1) and $f^1(b) = \frac{1}{f^1(0)}$
(d)$f^{-1}$is differentiable $(0,1)$

7 . Let $f : (-1,1) \to IR$ 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) $1 - \sqrt{\frac{3}{2}}$ (b)$1 + \sqrt{\frac{3}{2}}$
(c) $1 - \sqrt{\frac{2}{3}}$ (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 $f : \left(\frac{-\pi}{2}, \frac{\pi}{2}\right) \to R$ be given by $f(x) = (log(\sec x + tanx))^3$ 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 $f : R \to R$ 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 $f(x) = \sin(\frac{\pi}{6}(\frac{\pi}{2}\sin x))$ for all $x \in R$ and $g(x) = \frac{\pi}{2}\sin x$ for all $x \in R$. Let $(fog)(x)$ denote $f(g(x))$ and $(gof)(x)$ denote g($f(x)$). Then which of the following are true ?

(JEE Adv 2015)

(a) Range of f is $[\frac{-1}{2}, \frac{1}{2}]$
(b) Range of fog is $[\frac{-1}{2}, \frac{1}{2}]$
(c) $\lim_{x\to 0}\frac{f(x)}{g(x)} = \frac{\pi}{6}$
(d) There is an $x \in R$ such that $(gof)(x) = 1$

SECTION-A(E)
Subjective Problems(1-5)

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)**