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) $g(x) = -\sqrt{1-x^2}$
   d) $g(x) = \sqrt{1+x^2}$
3) If $f(x) = \cos\left[\pi^2\right]x + cos\left[-\pi^2\right]x$, where $[x]$ stands for the greatest integer function , then (1991-2Marks)
   a) $f\left(\frac{\pi}{2}\right) = -1$
   b) $f(\pi) = 1$
   c) $f(-\pi) = 0$
   d) $f\left(\frac{\pi}{4}\right) = 1$
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 $f(g(x)) = \left(\sin\sqrt{x}\right)^2$,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) (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 $f(x) = \sin\left(\frac{\pi}{6}\left(\frac{\pi}{2}\sin x\right)\right)$ for all $x \in R$ and $g(x) = \frac{\pi}{2}\sin x$ for all $x \in R$. Let $(fog)(x)$ 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 $\left[\frac{-1}{2}, \frac{1}{2}\right]$
   b) Range of fog is $\left[\frac{-1}{2}, \frac{1}{2}\right]$
   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)