

Topics : Function, Inverse Trigonometric Function

Type of Questions		M.M., Min.
Single choice Objective (no negative marking) Q.1,2,3	(3 marks, 3 min.)	[9, 9]
Multiple choice objective (no negative marking) Q.4	(5 marks, 4 min.)	[5, 4]
Subjective Questions (no negative marking) Q.5,6,7,8	(4 marks, 5 min.)	[16, 20]

- Range of the function $f(x) = \tan^{-1} \sqrt{[x]+[-x]} + \sqrt{2-|x|} + \frac{1}{x^2}$ is :
(where $[.]$ is the greatest integer function)
(A) $\left[\frac{1}{4}, \infty\right)$ (B) $\left\{\frac{1}{4}\right\} \cup [2, \infty)$ (C) $\left\{\frac{1}{4}, 2\right\}$ (D) $\left[\frac{1}{4}, 2\right]$
- Which of the following functions is periodic
(A) $\cos^2 x + \sin x^3 + \tan(x^4)$ (B) $\cos^2 x + \sin x^3 + \tan^4 x$
(C) $\cos^2 x^2 + \sin x^3 + \tan^4 x$ (D) $\cos 2x + \sin 3x + \tan 4x$
- Let $f : \mathbb{R} \rightarrow \left[0, \frac{\pi}{2}\right)$ defined by $f(x) = \tan^{-1}(x^2 + x + a)$, then the set of values of 'a' for which f is onto is
(A) $[0, \infty)$ (B) $\left[\frac{1}{4}, \infty\right)$ (C) $\frac{1}{4}$ (D) $(0, \infty)$
- If $x \in [0, 2\pi]$, then $y = \frac{\sin x}{|\sin x|}$, $y = \frac{|\cos x|}{\cos x}$ are identical functions for $x \in$
(A) $\left(0, \frac{\pi}{2}\right)$ (B) $\left(\frac{\pi}{2}, \pi\right)$ (C) $\left(\pi, \frac{3\pi}{2}\right)$ (D) $\left(\frac{3\pi}{2}, 2\pi\right)$
- If A is domain of $f(x) = \ln \tan^{-1}((x^3 - 6x^2 + 11x - 6)(x)(e^x - 8))$ and B is the range of $g(x) = \sin^2 \frac{x}{4} + \cos \frac{x}{4}$. Then find $A \cap B$.
- Classify one-one, many-one, into, onto function of the following functions
(i) $f(x) = x|x|$, $f : [-1, 1] \rightarrow [-1, 1]$ (ii) $f(x) = \frac{x^2}{x^2 + 1}$, $f : \mathbb{R} \rightarrow \mathbb{R}$
(iii) $f(x) = \frac{x-2}{x-3}$, $f : A \rightarrow B$, where $A = \mathbb{R} - \{3\}$, $B = \mathbb{R} - \{1\}$
- Prove that the equality $\left(1 - \frac{4}{1}\right) \left(1 - \frac{4}{9}\right) \left(1 - \frac{4}{25}\right) \dots \dots \dots \left(1 - \frac{4}{(2n-1)^2}\right) = \frac{1+2n}{1-2n}$ holds true for any natural n.
- Solve for x, if $\cot^{-1}(x) + \cot^{-1}(17-x) = \cot^{-1}(3)$.

Answers Key

1. (C) 2. (D) 3. (C) 4. (A C)
5. (0, 1)
6. (i) one-one, onto (ii) many-one, into
(iii) one-one, onto 8. $x = 4, 13$

