MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 16

Total Marks : 30

Max. Time : 33 min.

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]**

1. 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) $\left[\frac{1}{4}, 2\right]$

2. 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) $\cos 2x + \sin 3x + \tan 4x$

3. Let $f : R \to \left[0, \frac{\pi}{2}\right)$ 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) $(0, \infty)$

4. 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) $\left(\frac{3\pi}{2}, 2\pi\right)$

5. If A is domain of $f(x) = \ell n \tan^{-1}((x^3 - 6x^2 + 11x - 6)(x)(e^x - 8))$ and B is the range of $g(x) = \sin^2\frac{x}{4} + \cos\frac{x}{4}$. Then find $A \cap B$.

6. Classify one-one, many-one, into, onto function of the following functions

(i) $f(x) = x|x|$, $f : [-1, 1] \to [-1, 1]$ (ii) $f(x) = \frac{x^2}{x^2+1}$, $f : R \to R$

(iii) $f(x) = \frac{x-2}{x-3}$, $f : A \to B$, where $A = R - \{3\}$, $B = R - \{1\}$

7. Prove that the equality $\left(1-\frac{4}{1}\right)\left(1-\frac{4}{9}\right)\left(1-\frac{4}{25}\right)\ldots\ldots\ldots\left(1-\frac{4}{(2n-1)^2}\right) = \frac{1+2n}{1-2n}$ holds true for any natural n.

8. 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