MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 22

Total Marks : 32

Max. Time : 35 min.

Topics : Fundamentals of Mathematics, Function, Limits

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3,4	**(3 marks, 3 min.)**	**[12, 12]**
Subjective Questions (no negative marking) Q.5,6,7	**(4 marks, 5 min.)**	**[12, 15]**
Match the Following (no negative marking) Q.8	**(8 marks, 8 min.)**	**[8, 8]**

1. Range of the function $f(x) = \frac{\ell nx}{\sqrt{x}}$ is

(A) $(-\infty, e)$ (B) $(-\infty, e^2)$ (C) $\left(-\infty, \frac{2}{e}\right]$ (D) $\left(-\infty, \frac{1}{e}\right]$

2. Let $\tan(2\pi|\sin\theta|) = \cot(2\pi|\cos\theta|)$, where $\theta \in R$ and $f(x) = (|\sin\theta| + |\cos\theta|)^x$, $x \geq 1$. Then range of f(x) does not include

(A) 1 (B) 2 (C) 3 (D) 4

3. Range of the function $f(x) = \sqrt{\sin^{-1}|\sin x| - \cos^{-1}|\cos x|}$ is

(A) {0} (B) $\left[0, \sqrt{\pi/2}\right]$ (C) $\left[0, \sqrt{\pi}\right]$ (D) none of these

4. If f(4) = g(4) = 2, f′(4) = 9, g′(4) = 6, then $\lim\limits_{x\to 4} \frac{\sqrt{f(x)} - \sqrt{g(x)}}{\sqrt{x} - 2}$ is equal to

(A) $3\sqrt{2}$ (B) $\frac{3}{\sqrt{2}}$ (C) 0 (D) does not exists

5. Evaluate :

(i) $\lim\limits_{x\to\infty} \frac{\cot^{-1}\left(\sqrt{x+1} - \sqrt{x}\right)}{\sec^{-1}\left(\left(\frac{2x+1}{x-1}\right)^x\right)}$

(ii) $\lim\limits_{n\to\infty} \sum\limits_{r=1}^{n} \frac{r}{1 + r^2 + r^4}$

6. Let $f(x) = \begin{cases} \frac{\sin ax^2}{x^2}; & x \neq 0 \\ \frac{3}{4} + \frac{1}{4a}; & x = 0 \end{cases}$. For what values of a, f(x) is continuous at x = 0 ?

7. Find all values of the parameter 'a' for which the inequality $4^x - a2^x - a + 3 \leq 0$ is satisfied by at least one real x.

8.

Column - I		**Column - II**	
(A)	$\lim\limits_{x\to\pi/2} [\sin^{-1}\sin x] =$	(p)	-2
(B)	$\lim\limits_{x\to-\infty} [\tan^{-1}x] =$	(q)	0
(C)	$\lim\limits_{x\to\frac{\pi}{4}} \frac{\sqrt{1-\sqrt{\sin 2x}}}{\pi - 4x} =$	(r)	1
(D)	$\lim\limits_{x\to 0^+} \left[\frac{\sin\lvert x\rvert}{x}\right] =$	(s)	does not exist.

($\because$ where [.] denotes greatest integer function)

Answers Key

1. (C) **2.** (A) **3.** (A) **4.** (A)

5. (i) 1 (ii) $\frac{1}{2}$ **6.** $a = 1, a = \frac{-1}{4}$

7. $a \in [2, \infty)$ **8.** (A) $\rightarrow$ r, (B) $\rightarrow$ p, (C) $\rightarrow$ s, (D) $\rightarrow$ q