MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 20

Total Marks : 33

Max. Time : 37 min.

Topics : Fundamentals of Mathematics, Function, Limits

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

1. If $f(x) = \frac{x-1}{x+1}$, then f(f(ax)) in terms of f(x) is equal to

(A) $\frac{f(x)-1}{a(f(x)-1)}$ (B) $\frac{f(x)+1}{a(f(x)-1)}$ (C) $\frac{f(x)-1}{a(f(x)+1)}$ (D) $\frac{f(x)+1}{a(f(x)+1)}$

2. If $f(x) = ((\text{sgn } x)^{\text{sgn } x})^n$; n is an odd integer. Then

(A) f(x) is an odd function (B) f(x) is an even function

(C) f(x) = 0 (D) none of these

3. Let $f(x) = \frac{2}{4^x+2}$ for real numbers x. Evaluate : $f\left(\frac{1}{2011}\right) + f\left(\frac{2}{2011}\right) + \ldots\ldots + f\left(\frac{2010}{2011}\right)$.

4. In which of the following functions, range is singleton set.

(A) f(x) = [x] + [–x] (B) f(x) = {x} + {– x} (C) f(x) = $|\text{sgn}(x)|$ (D) f(x) = $\left[\sqrt{x-[x]}\right]$

where [x], {x} and sgn(x) are greatest integer function, fractional part function and signum function respectively.

5. Evaluate : (i) $\lim\limits_{x\to\pi} \frac{1-\sin\frac{x}{2}}{\cos\frac{x}{2}\left(\cos\frac{x}{4}-\sin\frac{x}{4}\right)}$ (ii) $\lim\limits_{x\to 0}\left(\frac{\sqrt{1+x\sin x}-\sqrt{\cos 2x}}{\tan^2(x/2)}\right)$

6. Solve the inequality : $\left(2\log_3^2 x - 3\log_3 x - 8\right)\left(2\log_3^2 x - 3\log_3 x - 6\right) \geq 3$.

7. Let $f(x) = \frac{|x^3-6x^2+11x-6|}{x^3-6x^2+11x-6}$. Find the set of points 'a' where $\lim\limits_{x\to a} f(x)$ does not exist.

8.

Column - I		**Column - II**	
(A)	$\lim\limits_{x\to 0}[\sin\|x\| - \|x\|] =$	(p)	0
(B)	$\lim\limits_{x\to 0}\left[\frac{x}{[x]}\right] =$	(q)	1
(C)	$\lim\limits_{x\to\frac{1}{2}}\left[x\left[\frac{1}{x}\right]\right] =$	(r)	Does not exist
(D)	$\lim\limits_{x\to -1}\left[\frac{[x]}{x}\right] =$	(s)	– 1

(∵ where [.] denotes greatest integer function)

Answers Key

1. (C) **2.** (A) **3.** 1005 **4.** (D)

5. (i) $\frac{1}{\sqrt{2}}$ (ii) 6

6. $\left(0, \frac{1}{\sqrt{27}}\right] \cup \left[\frac{1}{3}, \sqrt{243}\right] \cup [27, \infty)$]

7. a = 1, 2, 3.

8. (A) $\rightarrow$ (s), (B) $\rightarrow$ (r), (C) $\rightarrow$ (p), (D) $\rightarrow$ (q)