MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 7

Total Marks : 29

Max. Time : 31 min.

Topics : Fundamentals of Mathematics, Trigonometric Ratio, Inverse Trigonometric Function, Quadratic Equation

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q. 4, 5, 6	(3 marks, 3 min.)	[12, 12]
Subjective Questions (no negative marking) Q. 7, 8	(4 marks, 5 min.)	[8, 10]

COMPREHENSION (1 to 3)

Consider the equation $2^{|x+1|} - 2^x = |2^x - 1| + 1$

1. The least value of x satisfying the equation is
    (A) 0   (B) 2   (C) 4   (D) none of these

2. Number of integers less than 15 satisfying the equation are
    (A) 14   (B) 15   (C) 16   (D) none of these

3. Number of composite numbers less than 20 which are coprime with 4 satisfying the given equation is/ are
    (A) 2   (B) 3   (C) 4   (D) 5

4. If $\sin\theta = 5\sin(\theta + \phi)$, then $\tan(\theta + \phi) =$

    (A) $\dfrac{\sin\phi}{\cos\phi - 3}$ (B) $\dfrac{\sin\phi}{\cos\phi + 3}$ (C) $\dfrac{\sin\phi}{\cos\phi - 5}$ (D) $\dfrac{\cos\phi}{\sin\phi + 5}$

5. The number of solutions of the equation $2\sin^{-1}\sqrt{x^2 - x + 1} + \cos^{-1}(\sqrt{x^2 - x}) = \dfrac{3\pi}{2}$ is

    (A) 0   (B) Infinite   (C) 2   (D) 4

6. If $2\tan^{-1}x + \sin^{-1}\left(\dfrac{2x}{1 + x^2}\right)$ is independent of 'x' then

    (A) $x \in (-\infty, -1] \cup [1, \infty)$ (B) $x \in [-1, 1]$
    (C) $x \in (-\infty, 1]$ (D) $x \in R$

7. Find the sum to n terms of the series

    $$S_n = \cot^{-1}\left(2^2 + \frac{1}{2}\right) + \cot^{-1}\left(2^3 + \frac{1}{2^2}\right) + \cot^{-1}\left(2^4 + \frac{1}{2^3}\right) + \dots\dots \text{ up to n terms}$$

8. Find the values of 'a' for which the equation,
    $(x^2 + x + 2)^2 - (a - 3)(x^2 + x + 2)(x^2 + x + 1) + (a - 4)(x^2 + x + 1)^2 = 0$ has at least one solution.

Answers Key

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

5. (C) **6.** (A) **7.** $\cot^{-1}\left(\dfrac{1+4.2^n}{2(2^n-1)}\right)$

8. $5 < a \le \dfrac{19}{3}$