

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 $2^{|x+1|} - 2^x = |2^x - 1| + 1$

- The least value of x satisfying the equation is
 (A) 0 (B) 2 (C) 4 (D) none of these
- Number of integers less than 15 satisfying the equation are
 (A) 14 (B) 15 (C) 16 (D) none of these
- 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
- If $\sin \theta = 5 \sin (\theta + \phi)$, then $\tan (\theta + \phi) =$
 (A) $\frac{\sin \phi}{\cos \phi - 3}$ (B) $\frac{\sin \phi}{\cos \phi + 3}$ (C) $\frac{\sin \phi}{\cos \phi - 5}$ (D) $\frac{\cos \phi}{\sin \phi + 5}$
- The number of solutions of the equation $2 \sin^{-1} \sqrt{x^2 - x + 1} + \cos^{-1} (\sqrt{x^2 - x}) = \frac{3\pi}{2}$ is
 (A) 0 (B) Infinite (C) 2 (D) 4
- If $2 \tan^{-1} x + \sin^{-1} \left(\frac{2x}{1+x^2} \right)$ is independent of 'x' then
 (A) $x \in (-\infty, -1] \cup [1, \infty)$ (B) $x \in [-1, 1]$
 (C) $x \in (-\infty, 1]$ (D) $x \in \mathbb{R}$
- Find the sum to n terms of the series

$$S_n = \cot^{-1} \left(2^2 + \frac{1}{2} \right) + \cot^{-1} \left(2^3 + \frac{1}{2^2} \right) + \cot^{-1} \left(2^4 + \frac{1}{2^3} \right) + \dots \text{ up to n terms}$$
- 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. $\cot^{-1} \left(\frac{1+4 \cdot 2^n}{2(2^n-1)} \right)$
8. $5 < a \leq \frac{19}{3}$

