Std : XII **SLIP TEST** **Marks: 40**

Date : 05.08.2019 **MATHS** **Time : 1.00 hr**

I. Choose the correct answer: **(10 x 1 = 10)**

1. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$; then $\cos^{-1} x + \cos^{-1} y$ is equal to

   a) $\frac{2\pi}{3}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{6}$ d) π

2. If $\sin^{-1} x = 2\sin^{-1} \alpha$ has a solution, then

   a) $|\alpha| \leq \frac{1}{\sqrt{2}}$ b) $|\alpha| \geq \frac{1}{\sqrt{2}}$ c) $|\alpha| < \frac{1}{\sqrt{2}}$ d) $|\alpha| > \frac{1}{\sqrt{2}}$

3. $\sin^{-1}\frac{3}{5} - \cos^{-1}\frac{12}{13} + \sec^{-1}\frac{5}{3} - \operatorname{cosec}^{-1}\frac{13}{12}$ is equal to

   a) 2π b) π c) 0 d) $\tan^{-1}\frac{12}{65}$

4. The domain of the function defined by $f(x) = \sin^{-1}\sqrt{x-1}$ is

   a) [1,1] b) $[-1,1]$ c) [0,1] d) $[-1,0]$

5. If the function $f(x) = \sin^{-1}(x^2 - 3)$, then x belongs to

   a) [-1,1] b) $[\sqrt{2}, 2\,]$ c) $[-2,-\sqrt{2}] \cup [\sqrt{2}, 2\,]$ d) $[-2,-\sqrt{2}]$

6. $\sin^{-1}(2\cos^2 x - 1) + \cos^{-1}(1 - 2\sin^2 x) =$

   a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$

7. The equation $\tan^{-1} x - \cot^{-1} x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ has

   a) no solution b) Unique solution

   c) tow solutions d) infinite number of solutions

8. If $\sin^{-1}\frac{x}{5} + \operatorname{cosec}^{-1}\frac{5}{4} = \frac{\pi}{2}$, *then* x is equal to

   a) 4 b) 5 c) 2 d) 3

9. $\sin^{-1}\left(\tan\frac{\pi}{4}\right) - \sin^{-1}\left(\frac{3}{x}\right) = \frac{\pi}{6}$. Then x is a root of the equation.

a) $x^2 - x - 6 = 0$ b) $x^2 - x - 12 = 0$ c) $x^2 + x - 12 = 0$ d) $x^2 + x - 6 = 0$

10. $\sin(\tan^{-1} x), |x| < 1$ is equal to

a) $\frac{x}{\sqrt{1-x^2}}$ b) $\frac{1}{\sqrt{1-x^2}}$ c) $\frac{1}{\sqrt{1+x^2}}$ d) $\frac{x}{\sqrt{1+x^2}}$

(3 x 2 = 6)

II. Answer the following questions:

11. Find the principal value of: (i) $\cot^{-1}(\sqrt{3})$. (ii) $\sec^{-1}\left(-\frac{2\sqrt{3}}{3}\right)$.

12. Prove that $\tan(\sin^{-1} x) = \frac{x}{\sqrt{1-x^2}}$ for $|x| < 1$.

13. Find the value of the expression in terms of x, with the help of a reference triangle.

i) $\tan\left(\sin^{-1}\left(x + \frac{1}{2}\right)\right)$

(3 x 3 = 9)

III. Answer the following questions:

14. Find the value of: $\sin^{-1}(-1) + \cos^{-1}\frac{1}{2} + \cot^{-1}(2)$

15. Prove that $\frac{\pi}{2} \leq \sin^{-1} x + 2\cos^{-1} x \leq \frac{3\pi}{2}$

16. Prove that $\sin^{-1}\frac{3}{5} - \cos^{-1}\frac{12}{13} = \sin^{-1}\frac{16}{65}$

(3 x 5 = 15)

IV. Answer the following questions:

17. Find the number of solution of the equation $\tan^{-1}(x-1) + \tan^{-1} x + \tan^{-1}(x+1) = \tan^{-1}(3x)$.

18. If $a_1, a_2, a_3 \ldots\ldots a_n$ is an arithmetic progression with common difference d, prove that $\tan\left[\tan^{-1}\left(\frac{d}{1+a_1a_2}\right) + \tan^{-1}\left(\frac{d}{1+a_2a_3}\right) + \cdots + \tan^{-1}\left(\frac{d}{1+a_na_{n-1}}\right)\right] = \frac{a_n - a_1}{1+a_1a_n}$

19. solve: $\cos\left(\sin^{-1}\left(\frac{d}{\sqrt{1+x^2}}\right)\right) = \sin\left\{\cot^{-1}\left(\frac{3}{4}\right)\right\}$.