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Chapter End Test

(2019-20)

Date : _____ Duration: 45 Min. Max. Marks : 25	**Mathematics** **Topic :** Inverse Trigonometric Functions	**CLASS** **XII**

Instructions:

- All questions are compulsory.
- Questions 1-15 are multiple choice questions carrying 1 mark each.
- Question 16 carries 4 marks.
- Question 17 carries 6 marks.
- Use of calculator is not allowed.

Section A – 1 Mark

Choose the correct answer from the given four options:

1. If $3\tan^{-1}x+\cot^{-1}x=\pi$, then x equals

(a) 0 (b) 1 (c) -1 (d) ½

2. If $\tan^{-1}x+\tan^{-1}y=\frac{4\pi}{5}$, then $\cot^{-1}x+\cot^{-1}y$ equals

(a) $\frac{\pi}{5}$ (b) $\frac{2\pi}{5}$ (c) $\frac{3\pi}{5}$ (d) π

3. The value of the expression $2\sec^{-1}2+\sin^{-1}\left(\frac{1}{2}\right)$ is

(a) $\frac{\pi}{6}$ (b) $\frac{5\pi}{6}$ (c) $\frac{7\pi}{6}$ (d) 1

4. The value of $\tan^2\left(\sec^{-1}2\right)+\cot^2\left(\text{cosec}^{-1}3\right)$ is

(a) 5 (b) 11 (c) 13 (d) 15

5. $\tan^{-1}1+\cos^{-1}\left(-\frac{1}{2}\right)+\sin^{-1}\left(-\frac{1}{2}\right)$ is equal to:

(a) $\frac{5\pi}{12}$ (b) $\frac{\pi}{2}$ (c) $\frac{3\pi}{4}$ (d) $\frac{5\pi}{6}$

6. The simplest form of $\tan^{-1}\left(\frac{\cos x-\sin x}{\cos x+\sin x}\right), -\frac{\pi}{4}<x<\frac{\pi}{4}$, is:

(a) $\frac{\pi}{4}-x$ (b) $\frac{\pi}{2}-\frac{x}{2}$ (c) $\pi-\frac{x}{2}$ (d) $\frac{\pi}{4}+\frac{x}{2}$

7. The simplest form of $\tan^{-1}\left(\frac{x}{\sqrt{a^2-x^2}}\right), -a<x<a$, is:

(a) $\sin^{-1}\frac{x}{a}$ (b) $\frac{1}{a}\sin^{-1}\frac{x}{a}$ (c) $\sin a$ (d) None of these

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

(a) no solution (b) unique solution
(c) infinite number of solutions (d) two solutions

9. The value of the expression $\sin\left[\cot^{-1}\left(\cos\left(\tan^{-1}1\right)\right)\right]$ is

(a) 0 (b) 1 (c) $\frac{1}{\sqrt{3}}$ (d) $\sqrt{\frac{2}{3}}$

10. If $\sin^{-1}x + \sin^{-1}y = \frac{\pi}{2}$, then value of $\cos^{-1}x + \cos^{-1}y$ is

(a) $\frac{\pi}{2}$ (b) π (c) 0 (d) $\frac{2\pi}{3}$

11. Which of the following is the principal value branch of $\text{cosec}^{-1}x$?

(a) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ (b) $[0,\pi] - \left\{\frac{\pi}{2}\right\}$ (c) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (d) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right] - \{0\}$

12. The value of $\sin^{-1}\left[\cos\left(\frac{33\pi}{5}\right)\right]$ is

(a) $\frac{3\pi}{5}$ (b) $-\frac{7\pi}{5}$ (c) $\frac{\pi}{10}$ (d) $-\frac{\pi}{10}$

13. If $\cos^{-1}x + \cos^{-1}y + \cos^{-1}z = 3\pi$, then $x(y+z) + y(z+x) + z(x+y)$ equals

(a) 0 (b) 1 (c) 6 (d) 12

14. The value of $\cos^{-1}\left(\cos\frac{3\pi}{2}\right)$ is equal to

(a) $\frac{\pi}{2}$ (b) $\frac{3\pi}{2}$ (c) $\frac{5\pi}{2}$ (d) $\frac{7\pi}{2}$

15. If $\cos\left(\sin^{-1}\frac{2}{5} + \cos^{-1}x\right) = 0$, then x is equal to

(a) $\frac{1}{5}$ (b) $\frac{2}{5}$ (c) 0 (d) 1

Section B – 4 Marks

16. Prove that (i) $2\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{31}{17}$

(ii) find the value of $\tan\frac{1}{2}\left[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}\right], |x| < 1, y > 0 \text{ and } xy < 1$

Section C – 6 Marks

17. (i) Solve the following equation $\sin^{-1}(1-x) - 2\sin^{-1}x = \frac{\pi}{2}$.

(ii) Prove that $\tan^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right) = \frac{\pi}{4} - \frac{1}{2}\cos^{-1}x, -\frac{1}{\sqrt{2}} \le x \le 1$

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Hints/Solutions to Chapter End Test

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1. (c) **2.** (a) **3.** (b) **4.** (b)

5. (c) **6.** (a) **7.** (a) **8.** (b)

9. (d) **10.** (a) **11.** (d) **12.** (d)

13. (c) **14.** (a) **15.** (b)