



CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: MATHEMATICS

Chapter Name : Inverse Trigonometric Function & (ITF)/Circular Function

(Chap : 2)

Total : 14 Marks (expected) [MCQ(1)-2 Mark, VSA-(2)-4 Marks, SA-(1)-3 Marks, LA(1)-5 Marks]

Level 1 & 2 Combined

Section - A

MCQ Type :

1. If $\sin^{-1}x - \cos^{-1}x = \frac{\pi}{6}$ then $x = ?$

(A) 1

(B) $\frac{1}{2}$

(C) $\frac{1}{\sqrt{2}}$

(D) $\frac{\sqrt{3}}{2}$

(Hints : Complementary angle identities for ITF)

2. Find the value of : $\operatorname{sincos}^{-1}\left(-\frac{1}{2}\right)$

(A) $-\frac{\sqrt{3}}{2}$

(B) $\frac{\sqrt{3}}{2}$

(C) $\frac{1}{2}$

(D) $-\frac{1}{2}$

(Hints : Inverse Property)

3. $\tan \frac{1}{3}(\tan^{-1}x + \tan^{-1}\frac{1}{x}), (x > 0) = ?$

(A) $\frac{1}{\sqrt{3}}$

(B) $\sqrt{3}$

(C) 1

(D) 0

(Hints : Property of ITF)

4. If $2\tan^{-1}x = \sin^{-1}k$ then the value of k is

(A) $\frac{1-x^2}{1+x^2}$

(B) $\frac{2x}{1-x^2}$

(C) $\frac{2x}{1+x^2}$

(D) $\frac{2x^2}{1+x^2}$

(Hints : Property of ITF)

5. If $\sec^{-1}x = \cos^{-1}y$, find the value of $\left(\cos^{-1}\frac{1}{x} + \cos^{-1}\frac{1}{y}\right)$

(A) π

(B) $\frac{2\pi}{3}$

(C) $\frac{5\pi}{6}$

(D) $\frac{\pi}{2}$

(Hints : Property of ITF)

6. The general value of $\cos^{-1}(-1)$ is

(A) $2n\pi \pm \frac{\pi}{2}$

(B) $2n\pi \pm \frac{\pi}{3}$

(C) $2n\pi \pm \pi$

(D) $2n\pi \pm \frac{\pi}{6}$

(Hints : Definition of general value)

7. $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3} =$

(A) a

(B) a

(C) a

(D) a

(Hints : $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\frac{x+y}{1-xy}$)

Section - B

very short answer type questions (VSA) :

1. Prove that $2\tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8} = \tan^{-1}\frac{4}{7}$

(Hints : Property of ITF)

2. Find the value of $\cos^{-1}(\cos \frac{7\pi}{6})$

(Hints : Properties of ITF)

3. Prove that $\tan^{-1} \frac{1}{2} + \tan^{-1} \frac{2}{11} = \tan^{-1} \frac{3}{4}$

(Hints : Properties of ITF)

4. Solve : $\tan^{-1} \frac{1-x}{1+x} - \frac{1}{2} \tan^{-1} x = 0, x > 0$.

(Hints : Properties of ITF)

5. Prove that $\tan^{-1} \sqrt{x} = \frac{1}{2} \cos^{-1} \frac{1-x}{1+x}; 0 \leq x \leq 1$

(Hints : Properties of ITF)

6. Prove that $\sec^2(\tan^{-1} 3) + \operatorname{cosec}^2(\cot^{-1} 4) = 27$.

(Hints : Properties of ITF)

7. Solve : $\tan^{-1}(\cot x) + \cot^{-1}(\tan x) = \frac{\pi}{4}$.

(Hints : Properties of ITF)

Section - C

short Answer Question (SA) :

Prove that

1. a

(Hints : Indefinite Integral)

2. $\tan^{-1} \frac{1}{p+q} + \tan^{-1} \frac{q}{p^2+pq+1} = \cot^{-1} p$.

(Hints : Properties of ITF)

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

(Hints : Properties of ITF)

4. $\tan^{-1}(\cot x) + \cot^{-1}(\tan x) = \pi - 2x$

5. $\tan\left(\frac{\pi}{4} + \frac{1}{2} \cos^{-1} \frac{a}{b}\right) + \tan\left(\frac{\pi}{4} - \frac{1}{2} \cos^{-1} \frac{a}{b}\right) = \frac{2b}{a}$

6. $\tan^{-1}\left(\frac{1}{\sqrt{3}} \tan \frac{x}{2}\right) = \frac{1}{2} \cos^{-1}\left(\frac{1+2\cos x}{2+\cos x}\right)$

7. If two angles of a triangle are $\cot^{-1} \frac{1}{2}$ and $\cot^{-1} \frac{1}{3}$, then show that the third angle is $\frac{\pi}{4}$.

Simplify (8 - 11)

8. $\tan\left[\frac{1}{2} \sin^{-1} \frac{2x}{1+x^2} + \frac{1}{2} \cos^{-1} \frac{1-y^2}{1+y^2}\right]; xy \neq 1$

(Hints : Properties of ITF)

9. $\cos(2\cos^{-1} x + \sin^{-1} x)$, when $x = \frac{1}{5}$ where, $0 \leq \cos^{-1} x \leq \pi; -\frac{\pi}{2} \leq \sin^{-1} x \leq \frac{\pi}{2}$

(Hints : Properties of ITF)

10. $2\tan^{-1} \frac{1+x}{1-x} + \sin^{-1} \frac{1-x^2}{1+x^2}$

(Hints : Properties of ITF)

11. $\tan(\sin^{-1}x + \sin^{-1}y) + \tan(\cos^{-1}x + \cos^{-1}y)$

(Hints : Properties of ITF)

12. $\tan^{-1}\left(\frac{x-1}{x-2}\right) + \tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$

(Hints : Properties of ITF)

13. $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1} \frac{8}{31}$

(Hints : Properties of ITF)

14. $\tan^{-1}\left(\frac{1}{2}\sec x\right) + \cot^{-1}(2\cos x) = \frac{\pi}{3}$

(Hints : Properties of ITF)

Section - D

Long Answer Question (LA) :

Prove that (1 - 4)

1. $\sin^{-1}\frac{12}{13} + \cos^{-1}\frac{4}{5} + \tan^{-1}\frac{63}{16} = \pi$

(Hints : Properties of ITF)

2. $4\tan^{-1}\frac{1}{5} - \tan^{-1}\frac{1}{70} + \tan^{-1}\frac{1}{99} = \frac{\pi}{4}$

(Hints : Properties of ITF)

3. $\frac{x^3}{2}\operatorname{cosec}^2\left(\frac{1}{2}\tan^{-1}\frac{x}{y}\right) + \frac{y^3}{2}\sec^2\left(\frac{1}{2}\tan^{-1}\frac{y}{x}\right) = (x^2 + y^2)(x + y)$

(Hints : Properties of ITF)

4. $\sin(\pi \cos \theta) = \cos(\pi \sin \theta) = \theta = \pm \frac{1}{2}\sin^{-1}\frac{3}{4}$

(Hints : Properties of ITF)

5. $2\tan^{-1}(\cos x) = \tan^{-1}(2\operatorname{cosec} x)$

(Hints : Properties of ITF)

6. $3\cot^{-1}\frac{1}{2-\sqrt{3}} + \cot^{-1}x = \frac{\pi}{2}$

(Hints : Properties of ITF)

7. $\sin^{-1}x + \sin^{-1}y = \frac{2\pi}{3}$
 $\cos^{-1}x - \cos^{-1}y = \frac{\pi}{3}$

(Hints : Properties of ITF)

Section - A

1. ④
2. ③
3. ①
4. ③
5. ④
6. ③
7. ③

Section - B_(VSA)

2. $\frac{5\pi}{6}$

4. $\frac{1}{\sqrt{3}}$

7. $\frac{3\pi}{8}$

Section - C(SA)

8. $\frac{x+y}{1-xy}$

10. π

13. $\frac{1}{4}$

9. $\frac{-2\sqrt{6}}{5}$

11. 0

14. $2n\pi \pm \frac{\pi}{6}$, $n = \text{any integer.}$

12. $\pm \frac{1}{\sqrt{2}}$

Section -D (LA)

5. $\frac{\pi}{4}$

6. 1

7. $x = \frac{1}{2} \quad y = 1$

