

Comprehensive Test Series-02

CHAPTER-2(Inverse – Trigonometric Functions)

TIME: 1hr

MM:

General Instructions:

- All Questions are compulsory.
 - Marks are given alongwith the questions individually.
 - Use of calculator is not permitted.
-

Q.1 Find the principal value of following:

$$\cot^{-1}\left(\frac{-1}{\sqrt{3}}\right)$$

Q.2 Find the value of following

$$\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$$

Q.3 Express $\tan^{-1}\left(\frac{\cos x}{1 + \sin x}\right)$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$ in the simplest form.

Q.4 $\tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{7} + \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$ (prove)

Q.5 Prove that $\tan^{-1} x + \tan^{-1}\frac{2x}{1-x^2} = \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$, $|x| < \frac{1}{\sqrt{3}}$

Q.6 $\tan^{-1}\left(\frac{3a^2x-x^3}{a^3-3ax^2}\right)$, $a > 0$; $\frac{-a}{\sqrt{3}} \leq x \leq \frac{a}{\sqrt{3}}$

Q.7 $\tan\frac{1}{2}\left[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}\right]$, $|x| < 1$, $y > 0$ and $xy < 1$

Q.8 If $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1}x\right) = 1$, then find the value of x .

Q.9 If $\tan^{-1}2x + \tan^{-1}3x = \frac{\pi}{4}$, then find the value of x .

Q.10 Find the value $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$.

Q.11 $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$ is equal to

(A) π (B) $-\frac{\pi}{2}$ (C) 0 (D) $2\sqrt{3}$

Q.12 Simplify $\tan^{-1}\left[\frac{a \cos x - b \sin x}{b \cos x + a \sin x}\right]$, if $\frac{a}{b} \tan x > -1$

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

Q.14 Find the value $\sin^{-1}\frac{8}{17} + \sin^{-1}\frac{3}{5} = \sin^{-1}\frac{77}{85}$.

Q.15 Prove that

(i) $\tan^{-1}\left[\frac{\sqrt{1+\cos x} + \sqrt{1-\cos x}}{\sqrt{1+\cos x} - \sqrt{1-\cos x}}\right] = \frac{\pi}{4} + \frac{x}{2}, 0 < x < \frac{\pi}{2}$

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

(iii) $\frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\frac{1}{3} = \frac{9}{4}\sin^{-1}\frac{2\sqrt{2}}{3}$

(iv) $\tan^{-1}\sqrt{x} = \frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right), x \in [0, 1]$

Q.16 solving the following equation: $\sin^{-1}(1-x) - 2\sin^{-1}x = \frac{\pi}{2}$