

Comprehensive Test Series-03

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.
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Q.1 Find the principal value of following:

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

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

(ii) $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

(iv) $\operatorname{cosec}^{-1}(-\sqrt{2})$

(v) $\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$

Q.2 Find the value of following

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

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

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 $2 \tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{31}{17}$

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

Q. 10 Find the value $\tan^{-1} \left(\tan \frac{3\pi}{4} \right)$.

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 $\cos^{-1} \frac{4}{5} + \cos^{-1} \frac{12}{13} = \cos^{-1} \frac{33}{65}$.

Q.15 Prove that

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

(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: $2 \tan^{-1} (\cos x) = \tan^{-1} (2 \cos ecx)$