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QUESTION BANK

CHAPTER – 2 INVERSE TRIGONOMETRIC FUNCTIONS

Answer the following.

1. Express $\tan^{-1}\left(\frac{cosx}{1-sinx}\right), \frac{-\pi}{2} < x < \frac{3\pi}{2}$ in the simplest form.
2. Write the principal value of $\cos^{-1}\left(\cos\frac{7\pi}{6}\right) + \sin^{-1}\left(sin\frac{7\pi}{6}\right)$.
3. Solve for x: $\tan^{-1}(2x) + \tan^{-1}(3x) = \frac{\pi}{4}$.
4. Prove: $\tan^{-1}\left[\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right] = \frac{\pi}{4} + \frac{1}{2}\cos^{-1}x^2$
5. $\tan\left[\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right] + \tan\left[\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right] = \frac{2b}{a}$.
6. Simplify: $\tan\left[\frac{1}{2}\cos^{-1}\frac{\sqrt{5}}{3}\right]$.
7. Find the principal value of $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$.
8. Simplify: $\tan^{-1}\left(\frac{3\,sin2x}{5+3\,cos2x}\right) + \tan^{-1}\left(\frac{tanx}{4}\right)$.
9. $If\ \cos^{-1}\left(\frac{x}{a}\right) + \cos^{-1}\left(\frac{y}{b}\right) = \propto$, Prove that $\frac{x^2}{a^2} - \frac{2xy}{ab}\cos\propto + \frac{y^2}{b^2} = sin^2\propto$
10. Solve for x : $\sin^{-1}(1-x) - 2\sin^{-1}x = \frac{\pi}{2}$
11. Prove : $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right) = \frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$
12. Write the principal value of $\cos^{-1}(\cos\frac{7\pi}{6})$.
13. Prove that $\sin^{-1}$ 3/5 - $\sin^{-1}$ 8/17 = $\cos^{-1}$ 84/85 .
14. If $\tan^{-1}x + \tan^{-1}y = \frac{\pi}{4}$,where xy < 1, find the value of x+y+ xy .
15. Find x , if $\tan^{-1}$ 3 + $\cot^{-1}x = \frac{\pi}{2}$.
16. Prove: $\cos\left(\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{3}{2}\right) = \frac{6}{5\sqrt{13}}$
17. Solve for x: 2 $\tan^{-1}$(sin x)= $\tan^{-1}$(2 sec x), $0 < x < \frac{\pi}{2}$.
18. Solve for x: $\cos^{-1}x + \sin^{-1}\frac{x}{2} = \frac{\pi}{6}$.
19. Show that : $\tan^{-1}$ 1+ $\tan^{-1}$ 2 + $\tan^{-1}$ 3 = 2 ($\tan^{-1}$ 1 + $\tan^{-1}$ ½ + $\tan^{-1}$ 1/3)
20. If $\cos^{-1}x + \cos^{-1}y + \cos^{-1}z = \pi$, $0 < x, y, z < 1$,show that $x^2 + y^2 + z^2 + 2xyz = 1$.
21. Evaluate : $\sin^{-1}(\cos(-105^0))$.
22. Solve for x : $sin^{-1}\frac{2a}{1+a^2} + sin^{-1}\frac{2b}{1+b^2} = 2tan^{-1}x,\ ab < 1$
23. Prove: $\sin^{-1}\left(\frac{12}{13}\right) + \cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{63}{16}\right) = \pi$
24. Write the principal value of $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$.
25. Solve for x: $2\tan^{-1}(sinx) = \tan^{-1}\left(\frac{2}{cosx}\right)$, $x \neq \frac{\pi}{2}$.
26. Find the value of $\sin^{-1}\{\cos(\sin^{-1}x)\} + \cos^{-1}\{\sin(\cos^{-1}x)\}$.

27. Prove: $\sin^{-1}\left(\frac{12}{13}\right) + \cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{63}{16}\right) = \pi$

28. Prove: $\tan^{-1}\left(\frac{1}{8}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{4}$

29. Find the principal value of $\cos^{-1}\left(-\frac{1}{\sqrt{3}}\right)$

30. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \frac{\pi}{2}$, prove that xy + yz + zx = 1.

31. Solve for x: $\cos^{-1}\left(\frac{x^2-1}{x^2+1}\right) + \tan^{-1}\left(\frac{2x}{x^2-1}\right) = \frac{2\pi}{3}$

32. Prove that : $2\tan^{-1}\frac{1}{5} + \sec^{-1}\frac{5\sqrt{2}}{7} + 2\tan^{-1}\frac{1}{8} = \frac{\pi}{4}$

33. Prove that: $\frac{9\pi}{8} - \frac{9}{4}sin^{-1}\frac{1}{3} = \frac{9}{4}sin^{-1}\frac{2\sqrt{2}}{3}$

34. Write in simplest form : $\tan^{-1}\left(\frac{cosx-sinx}{cosx+sinx}\right)$, $0 < x < \pi$.

35. Prove : $2\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{7}\right) = \tan^{-1}\left(\frac{31}{17}\right)$

36. Prove that $\sin^{-1}\left(\frac{3}{5}\right) - \sin^{-1}\left(\frac{8}{17}\right) = \cos^{-1}\left(\frac{84}{85}\right)$

37. Solve for x : $2\tan^{-1}(\cos x) = \tan^{-1}(2\operatorname{cosec} x)$.

38. Prove that $\tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \pi/4$.

39. If $\cos^{-1}(x/a) + \cos^{-1}(y/b) = \theta$, prove that $\frac{x^2}{a^2} - \frac{2xy}{ab}cos\,\theta + \frac{y^2}{b^2} = \sin^2\theta$.

40. Prove : $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$

41. Prove that : $4(\cot^{-1} 3 + \operatorname{cosec}^{-1}\sqrt{5}) = \pi$

42. Solve for x : $\sin^{-1}\left(\frac{5}{x}\right) + \sin^{-1}\left(\frac{12}{x}\right) = \frac{\pi}{2}$

43. Write the principal value of $\tan^{-1}[\sin(-\pi/2)]$.

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