



CLASS- XII(NON-MED)

ASSIGNMENT- 4 (MATHS)

CH-2 (INVERSE T- FUNCTIONS)

❖ REVISION:

1. IMPORTANT FORMULAE:

- (a) (i) $\sin^{-1} \left(\frac{1}{x} \right) = \operatorname{cosec}^{-1} x; x \geq 1 \text{ or } x \leq -1$ (ii) $\cos^{-1} \left(\frac{1}{x} \right) = \sec^{-1} x; x \geq 1 \text{ or } x \leq -1$
- (iii) $\tan^{-1} \left(\frac{1}{x} \right) = \begin{cases} \cot^{-1} x; x > 0 \\ -\pi + \cot^{-1} x; x < 0 \end{cases}$
- (b) (i) $\sin^{-1} (-x) = -\sin^{-1} x; x \in [-1, 1]$ (ii) $\tan^{-1} (-x) = -\tan^{-1} x; x \in R$
- (iii) $\operatorname{cosec}^{-1} (-x) = -\operatorname{cosec}^{-1} x; |x| \geq 1$
- (c) (i) $\cos^{-1} (-x) = \pi - \cos^{-1} x; x \in [-1, 1]$ (ii) $\sec^{-1} (-x) = \pi - \sec^{-1} x; |x| \geq 1$
- (iii) $\cot^{-1} (-x) = \pi - \cot^{-1} x; x \in R$
- (d) (i) $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}; x \in [-1, 1]$ (ii) $\tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}; x \in R$
- (iii) $\operatorname{cosec}^{-1} x + \sec^{-1} x = \frac{\pi}{2}; |x| \geq 1$
- (e) (i) $\tan^{-1} x + \tan^{-1} y = \tan^{-1} \left(\frac{x+y}{1-xy} \right); xy < 1$
- (ii) $\tan^{-1} x - \tan^{-1} y = \tan^{-1} \left(\frac{x-y}{1+xy} \right); xy > -1$
- (f) (i) $2 \tan^{-1} x = \sin^{-1} \left(\frac{2x}{1+x^2} \right); |x| \leq 1$ (ii) $2 \tan^{-1} x = \cos^{-1} \left(\frac{1-x^2}{1+x^2} \right); x \geq 0$
- (iii) $2 \tan^{-1} x = \tan^{-1} \left(\frac{2x}{1-x^2} \right); -1 < x < 1$
- (iv) $2 \sin^{-1} x = \sin^{-1} (2x\sqrt{1-x^2}); \frac{-1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$
- (v) $2 \cos^{-1} x = \sin^{-1} (2x\sqrt{1-x^2}); \frac{-1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$ or $2 \cos^{-1} x = \cos^{-1} (2x^2 - 1); 0 \leq x \leq 1$
- (g) (i) $\sin^{-1} x + \sin^{-1} y = \sin^{-1} (x\sqrt{1-y^2} + y\sqrt{1-x^2})$
- (ii) $\sin^{-1} x - \sin^{-1} y = \sin^{-1} (x\sqrt{1-y^2} - y\sqrt{1-x^2})$
- (iii) $\cos^{-1} x + \cos^{-1} y = \cos^{-1} (xy - \sqrt{1-x^2}\sqrt{1-y^2})$
- (iv) $\cos^{-1} x - \cos^{-1} y = \cos^{-1} (xy + \sqrt{1-x^2}\sqrt{1-y^2})$

2. IMPORTANT QUESTIONS:

❖ OBJECTIVE TYPE QUESTIONS (1 mark):

1. Find the principal value of $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$.
2. Find the value of $\sin^{-1}\left(\sin\frac{3\pi}{5}\right)$
3. Find the value of $\sin(\sin^{-1} a + \cos^{-1} a)$
4. Evaluate : $\tan^{-1}\left(\frac{x}{y}\right) + \tan^{-1}\left(\frac{x-y}{x+y}\right)$
5. Find the principal value of $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$
6. Find the value of $\left[\sin\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right]$
7. Find the value of $\tan^{-1}\left(\tan\frac{7\pi}{6}\right)$

❖ SHORT ANSWER TYPE QUESTIONS (2 marks):

8. Write the $\tan^{-1}\left(\frac{1}{\sqrt{x^2-1}}\right)$, $|x| > 1$ in the simplest form:
9. Prove that: $3 \sin^{-1} x = \sin^{-1}(3x - 4x^3)$, $x \in \left[-\frac{1}{2}, \frac{1}{2}\right]$
10. Write the $\tan^{-1}\left(\frac{1-\cos x}{1+\cos x}\right)$, $x < \pi$ in the simplest form:
11. Prove that: $\tan^{-1}\left(\frac{2}{11}\right) + \tan^{-1}\left(\frac{7}{24}\right) = \tan^{-1}\left(\frac{1}{2}\right)$
12. Write the $\tan^{-1}\left(\frac{\cos x - \sin x}{\cos x + \sin x}\right)$, $x < \pi$ in the simplest form:

❖ LONG ANSWER TYPE QUESTIONS (4 marks):

13. If $\tan^{-1}\frac{x-1}{x-2} + \tan^{-1}\frac{x+1}{x+2} = \frac{\pi}{4}$, then find the value of x .
14. Show that $\sin^{-1}\frac{3}{5} - \sin^{-1}\frac{8}{17} = \cos^{-1}\frac{84}{85}$
15. Show that $\sin^{-1}\frac{12}{13} + \cos^{-1}\frac{4}{5} + \tan^{-1}\frac{63}{16} = \pi$

