INVERSE TRIGONOMETRIC FUNCTIONS

SELECT THE CORRECT ALTERNATIVE (ONLY ONE CORRECT ANSWER)

1. The value of $\sin^{-1}(-\sqrt{3}/2)$ is -

(A) $-\pi/3$ (B) $-2\pi/3$ (C) $4\pi/3$ (D) $5\pi/3$

2. $\cos\left(2\tan^{-1}\left(\frac{1}{7}\right)\right)$ equals -

(A) $\sin(4\cot^{-1}3)$ (B) $\sin(3\cot^{-1}4)$ (C) $\cos(3\cot^{-1}4)$ (D) $\cos(4\cot^{-1}4)$

3. The value of $\sec\left[\sin^{-1}\left(-\sin\frac{50\pi}{9}\right)+\cos^{-1}\cos\left(-\frac{31\pi}{9}\right)\right]$ is equal to -

(A) $\sec\frac{10\pi}{9}$ (B) $\sec\frac{\pi}{9}$ (C) 1 (D) -1

4. $\cos\left(\cos^{-1}\cos\left(\frac{8\pi}{7}\right)+\tan^{-1}\tan\left(\frac{8\pi}{7}\right)\right)$ has the value equal to -

(A) 1 (B) -1 (C) $\cos\frac{\pi}{7}$ (D) 0

5. $(\sin^{-1}x)^2+(\sin^{-1}y)^2+2(\sin^{-1}x)(\sin^{-1}y)=\pi^2$, then x^2+y^2 is equal to -

(A) 1 (B) 3/2 (C) 2 (D) 1/2

6. $\cot^{-1}[(\cos\alpha)^{1/2}]-\tan^{-1}[(\cos\alpha)^{1/2}]=x$, then $\sin x$ =

(A) $\tan^2\left(\frac{\alpha}{2}\right)$ (B) $\cot^2\left(\frac{\alpha}{2}\right)$ (C) $\tan\alpha$ (D) $\cot\left(\frac{\alpha}{2}\right)$

7. $\tan(\cos^{-1}x)$ is equal to

(A) $\frac{x}{1+x^2}$ (B) $\frac{\sqrt{1+x^2}}{x}$ (C) $\frac{\sqrt{1-x^2}}{x}$ (D) $\sqrt{1-2x}$

8. If $x=2\cos^{-1}\left(\frac{1}{2}\right)+\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)+\tan^{-1}\left(\sqrt{3}\right)$ and $y=\cos\left(\frac{1}{2}\sin^{-1}\left(\sin\frac{x}{2}\right)\right)$ then which of the following statements holds good ?

(A) $y=\cos\frac{3\pi}{16}$ (B) $y=\cos\frac{5\pi}{16}$ (C) $x=4\cos^{-1}y$ (D) none of these

9. If $x=\tan^{-1}1-\cos^{-1}\left(-\frac{1}{2}\right)+\sin^{-1}\frac{1}{2}$; $y=\cos\left(\frac{1}{2}\cos^{-1}\left(\frac{1}{8}\right)\right)$ then -

(A) $x=\pi y$ (B) $y=\pi x$ (C) $\tan x=-(4/3)y$ (D) $\tan x=(4/3)y$

10. $\tan^{-1}2+\tan^{-1}3=\operatorname{cosec}^{-1}x$, then x is equal to -

(A) 4 (B) $\sqrt{2}$ (C) $-\sqrt{2}$ (D) none of these

11. The number k is such that tan {arc tan(2) + arc tan(20k)}=k. The sum of all possible values of k is -

(A) $-\frac{19}{40}$ (B) $-\frac{21}{40}$ (C) 0 (D) $\frac{1}{5}$

12. If $\sin^{-1}x+\cot^{-1}\left(\frac{1}{2}\right)=\frac{\pi}{2}$, then x is -

(A) 0 (B) $\frac{1}{\sqrt{5}}$ (C) $\frac{2}{\sqrt{5}}$ (D) $\frac{\sqrt{3}}{2}$

13. If $\tan(\cos^{-1}x) = \sin(\cot^{-1} 1/2)$ then x is equal to -

(A) $1/\sqrt{5}$ (B) $2/\sqrt{5}$ (C) $3/\sqrt{5}$ (D) $\sqrt{5}/3$

14. $\sin^{-1}(2x\sqrt{1-x^2}) = 2\sin^{-1} x$ is true if -

(A) $x \in [0,1]$ (B) $\left[-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right]$ (C) $\left[-\frac{1}{2}, \frac{1}{2}\right]$ (D) $\left[-\frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2}\right]$

15. Domain of the explicit form of the function y represented implicitly by the equation $(1+x)\cos y - x^2 = 0$ is -

(A) $(-1,1]$ (B) $\left(-1, \frac{1-\sqrt{5}}{2}\right]$ (C) $\left[\frac{1-\sqrt{5}}{2}, \frac{1+\sqrt{5}}{2}\right]$ (D) $\left[0, \frac{1+\sqrt{5}}{2}\right]$

16. If $\cos^{-1} x - \cos^{-1}\frac{y}{2} = \alpha$, then $4x^2 - 4xy\cos\alpha + y^2$ is equal to -

(A) $-4\sin^2\alpha$ (B) $4\sin^2\alpha$ (C) 4 (D) $2\sin 2\alpha$

17. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = \pi$, then -

(A) $x^2+ y^2+ z^2+ xyz = 0$ (B) $x^2+ y^2+ z^2+ xyz = 1$ (C) $x^2+ y^2+ z^2+ 2xyz = 0$ (D) $x^2+ y^2+ z^2+ 2xyz = 1$

18. If $\tan^{-1}\frac{x}{\pi} < \frac{\pi}{3}$, $x \in N$, then the maximum value of x is -

(A) 2 (B) 5 (C) 7 (D) none of these

19. The solution of the inequality $(\tan^{-1} x)^2 - 3\tan^{-1} x + 2 \geq 0$ is -

(A) $(-\infty, \tan 1] \cup [\tan 2, \infty)$ (B) $(-\infty, \tan 1]$ (C) $(-\infty, -\tan 1] \cup [\tan 2, \infty)$ (D) $[\tan 2, \infty)$

20. The set of values of x, satisfying the equation $\tan^2(\sin^{-1}x) > 1$ is -

(A) $[-1,1]$ (B) $\left[-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right]$ (C) $(-1,1) - \left[-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right]$ (D) $[-1,1] - \left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

SELECT THE CORRECT ALTERNATIVES (ONE OR MORE THAN ONE CORRECT ANSWERS)

21. If numerical value of $\tan\left\{\cos^{-1}\frac{4}{5} + \tan^{-1}\frac{2}{3}\right\}$ is $\frac{a}{b}$, then -

(A) a + b = 23 (B) a – b = 11 (C) 3b = a + 1 (D) 2a = 3b

22. The value of $\cos\left[\frac{1}{2}\cos^{-1}\left(\cos\left(-\frac{14\pi}{5}\right)\right)\right]$ is/are -

(A) $\cos\left(-\frac{7\pi}{5}\right)$ (B) $\sin\left(\frac{\pi}{10}\right)$ (C) $\cos\left(\frac{2\pi}{5}\right)$ (D) $-\cos\left(\frac{3\pi}{5}\right)$

23. $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right)$ equals to

(A) $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$ (B) $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$ (C) $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$ (D) $\tan^{-1}\left(\frac{1}{2}\right)$

24. $\sin^{-1}\frac{3x}{5} + \sin^{-1}\frac{4x}{5} = \sin^{-1} x$, then roots of the equation are -

(A) 0 (B) 1 (C) –1 (D) –2

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	A	A	D	B	C	A	C	A	C	D	A	B	D	B	C
Que.	16	17	18	19	20	21	22	23	24						
Ans.	B	D	B	B	C	A,B,C	B,C,D	A,D	A,B,C						

EXTRA PRACTICE QUESTIONS ON INVERSE TRIGONOMETRIC FUNCTIONS

SELECT THE CORRECT ALTERNATIVES (ONE OR MORE THAN ONE CORRECT ANSWERS)

1. $\cos^{-1}x = \tan^{-1}x$ then -

(A) $x^2 = \left(\frac{\sqrt{5}-1}{2}\right)$ (B) $x^2 = \left(\frac{\sqrt{5}+1}{2}\right)$

(C) $\sin(\cos^{-1}x) = \left(\frac{\sqrt{5}-1}{2}\right)$ (D) $\tan(\cos^{-1}x) = \left(\frac{\sqrt{5}-1}{2}\right)$

2. The value of $\sin\left(\frac{1}{2}\cot^{-1}\left(-\frac{3}{4}\right)\right) + \cos\left(\frac{1}{2}\cot^{-1}\left(-\frac{3}{4}\right)\right)$ is/are equal to -

(A) 1 (B) $\frac{3\sqrt{2}}{\sqrt{10}}$

(C) $\sqrt{2}\sin\left(\frac{1}{2}\cot^{-1}\left(-\frac{3}{4}\right) + \cot^{-1}(1)\right)$ (D) $\sqrt{2}\sin\left(\pi - \tan^{-1}(1) - \frac{1}{2}\tan^{-1}\frac{4}{3}\right)$

3. The value of $\tan^{-1}\left(\frac{1}{2}\tan 2A\right) + \tan^{-1}(\cot A) + \tan^{-1}(\cot^3 A)$ for $0 < A < (\pi/4)$ is -

(A) $4\tan^{-1}(1)$ (B) $2\tan^{-1}(2)$ (C) 0 (D) none

4. For the equation $2x = \tan(2\tan^{-1}a) + 2\tan(\tan^{-1}a + \tan^{-1}a^3)$, which of the following is/are invalid ?

(A) $a^2x + 2a = x$ (B) $a^2 + 2ax + 1 = 0$ (C) $a \neq 0$ (D) $a \neq -1, 1$

5. The value of $\left[\tan\left\{\frac{\pi}{4} + \frac{1}{2}\sin^{-1}\left(\frac{a}{b}\right)\right\} + \tan\left\{\frac{\pi}{4} - \frac{1}{2}\sin^{-1}\left(\frac{a}{b}\right)\right\}\right]^{-1}$, where $(0 < a < b)$, is -

(A) $\frac{b}{2a}$ (B) $\frac{a}{2b}$ (C) $\frac{\sqrt{b^2-a^2}}{2b}$ (D) $\frac{\sqrt{b^2-a^2}}{2a}$

6. Identify the pair(s) of functions which are identical -

(A) $y = \tan(\cos^{-1}x)$; $y = \frac{\sqrt{1-x^2}}{x}$ (B) $y = \tan(\cot^{-1}x)$; $y = \frac{1}{x}$

(C) $y = \sin(\text{arc}\tan x)$; $y = \frac{x}{\sqrt{1+x^2}}$ (D) $y = \cos(\text{arc}\tan x)$; $y = \sin(\text{arc}\cot x)$

7. Which of the following, satisfy the equation $2\cos^{-1}x = \cot^{-1}\left(\frac{2x^2-1}{\sqrt{4x^2-4x^4}}\right)$

(A) $(-1, 0)$ (B) $(0, 1)$ (C) $\left(-\frac{1}{2}, \frac{1}{\sqrt{2}}\right)$ (D) $[-1, 1]$

8. The solution set of the equation $\sin^{-1}\sqrt{1-x^2} + \cos^{-1}x = \cot^{-1}\left(\frac{\sqrt{1-x^2}}{x}\right) - \sin^{-1}x$ is -

(A) $[-1, 1] - \{0\}$ (B) $(0,1] \cup \{-1\}$ (C) $[-1,0) \cup \{1\}$ (D) $[-1,1]$

9. If $0 < x < 1$, then $\tan^{-1}\frac{\sqrt{1-x^2}}{1+x}$ is equal to -

(A) $\frac{1}{2}\cos^{-1}x$ (B) $\cos^{-1}\sqrt{\frac{1+x}{2}}$ (C) $\sin^{-1}\sqrt{\frac{1-x}{2}}$ (D) $\frac{1}{2}\tan^{-1}\sqrt{\frac{1+x}{1-x}}$

10. The number of real solutions of $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{2}$ is - **[JEE 99]**

(A) zero (B) one (C) two (D) infinite

11. If $[\sin^{-1}x] + [\cos^{-1}x] = 0$, where 'x' is a non negative real number and [.] denotes the greatest integer function, then complete set of values of x is -

(A) (cos1, 1) (B) (–1, cos1) (C) (sin1, 1) (D) (cos1, sin1)

12. Value of k for which the point $(\alpha, \sin^{-1}\alpha)(\alpha > 0)$ lies inside the triangle formed by $x + y = k$ with co-ordinate axes is -

(A) $\left(1+\frac{\pi}{2}, \infty\right)$ (B) $\left(-\left(1+\frac{\pi}{2}\right), \left(1+\frac{\pi}{2}\right)\right)$ (C) $\left(-\infty, 1+\frac{\pi}{2}\right)$ (D) (–1–sin1, 1+sin1)

13. Solution set of the inequality $\sin^{-1}\left(\sin\frac{2x^2+3}{x^2+1}\right) \le \pi - \frac{5}{2}$ is -

(A) $(-\infty, 1) \cup (1, \infty)$ (B) [–1, 1] (C) (–1, 1) (D) $(-\infty, -1] \cup [1, \infty)$

14. Consider two geometric progressions $a_1, a_2, a_3 \ldots\ldots a_n$ & $b_1, b_2, b_3, \ldots\ldots b_n$ with $a_r = \frac{1}{b_r} = 2^{r-1}$ and another sequence $t_1, t_2, t_3 \ldots\ldots t_n$ such that $t_r = \cot^{-1}(2a_r + b_r)$ then $\lim\limits_{n\to\infty}\sum\limits_{r=1}^{n} t_r$ is -

(A) 0 (B) $\pi/4$ (C) $\tan^{-1}2$ (D) $\pi/2$

15. The sum of the infinite terms of the series -

$$\cot^{-1}\left(1^2+\frac{3}{4}\right) + \cot^{-1}\left(2^2+\frac{3}{4}\right) + \cot^{-1}\left(3^2+\frac{3}{4}\right) + \ldots\ldots\ldots \text{ is equal to -}$$

(A) $\tan^{-1}(1)$ (B) $\tan^{-1}(2)$ (C) $\tan^{-1}(3)$ (D) $\frac{3\pi}{4} - \tan^{-1}3$

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	A,C	B,C,D	A	B,C	C	A,B,C,D	B	C	A,B,C	C
Que.	11	12	13	14	15					
Ans.	D	A	B	B	B,D					