1. Domain of the function

$$f(x) = \sin^{-1}\left(\frac{2-|x|}{4}\right) + \cos^{-1}\left(\frac{2-|x|}{4}\right) + \tan^{-1}\left(\frac{2-|x|}{4}\right)$$

is :-

(1) R (2) [0, 6]

(3) [–6, 6] (4) [–3, 3]

2. Range of $\left(\frac{(\cos^{-1}x)^2 - (\sin^{-1}x)^2}{(\pi/2)}\right)$ is

(1) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (2) $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

(3) $\left[-\frac{3\pi}{2}, \frac{\pi}{2}\right]$ (4) $\left[-\frac{\pi}{2}, \frac{3\pi}{2}\right]$

3. If $\sum_{i=1}^{20} \sin^{-1}x_i = 10\pi$; then $\sum_{i=5}^{12} x_i = ??$

(1) 0 (2) 9 (3) 7 (4) 8

4. $\sin\left(\sin^{-1}\frac{1}{3} + \sec^{-1}3\right) + \cos\left(\tan^{-1}\frac{1}{2} + \tan^{-1}2\right)$

is equal to

(1) 1 (2) 2 (3) 3 (4) 4

5. If $\cot\left(\cos^{-1}x\right) = \sec\left(\tan^{-1}\frac{a}{\sqrt{b^2 - a^2}}\right)$

then x is equal to ($\because$ x > 0)

(1) $\frac{b}{\sqrt{2b^2 - a^2}}$ (2) $\frac{a}{\sqrt{2b^2 - a^2}}$

(3) $\frac{\sqrt{2b^2 - a^2}}{a}$ (4) $\frac{\sqrt{2b^2 - a^2}}{b}$

6. Let $\tan^{-1}\left(\tan\frac{5\pi}{4}\right) = \alpha$, $\tan^{-1}\left(-\tan\frac{2\pi}{3}\right) = \beta$,

Then

(1) $\alpha > \beta$ (2) $4\alpha - 3\beta = 0$

(3) $\alpha + \beta = \frac{5\pi}{12}$ (4) None

7. The value of

$$\cos^{-1}\left[\cot\left(\sin^{-1}\sqrt{\frac{2-\sqrt{3}}{4}}\right) + \cos^{-1}\left(\frac{\sqrt{12}}{4}\right) + \sec^{-1}\sqrt{2}\right]$$

is

(1) 0 (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

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

(1) 2 (2) 5 (3) 7 (4) None

9. If $\pi \le x \le 2\pi$ then $\cos^{-1}(\cos x)$ is equal to

(1) x (2) – x (3) $2\pi + x$ (4) $2\pi - x$

10. The value of $\tan\left(\frac{1}{2}\cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right)$ is

(1) $\frac{3+\sqrt{5}}{2}$ (2) $3 + \sqrt{5}$

(3) $\frac{1}{2}(3 - \sqrt{5})$ (4) None

11. The sum of infinite series

$$\tan^{-1}\left(\frac{2}{1-1^2+1^4}\right) + \tan^{-1}\left(\frac{4}{1-2^2+2^4}\right) + \tan^{-1}\left(\frac{6}{1-3^2+3^4}\right) + \ldots\ldots$$

is

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$ (3) $\frac{3\pi}{4}$ (4) None

12. The value of x for which $\sin(\cot^{-1}(1 + x)) = \cos(\tan^{-1}x)$ is

(1) $\frac{1}{2}$ (2) 1 (3) 0 (4) $-\frac{1}{2}$

13. Domain of the function $f(x) = \sin^{-1}(|x - 1| - 2)$ is

(1) R (2) [–2, 2]

(3) [–2, 0] ∪ [2, 4] (4) [–2, 4]

14. The set of values of P for which $x^2 - px + \sin^{-1}(\sin 4) > 0$ for all real x is given by

(1) (–4, 4) (2) (–∞, –4) ∪ (4, ∞)

(3) ϕ (4) None

15. $2\tan^{-1}(\cos x) = \tan^{-1}(\operatorname{cosec}^2 x)$ then x =

(1) $\frac{\pi}{2}$ (2) π (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{3}$

16. The solution of the inequallity $(\cot^{-1}x)^2 - 5\cot^{-1}x + 6 > 0$ is
(1) (cot 3, cot 2)
(2) $(-\infty, \cot 3) \cup (\cot 2, \infty)$
(3) (cot 2, ∞)
(4) None

17. If $y = \sin^{-1}x + \tan^{-1}x + \sec^{-1}x$ then set of values of y is

(1) $\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$ (2) $\left[-\frac{3\pi}{4}, \frac{3\pi}{4}\right]$

(3) $\left\{\frac{\pi}{4}, \frac{3\pi}{4}\right\}$ (4) $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

18. The domain of the function $f(x) = \sec^{-1}[1+\cos^2 x]$ is (where [.] is G. I. F).
(1) $(0,\infty)$ (2) $[0,\infty)$
(3) $(-\infty,\infty)$ (4) $(-\infty,-1]\cup[1,\infty)$

19. The domain of

$f(x) = \cos^{-1}\left(\frac{6-3x}{4}\right) + \text{cosec}^{-1}\left(\frac{x-1}{2}\right)$ is

(1) $\left[3, \frac{10}{3}\right]$ (2) $\left[\frac{2}{3}, \frac{10}{3}\right]$
(3) $(-\infty,1]\cup[3, \infty)$ (4) None of these

20. If $(\sin^{-1}x)^2 + (\sin^{-1}y)^2 + (\sin^{-1}z)^2 = \frac{3\pi^2}{4}$; then find the minimum value of $(x + y + z)$
(1) 0 (2) 3 (3) –3 (4) 9

21. If $\angle A = 90°$ in ΔABC ; then

$\tan^{-1}\left(\frac{c}{a+b}\right) + \tan^{-1}\left(\frac{b}{a+c}\right) =$

(1) 0 (2) 1 (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{6}$

22. $\sin^{-1}\left(\sin\left(\frac{\tan^{-1}1 + \tan^{-1}2 + \tan^{-1}3}{\cot^{-1}1 + \cot^{-1}2 + \cot^{-1}3}\right)\right) = ??$

(1) 0 (2) $\pi - 2$
(3) $2 - \pi$ (4) 2

23. Number of integral solutions of the inequality is/are $3x^2 + 8x < 2\sin^{-1}(\sin 4) - \cos^{-1}(\cos 4)$
(1) 2 (2) 3
(3) 1 (4) zero

24. If $\sum_{i=1}^{10}\left(\cos^{-1}x_i + \cos^{-1}y_i\right) = 20\pi$, then the value of

$\sum\sum_{1\le i\le j\le 10} x_i y_j$ is-

(1) 35 (2) 40 (3) 55 (4) 60

25. If $\cos^{-1}\lambda + \cos^{-1}\mu + \cos^{-1}\nu = 3\pi$, then value of $\lambda\mu + \mu\nu + \nu\lambda$ is :
(1) 1 (2) 2 (3) 3 (4) 0

26. Sum of n terms of the series $\cot^{-1}(2.1^2) + \cot^{-1}(2.2^2) + \cot^{-1}(2.3^2)$ ..... is

(1) $\tan^{-1}(n + 1)$ (2) $\tan^{-1}\left(\frac{n+1}{n}\right)$

(3) $\tan^{-1}\left(\frac{n}{n+1}\right)$ (4) $\tan^{-1}(1)$

27. Value of $\sin^{-1}\left(\frac{3}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right)$ is:

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{3}$

28. If $\tan^{-1}\left(\frac{a+x}{a}\right) + \tan^{-1}\left(\frac{a-x}{a}\right) = \frac{\pi}{6}$ then $x^4 = ?$

(1) $2\sqrt{3}a^2$ (2) $12a^4$
(3) $2\sqrt{3}a^4$ (4) $12a^2$

29. The maximum value of $f(x) = \tan^{-1}\left(\frac{(\sqrt{12}-2)x^2}{x^4+2x^2+3}\right)$ is:

(1) $\frac{\pi}{10}$ (2) $\frac{\pi}{5}$ (3) $\frac{\pi}{8}$ (4) $\frac{\pi}{12}$

30. If the equation

$\sin^{-1}\sqrt{x} + \cos^{-1}\sqrt{x^2-1} + \tan^{-1}(\tan y) = a$

has at least one solution, then number of integral values of a is -
(1) 1 (2) 2 (3) 3 (4) 4

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**3**	**4**	**4**	**1**	**1**	**2**	**4**	**2**	**4**	**3**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**2**	**4**	**3**	**3**	**4**	**2**	**3**	**3**	**1**	**3**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**3**	**2**	**3**	**3**	**3**	**3**	**1**	**2**	**4**	**3**