Q.1 If $(\tan^{-1}x)^2 + (\cot^{-1}x)^2 = \frac{5\pi^2}{8}$, then x equals-

(A) –1 **(B) 1**

(C) 0 **(D) None of these**

Q.2 $\sum_{r=1}^{n} \tan^{-1}\left(\frac{2^{r-1}}{1+2^{2r-1}}\right)$ is equal to -

(A) $\tan^{-1}(2^n)$ **(B)** $\tan^{-1}(2^n) - \frac{\pi}{4}$

(C) $\tan^{-1}(2^{n+1})$ **(D)** $\tan^{-1}(2^{n+1}) - \frac{\pi}{4}$

Q.3 If $\tan^{-1}\frac{1}{a-1} = \tan^{-1}\frac{1}{x} + \tan^{-1}\frac{1}{a^2-x+1}$, then x is-

(A) $\frac{a}{2}$ **(B)** a^3

(C) $a^2 - a + 1$ **(D)** $a^2 + a - 1$

Q.4 $\tan^{-1}n + \cot^{-1}(n+1)$ is equal to-

(A) $\cot^{-1}(n^2 + n + 1)$

(B) $\cot^{-1}(n^2 - n + 1)$

(C) $\tan^{-1}(n^2 + n + 1)$

(D) None of these

Q.5 The value of sin $\left[\cot^{-1}\left(\cot\frac{17\pi}{3}\right)\right]$ is-

(A) $-\frac{\sqrt{3}}{2}$ **(B)** $\frac{\sqrt{3}}{2}$

(C) $\frac{1}{\sqrt{2}}$ **(D) None of these**

Q.6 sec (cosec^{-1}x) is equal to-

(A) cosec (sec^{-1}x) **(B)** cot x

(C) π **(D) None of these**

Q.7 If $\sum_{i=1}^{20}\sin^{-1}x_i = 10\pi$ then $\sum_{i=1}^{20}x_i$ is equal to-

(A) 20 **(B) 10**

(C) 0 **(D) None of these**

Q.8 The value of cot^{-1}3 + sec^{-1} $\frac{\sqrt{5}}{2}$ is-

(A) $\frac{\pi}{4}$ **(B)** $\frac{\pi}{3}$

(C) $\frac{\pi}{2}$ **(D) None of these**

Q.9 $-\frac{2\pi}{5}$ is the principal value of -

(A) $\cos^{-1}\left(\cos\frac{7\pi}{5}\right)$ **(B)** $\sin^{-1}\left(\sin\frac{7\pi}{5}\right)$

(C) $\sec^{-1}\left(\sec\frac{7\pi}{5}\right)$ **(D) None of these**

Q.10 If $\theta = \sin^{-1}(\sin(-600°))$, then one of the possible value of θ is-

(A) $\frac{\pi}{3}$ **(B)** $\frac{\pi}{2}$

(C) $\frac{2\pi}{3}$ **(D)** $-\frac{2\pi}{3}$

Q.11 $\sin\left[2\cos^{-1}\left(-\frac{3}{5}\right)\right]$ is equal to -

(A) $\frac{6}{25}$ **(B)** $\frac{24}{25}$

(C) $\frac{4}{5}$ **(D)** $-\frac{24}{25}$

Q.12 If $\sin^{-1}\sin x = \cos^{-1}\cos x$; $\forall\ 0 < x < \pi$ then x =

(A) $\left[0, \frac{\pi}{4}\right]$ **(B)** $\left(0, \frac{\pi}{2}\right]$

(C) $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$ **(D)** $\left[0, \frac{\pi}{2}\right)$

Q.13 If $\sin^{-1}x - \cos^{-1}x = \frac{\pi}{6}$, then x is-

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

(C) $-\frac{1}{2}$ **(D) None of these**

Q.14 The principal value of $\cos^{-1}\left(-\sin\frac{7\pi}{6}\right)$ is-

(A) $\frac{5\pi}{3}$ **(B)** $\frac{7\pi}{6}$

(C) $\frac{\pi}{3}$ **(D) None of these**

Q.15 The number of positive integral solutions of the equation

$$\tan^{-1} x + \cos^{-1} \frac{y}{\sqrt{1+y^2}} = \sin^{-1} \frac{3}{\sqrt{10}}$$ **is-**

(A) one **(B) two**

(C) zero **(D) None of these**

Q.16 The value of

$$\sin^{-1}\left[\cot\left(\sin^{-1}\sqrt{\left(\frac{2-\sqrt{3}}{4}\right)}\right.\right.$$

$$\left.\left.+\cos^{-1}\left(\frac{\sqrt{12}}{4}\right)+\sec^{-1}\sqrt{2}\right)\right]$$ **is -**

(A) 0 **(B) $\pi/4$**

(C) $\pi/6$ **(D) $\pi/2$**

Q.17 The value of $\tan\left\{\left(\cos^{-1}\left(-\frac{2}{7}\right)-\pi/2\right)\right\}$ **is-**

(A) $\frac{2}{3\sqrt{5}}$ **(B)** $\frac{2}{3}$

(C) $\frac{1}{\sqrt{5}}$ **(D)** $\frac{4}{\sqrt{5}}$

Q.18 If $\cos^{-1}(a) + \cos^{-1}(b) + \cos^{-1}(c) = 3\pi$ and $f(1) = 2$, $f(x + y) = f(x)\, f(y)$ for all x, y; then

$$a^{2f(1)} + b^{2f(2)} + c^{2f(3)} + \frac{(a+b+c)}{a^{2f(1)} + b^{2f(2)} + c^{2f(3)}}$$

is equal to -

(A) 0 **(B) 1** **(C) 2** **(D) 3**

Q.19 $\tan^{-1} \tan\left(\frac{5\pi}{7}\right)$ is equal to-

(A) $\frac{2\pi}{7}$ **(B)** $\frac{5\pi}{7}$ **(C)** $-\frac{2\pi}{7}$ **(D)** $\frac{\pi}{7}$

Q.20 The principal value of

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

(A) $\frac{5\pi}{12}$ **(B)** $-\frac{5\pi}{12}$

(C) $\frac{\pi}{12}$ **(D)** $\frac{7\pi}{12}$

Q.21 If $\sin^{-1}x + \tan^{-1}x = y$ $(-1 < x < 1)$, then which is not possible -

(A) $y = \frac{3\pi}{2}$ **(B) y = 0**

(C) $y = \frac{\pi}{2}$ **(D)** $y = -\frac{\pi}{2}$

Q.22 The number of positive integral solutions of $\cos^{-1}\left(4x^2 - 8x + \frac{7}{2}\right) = \frac{\pi}{3}$ **is -**

(A) one **(B) two**

(C) three **(D) None of these**

Statement type Questions

Each of the questions given below consists of Statement–I and Statement–II. Use the following Key to choose the appropriate answer.

(A) If both Statement-I and Statement-II are true, and Statement-II is the correct explanation of Statement– I.

(B) If both Statement-I and Statement-II are true but Statement-II is not the correct explanation of Statement – I.

(C) If Statement-I is true but Statement-II is false.

(D) If Statement- I is false but Statement-II is true.

Q.23 **Statement I : The equation**

$\sec^{-1}x + \cot^{-1}x < \frac{-\pi}{2}$ has no solution.

Statement II : sec x is not defined at $\frac{\pi}{2}$.

Q.24 **Statement I : The equation $\sin^{-1}x = \cos^{-1}x$ has one and only one solution.**

Statement II : The equation $\tan^{-1}x = 1$ has only one solution.

Q.25 **Statement I : $\sin^{-1}\sin x \neq \sin \sin^{-1}x$, if $-1 \leq x \leq 1$**

Statement II : $\sin\theta$ and $\sin^{-1}\theta$ are different functions

Q.26 **Statement I : Equation $2\sin^{-1}x + 3\sin^{-1}y = \frac{5\pi}{2}$ and $y = px - 5$ hold simultaneously when p is equal to 6.**

Statement II : The range of $\sin^{-1}x$ is $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$

Q.27 **Statement I : The maximum value or $\sin^{-1}x + \text{cosec}^{-1}x + \cos^{-1}x + \sec^{-1}x + \tan^{-1}x$ is $\frac{3\pi}{2}$**

Statement II : $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$ and $\sec^{-1}x + \text{cosec}^{-1}x = \frac{\pi}{2}$

Passage based Questions

Passage

Every bijection $f : A \to B$ there exists a bijection $g : B \to A$ defined by $g(y) = x$ if and only if $f(x) = y$. The function $g : B \to A$ is called the inverse of function $f : A \to B$ and is denoted by f^{-1}.

Q.28 **The value of $\cos[\tan^{-1}\tan 2]$ is -**

(A) $\frac{1}{\sqrt{5}}$ **(B)** $-\frac{1}{\sqrt{5}}$

(C) cos 2 **(D) – cos2**

Q.29 If $\pi \le x \le 2\pi$ then $\cos^{-1}\cos x$ is equal to -

(A) x **(B)** – x

(C) $2\pi + x$ **(D)** $2\pi - x$

Q.30 If $x + \frac{1}{x} = 2$, the principal value of $\sin^{-1}x$ is -

(A) $\frac{\pi}{4}$ **(B)** $\frac{\pi}{2}$

(C) π **(D)** $\frac{3\pi}{2}$

ANSWER KEY

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