EXERCISE LEVEL –I

EL– I

Q.1 Principal value of $\cot^{-1}(-\frac{1}{\sqrt{3}})$ is equal to

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{3}$ (c) $-\frac{\pi}{3}$ (d) $-\frac{\pi}{6}$

Q.2 The value of $\sin^{-1}(\sin 5)$ is equal to

(a) $3-\pi$ (b) $2\pi-5$ (c) $5-2\pi$ (d) $3\pi-5$

Q.3 If x takes non-positive permissible value, then $\sin^{-1} x$ is equal to

(a) $\cos^{-1}\sqrt{1-x^2}$ (b) $\pi-\cos^{-1}\sqrt{1-x^2}$ (c) $\cos^{-1}\sqrt{x^2-1}$ (d) $-\cos^{-1}\sqrt{1-x^2}$

Q.4 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.5 The value of $\cos(\tan^{-1}(\tan 2))$ is equal to

(a) $\frac{1}{\sqrt{5}}$ (b) $-\frac{1}{\sqrt{5}}$ (c) $\cos 2$ (d) $-\cos 2$

Q.6 The value of $\sin[2\cos^{-1}\frac{\sqrt{5}}{3}]$ is equal to

(a) $\frac{\sqrt{5}}{3}$ (b) $\frac{2\sqrt{5}}{3}$ (c) $\frac{4\sqrt{5}}{9}$ (d) $\frac{2\sqrt{5}}{9}$

Q.7 If $\sin(\cot^{-1}(x+1)) = \cos(\tan^{-1} x)$, then x is equal to

(a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) Zero (d) $\frac{9}{4}$

Q.8 $\cot^{-1}[\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}}]$ is equal to (where $x \in (0, \frac{\pi}{2})$)

(a) $\pi - x$ (b) $2\pi - x$ (c) $\frac{x}{2}$ (d) $\pi - \frac{x}{2}$

Q.9 The smallest and the largest values of $\tan^{-1}(\frac{1-x}{1+x}), 0 \le x \le 1$, respectively, are

(a) $0, \pi$ (b) $0, \frac{\pi}{4}$ (c) $-\frac{\pi}{4}, \frac{\pi}{4}$ (d) $\frac{\pi}{4}, \frac{\pi}{2}$

Q.10 $\frac{1}{2}\cos^{-1}(\frac{1-x}{1+x})$ is equal to

(a) $\cot^{-1}\sqrt{x}$ (b) $\tan^{-1}\sqrt{x}$ (c) $\tan^{-1} x$ (d) $\cot^{-1} x$

Q.11 If $\cot^{-1} x + \tan^{-1} 3 = \frac{\pi}{2}$, then x =

(a) $\frac{1}{3}$ (b) $\frac{1}{4}$ (c) 3 (d) 4

Q.12 If $x^2+y^2+z^2 = r^2$ and $x, y, z > 0$, then $\tan^{-1}\left(\frac{xy}{zr}\right) + \tan^{-1}\left(\frac{yz}{xr}\right) + \tan^{-1}\left(\frac{zx}{yr}\right)$ is equal

(a) π (b) $\frac{\pi}{2}$ (c) 0 (d) $\frac{\pi}{6}$

Q.13 If $\tan(x+y) = 33$ and $x = \tan^{-1} 3$, then y will be

(a) 0.3 (b) $\tan^{-1}(1.3)$ (c) $\tan^{-1}(0.3)$ (d) $\tan^{-1}(\frac{1}{18})$

Q.14 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) $2\sin 2\alpha$ (d) 4

Q.15 If $\sum_{i=1}^{n} \cos^{-1}\alpha_i = 0$, then $\sum_{i=1}^{n} \alpha_i$ equals

(a) n (b) –n (c) 0 (d) $\frac{n}{2}$

Q.16 If $\cos^{-1}\sqrt{p} + \cos^{-1}\sqrt{1-p} + \cos^{-1}\sqrt{1-q} = \frac{3\pi}{4}$, then the value of q is

(a) 1 (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{1}{3}$ (d) $\frac{1}{2}$

Q.17 If $\cos^{-1} a + \cos^{-1} b + \cos^{-1} c = \pi$, then the value of $(a\sqrt{1-a^2} + b\sqrt{1-b^2} + c\sqrt{1-c^2})$ will be

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

(c) abc (d) 2abc

Q.18 If $\cot^{-1}[\sqrt{\cos\alpha}] - \tan^{-1}[\sqrt{\cos\alpha}] = x$, then $\sin x$ is equal to

(a) $\tan^2\left(\frac{\alpha}{2}\right)$ (b) $\cot^2\left(\frac{\alpha}{2}\right)$ (c) $\tan\alpha$ (d) $\cot\frac{\alpha}{2}$

Q.19 $\cot^{-1}(2\cdot 1^2) + \cot^{-1}(2\cdot 2^2) + \cot^{-1}(2\cdot 3^2) + \cdots \ldots\ldots \infty$ is equal to

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{5}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{3}$

Q.20 The value of $\tan^{-1}(\frac{1}{3}) + \tan^{-1}(\frac{2}{9}) + \tan^{-1}(\frac{4}{33}) + \tan^{-1}(\frac{8}{129}) + \cdots \ldots\ldots$ n terms is

(a) $\tan^{-1} 2^n - \frac{\pi}{4}$ (b) $\tan^{-1} 2^n$ (c) $\cot^{-1} 2^n$ (d) $\frac{\sin^{-1} 2^n}{\cos^{-1} 2^n}$

Q.21 The equation $2\cos^{-1} x + \sin^{-1} x = \frac{11\pi}{6}$ has

(a) No solution (b) Only one solution (c) Two solutions (d) Three solutions

Q.22 Solution of $\tan^{-1}(\frac{1-x}{1+x}) = \frac{1}{2}\tan^{-1} x, (x > 0)$ is

(a) $x = \frac{1}{\sqrt{3}}$ (b) $x = \sqrt{3}$ (c) $x = 1$ (d) $x = \frac{1}{2}$

Q.23 The number of solution(s) of the equation $\tan^{-1}(1+x) + \tan^{-1}(1-x) = \frac{\pi}{2}$ is

(a) 3 (b) 2 (c) 1 (d) 4

Q.24 The number of solution(s) of the equation $\sin^{-1} x + \cos^{-1}(1-x) = \sin^{-1}(-x)$ is/are

(a) 0 (b) 1 (c) 2 (d) More than two

Q.25 If $[\cot^{-1} x] + [\cos^{-1} x] = 0$, then complete set of value of x is (where $[*]$ denotes the integer function)

(a) $(\cos 1, 1)$ (b) $(\cot 1, \cos 1)$ (c) $(\cot 1, 1)$ (d) $(1, \cot 2)$

Q.26 If $\tan^{-1}\frac{\sqrt{1+x^2}-1}{x} = \frac{\pi}{45}$, then

(a) $x = \tan 2°$ (b) $x = \tan 4°$ (c) $x = \tan\left(\frac{1}{4}\right)^{\circ}$ (d) $x = \tan 8°$

Q.27 If $\sin^{-1}\left(\frac{2a}{1+a^2}\right) + \sin^{-1}\left(\frac{2b}{1+b^2}\right) = 2\tan^{-1} x$, then x may be

(a) $\frac{a-b}{1+ab}$ (b) $\frac{b}{1+ab}$ (c) $\frac{b}{1-ab}$ (d) $\frac{a+b}{1-ab}$

Q.28 If $6\sin^{-1}(x^2 - 6x + 8.5) = \pi$, then

(a) $x = 2$ (b) $x = 1$ (c) $x = 6$ (d) $x = 5$

Q.29 If $a < \frac{1}{32}$, then the number of solution of $(\sin^{-1} x)^3 + (\cos^{-1} x)^3 = a\pi^3$ is

(a) 0 (b) 1 (c) 2 (d) Infinite

Q.30 If $\cot^{-1}\left(\frac{n}{\pi}\right) > \frac{\pi}{6}$, $n \in N$, then the maximum value of n is

(a) 1 (b) 5 (c) 9 (d) 4

Q.31 If $\cos^{-1}\left(\frac{1}{x}\right) = \theta$, then $\tan\theta =$

(a) $\frac{1}{\sqrt{x^2-1}}$ (b) $\sqrt{x^2+1}$ (c) $\sqrt{1-x^2}$ (d) $\sqrt{x^2-1}$

Q.32 $\sin(\cot^{-1} x) =$

(a) $\sqrt{1+x^2}$ (b) x (c) $\sqrt{1-x^2}$ (d) $(1+x^2)^{-\frac{1}{2}}$

Q.33 $\cos\left(\sin^{-1}\frac{5}{13}\right) =$

(a) $\frac{12}{13}$ (b) $-\frac{12}{13}$ (c) $\frac{5}{12}$ (d) $\frac{3}{13}$

Q.34 $\cot^{-1}(-\sqrt{3}) =$

(a) $-\frac{\pi}{6}$ (b) $\frac{5\pi}{6}$ (c) $\frac{\pi}{3}$ (d) $\frac{2\pi}{3}$

Q.35 $1 + \cot^2(\sin^{-1} x) =$

(a) $\frac{1}{2x}$ (b) x^2 (c) $\frac{1}{x^2}$ (d) $\frac{2}{x}$

Q.36 If $\sin^{-1}\frac{1}{2} = \tan^{-1} x$, then x =

(a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{3}}$ (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{1}{2}$

Q.37 $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right) =$

(a) $\tan^{-1} x$ (b) $\frac{1}{2}\tan^{-1} x$ (c) $2\tan^{-1} x$ (d) $3\tan^{-1} x$

Q.38 $\cos(\tan^{-1} x) =$

(a) $\sqrt{1+x^2}$ (b) $\frac{1}{\sqrt{1+x^2}}$ (c) $1 + x^2$ (d) $1 - x^2$

Q.39 The principal value of $\sin^{-1}(-\frac{1}{2})$ is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $-\frac{\pi}{3}$ (d) $-\frac{\pi}{6}$

Q.40 $\sec^2(\tan^{-1} 2) + \text{cosec}^2(\cot^{-1} 3) =$

(a) 5 (b) 13 (c) 15 (d) 6

Q.41 $\sin^{-1}\left(-\left(\frac{1}{2}\right)\right)+\cos^{-1}\left(-\left(\frac{1}{2}\right)\right)+\cot^{-1}(-\sqrt{3})+\operatorname{cosec}^{-1}(\sqrt{2})+\tan^{-1}(-1)+\sec^{-1}(\sqrt{2})$ equals

(a) $\frac{9\pi}{4}$ (b) $\frac{19\pi}{12}$ (c) $\frac{3\pi}{2}$ (d) $\frac{\pi}{2}$

Q.42 The value of $\cot^{-1}(-\sqrt{3})+\operatorname{cosec}^{-1}(2)+\tan^{-1}(\sqrt{3})$ is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{5\pi}{6}$ (d) $\frac{4\pi}{3}$

Q.43 Select the wrong option.

(a) $-1 \le \sin^{-1}x \le 1 \Rightarrow -\sin 1 < x \le \sin 1$ (b) $\frac{\pi}{3} \le \cos^{-1}x \le \frac{2\pi}{3} \Rightarrow -\frac{1}{2} \le x \le \frac{1}{2}$

(c) $\frac{\pi}{4} \le \cot^{-1}x \le \frac{5\pi}{6} \Rightarrow -\sqrt{3} \le x \le 1$ (d) $\sec^{-1}x \ge \frac{\pi}{4} \Rightarrow x \le \sqrt{2}$

Q.44 If x_1 and x_2 are the roots of $15x^2+28x+12=0$, then

(a) Both $\cos^{-1}x_1$ and $\cos^{-1}x_2$ are real (b) Both $\sin^{-1}x_1$ and $\sin^{-1}x_2$ are real

(c) Both $\sec^{-1}x_1$ and $\sec^{-1}x_2$ are real (d) Both $\cot^{-1}x_1$ and $\cot^{-1}x_2$ are real

Q.45 If k satisfies $k^2-k-6>0$, then a value exists for

(a) $\sec^{-1}k$ (b) $\sin^{-1}k$ (c) $\cos^{-1}k$ (d) $\sec^{-1}(\frac{1}{k})$

Q.46 If $\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\frac{3\pi}{2}$, the value of $x^{100}+y^{100}+z^{100}-\frac{9}{x^{101}+y^{101}+z^{101}}$

(a) 0 (b) 1 (c) 2 (d) 3

Q.47 Let $x_i \in [-1,1]$ for $i = 1,2,3, \ldots 24$, such that $\sin^{-1}x_1+\sin^{-1}x_2+\cdots.+\sin^{-1}x_{24}=12$ then the value of $x_1+2x_2+3x_3+\cdots..+24x_{24}$ is

(a) 276 (b) 300 (c) 325 (d) 351

Q.48 The domain of the function $f(x)=\cos^{-1}\left(\frac{2-|x|}{4}\right)$ is

(a) $[-6,6]$ (b) $(-\infty,2)\cup(2,3)$ (c) $(2,3)$ (d) $[-6,2)\cup(2,3)$

Q.49 The domain of the function given by $f(x)=\sqrt{\sin^{-1}(2x)+\frac{\pi}{6}}$ is

(a) $\left[-\frac{1}{2},\frac{1}{2}\right]$ (b) $\left[-\frac{1}{4},\frac{1}{2}\right]$ (c) $[-1,1]$ (d) $\left[-1,\frac{1}{2}\right]$

Q.50 The domain and range of $f(x)=\sin^{-1}x+\cos^{-1}x+\tan^{-1}x+\cot^{-1}x+\sec^{-1}x+\operatorname{cosec}^{-1}x$ respectively are

(a) $\{-1,1\},\frac{3\pi}{2}$ (b) $\{-1,1\},\frac{\pi}{2}$ (c) $(-1,1),\frac{\pi}{2}$ (d) $(-1,1),2\pi$

Q.51 Let $f(x)=\sec^{-1}(x-10)+\cos^{-1}(10-x)$. The range of $f(x)$ is

(a) $\operatorname{cosec}^{-1}x$ (b) $-\sin^{-1}x$ (c) $-\sin^{-1}\left(\frac{1}{x}\right)$ (d) $\pi-\operatorname{cosec}^{-1}x$

Q.52 The value of $\sin^{-1}\sin(16)+\cos^{-1}\cos(10)$ is

(a) 26 (b) –26 (c) $6+\pi$ (d) $9\pi-26$

Q.53 The expression $\tan(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x)+\tan(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x)$ equals

(a) $\frac{1}{x}$ (b) x (c) $\frac{2}{x}$ (d) 2x

Q.54 If $p > q > 0$ and $pr < -1 < qr$, then $\tan^{-1}(\frac{p-q}{1+pq}) + \tan^{-1}(\frac{q-r}{1+qr}) + \tan^{-1}(\frac{r-p}{1+rp})$ is equal to
(a) 0 (b) $-\pi$ (c) π (d) $\frac{\pi}{2}$

Q.55 The value of $\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65}$ is
(a) $\frac{3\pi}{2}$ (b) $\frac{\pi}{2}$ (c) $\pi - \sin^{-1}\frac{3713}{4225}$ (d) $\pi - \tan^{-1}\frac{3713}{2016}$

Q.56 $\sin^{-1}\left(\frac{4}{5}\right) + 2\tan^{-1}\left(\frac{1}{3}\right)$ is equal to
(a) $\tan^{-1}\left(\frac{3}{4}\right)$ (b) $\tan^{-1}\left(\frac{4}{3}\right)$ (c) $\tan^{-1}\left(\frac{3}{\sqrt{10}}\right)$ (d) $\frac{\pi}{2}$

Q.57 If $x_1 = \cos^{-1}(\frac{3}{5}) + \cos^{-1}(\frac{2\sqrt{2}}{3})$ and $x_2 = \sin^{-1}(\frac{3}{5}) + \sin^{-1}(\frac{2\sqrt{2}}{3})$, then
(a) $x_1 < x_2$ (b) $x_1 = x_2$
(c) $x_1 > x_2$ (d) Can't be determined

Q.58 $\cos(\tan^{-1}\frac{3}{4}) + \cos(\tan^{-1}x)$ is equal to
(a) $\frac{4}{5} + \frac{x}{\sqrt{1+x^2}}$ (b) $\frac{3}{5} + \frac{1}{\sqrt{1+x^2}}$ (c) $\frac{4}{5} + \frac{1}{\sqrt{1+x^2}}$ (d) $\frac{3}{5} + \frac{x}{\sqrt{1+x^2}}$

Q.59 The value of $\sin\cot^{-1}\tan\cos^{-1}x$ is equal to
(a) x (b) $\frac{x}{2}$ (c) $-x$ (d) x^2

Q.60 The value $\tan\{\sin^{-1}(\cos(\sin^{-1}x))\}\tan\{\cos^{-1}(\sin(\cos^{-1}x))\}$ is equal to (where $0 < x < 1$)
(a) 0 (b) 1 (c) –1 (d) 2

Q.61 $\frac{1}{2}\tan^{-1}(\frac{12}{5})$ is equal to
(a) $\tan^{-1}\left(\frac{3}{2}\right)$ (b) $\tan^{-1}\left(\frac{2}{3}\right)$ (c) $\tan^{-1}\left(\frac{3}{4}\right)$ (d) $\tan^{-1}\left(\frac{7}{17}\right)$

Q.62 The sum $\sum_{n=1}^{\infty} \tan^{-1}(\frac{1}{2^n+2^{1-n}})$ equals
(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{3}$

Q.63 If $\sin(\cot^{-1}(1+x)) = \cos(\tan^{-1}x)$, then x is
(a) 1 (b) $\frac{1}{2}$ (c) 0 (d) $-\frac{1}{2}$

Q.64 If $\sin^{-1}\left(\frac{3}{x}\right) + \sin^{-1}\left(\frac{4}{x}\right) = \frac{\pi}{2}$, then x equals
(a) –5 (b) 5 (c) 7 (d) 12

Q.65 If $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z = \pi$, then $\frac{1}{xy} + \frac{1}{yz} + \frac{1}{zx} =$
(a) 0 (b) 1 (c) $\frac{1}{xyz}$ (d) xyz

Q.66 If $x + y + z = xyz$, then $\tan^{-1}x + \tan^{-1}y + \tan^{-1}z$
(a) π (b) $\frac{\pi}{2}$ (c) 1 (d) $\frac{\pi}{3}$

Q.67 If $\tan(\sin^{-1}\sqrt{1-x^2}) = \sin(\tan^{-1}2)$ then x is
(a) $-\frac{\sqrt{5}}{3}$ (b) $\frac{3}{\sqrt{10}}$ (c) $\frac{\sqrt{5}}{3}$ (d) Both (1) & (3)

Q.68 If $\sin^{-1}\left(x-\frac{x^2}{2}+\frac{x^3}{4}\ldots..\infty\right)+\cos^{-1}\left(x^2-\frac{x^4}{2}+\frac{x^6}{4}-\cdots.\infty\right)=\frac{\pi}{2}$ there $0<|x|<\sqrt{2}$, then x equals

(a) –1 (b) $\frac{-1}{2}$ (c) $\frac{1}{2}$ (d) 1

Q.69 If $\sin(\sin^{-1}\frac{3\pi}{11}+\cos^{-1}x)=1$, then x is

(a) $-\frac{3\pi}{11}$ (b) $\frac{-1}{2}$ (c) $\frac{1}{2}$ (d) 1

Q.70 If $\sin(\sin^{-1}\frac{3\pi}{11}+\cos^{-1}x)=1$, then x is

(a) $-\frac{3\pi}{11}$ (b) $\frac{\pi}{2}-\frac{3\pi}{11}$ (c) $\frac{3\pi}{11}$ (d) $\frac{8\pi}{11}$

Q.71 How many solutions does the equation $5\tan^{-1}x+3\cot^{-1}x=2\pi$ have?

(a) Zero (b) Exactly one (c)) Exactly two (d) Infinite

Q.72 Number of solution of the equation $\sin\left(\frac{1}{5}\cos^{-1}x\right)=1$ is

(a) 1 (b) 0 (c) 2 (d) Infinitely many

Q.73 If $\cos^{-1}(\frac{2}{3x})+\cos^{-1}(\frac{3}{4x})=\frac{\pi}{2}(x>\frac{3}{4})$, then x is equal to

(a) $\frac{\sqrt{146}}{12}$ (b) $\frac{\sqrt{145}}{12}$ (c) $\frac{\sqrt{145}}{10}$ (d) $\frac{\sqrt{145}}{11}$

Q.74 If $x=\sin^{-1}(\sin 10)$ and $y=\cos^{-1}(\cos 10)$, then $y-x$ is equal to

(a) 7π (b) 10 (c) 0 (d) π

Q.75 The value of $\cot(\sum_{n=1}^{19}\cot^{-1}(1+\sum_{p=1}^{n}2p))$ is

(a) $\frac{19}{21}$ (b) $\frac{23}{22}$ (c) $\frac{22}{23}$ (d) $\frac{21}{19}$

Q.76 All x satisfying the inequality $(\cot^{-1}x)^2-7(\cot^{-1}x)+10>0$, lie in the interval

(a) $(\cot 2,\infty)$ (b) $(\cot 5\cdot\cot 4)$

(c) $(-\infty,\cot 5)\cup(\cot 4,\cot 2)$ (d) $(-\infty,\cot 5)\cup(\cot 2,\infty)$

Q.77 If $\alpha=\cos^{-1}\left(\frac{3}{5}\right),\beta=\tan^{-1}\left(\frac{1}{3}\right)$, where $0<\alpha$, $\beta<\frac{\pi}{2}$, then $\alpha-\beta$ is equal to

(a) $\tan^{-1}\left(\frac{9}{14}\right)$ (b) $\cos^{-1}\left(\frac{9}{5\sqrt{10}}\right)$ (c) $\sin^{-1}\left(\frac{9}{5\sqrt{10}}\right)$ (d) $\tan^{-1}(\frac{9}{5\sqrt{10}})$

Q.78 If $\cos^{-1}x-\cos^{-1}\frac{y}{2}=\alpha$, where $-1\le x\le 1,-2\le y\le 2,x\le\frac{y}{2}$, then for all x, y, $4x^2-4xy\cos\alpha+y^2$ is equal to

(a) $2\sin^2\alpha$ (b) $4\sin^2\alpha-2x^2y^2$

(c) $4\cos^2\alpha+2x^2y^2$ (d) $4\sin^2\alpha$

Q.79 The value of $\sin^{-1}\left(\frac{12}{13}\right)-\sin^{-1}\left(\frac{3}{5}\right)$ is equal to

(a) $\frac{\pi}{2}-\sin^{-1}\left(\frac{56}{65}\right)$ (b) $\pi-\sin^{-1}\left(\frac{63}{65}\right)$ (c) $\pi-\cos^{-1}\left(\frac{33}{65}\right)$ (d) $\frac{\pi}{2}-\cos^{-1}\left(\frac{9}{65}\right)$

Q.80 The domain of the function $f(x)=\sin^{-1}\left(\frac{|x|+5}{x^2+1}\right)$ is $(-\infty,-a]\cup[a,\infty)$. Then a is equal to

(a) $\frac{1+\sqrt{17}}{2}$ (b) $\frac{\sqrt{17}}{2}+1$ (c) $\frac{\sqrt{17}-1}{2}$ (d) $\frac{\sqrt{17}}{2}$

Q.81 $2\pi - (\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65})$ is equal to

(a) $\frac{\pi}{2}$ (b) $\frac{7\pi}{4}$ (c) $\frac{3\pi}{2}$ (d) $\frac{5\pi}{4}$

Q.82 If S is the sum of the first 10 terms of the series $\tan^{-1}(\frac{1}{3}) + \tan^{-1}(\frac{1}{7}) + \tan^{-1}(\frac{1}{13}) + \tan^{-1}(\frac{1}{21}) + \cdots$ then $\tan(S)$ is equal to

(a) $-\frac{6}{5}$ (b) $\frac{5}{11}$ (c) $\frac{10}{11}$ (d) $\frac{5}{6}$

Q.83 A possible value of $\tan(\frac{1}{4}\sin^{-1}\frac{\sqrt{63}}{8})$ is

(a) $2\sqrt{2} - 1$ (b) $\sqrt{7} - 1$ (c) $\frac{1}{\sqrt{7}}$ (d) $\frac{1}{2\sqrt{2}}$

Q.84 $\operatorname{cosec}\left[2\cot^{-1}(5) + \cos^{-1}\left(\frac{4}{5}\right)\right]$ is equal to

(a) $\frac{65}{56}$ (b) $\frac{65}{33}$ (c) $\frac{75}{56}$ (d) $\frac{56}{33}$

Q.85 If $0 < a, b < 1$, and $\tan^{-1} a + \tan^{-1} b = \frac{\pi}{4}$, then the value of $(a+b) - (\frac{a^2+b^2}{2}) + (\frac{a^3+b^3}{3}) - (\frac{a^4+b^4}{4}) + \cdots$ is

(a) $e^2 - 1$ (b) $\log_e\left(\frac{e}{2}\right)$ (c) e (d) $\log_e 2$

Q.86 If $\frac{\sin^{-1} x}{a} = \frac{\cos^{-1} x}{b} = \frac{\tan^{-1} y}{c}$; $0 < x < 1$, then the value of $\cos\left(\frac{\pi c}{a+b}\right)$ is

(a) $1 - y^2$ (b) $\frac{1-y^2}{y\sqrt{y}}$ (c) $\frac{1-y^2}{1+y^2}$ (d) $\frac{1-y^2}{2y}$

Q.87 Given that the inverse trigonometric function take principal values only. Then, the number of real values of x which satisfy $\sin^{-1}\left(\frac{3x}{5}\right) + \sin^{-1}\left(\frac{4x}{5}\right) = \sin^{-1} x$ is equal to

(a) 3 (b) 1 (c) 0 (d) 2

Q.88 The number of solutions of the equation $\sin^{-1}\left[x^2 + \frac{1}{3}\right] + \cos^{-1}\left[x^2 - \frac{2}{3}\right] = x^2$, for $x \in [-1,1]$and [x] denotes the greatest integer less than or equal to x, is

(a) Infinite (b) 2 (c) 4 (d) 0

Q.89 If $\cot^{-1}(\alpha) = \cot^{-1} 2 + \cot^{-1} 8 + \cot^{-1} 18 + \cot^{-1} 32 +$ upto 100 terms, then α is

(a) 1.01 (b) 1.02 (c) 1.03 (d) 1.00

Q.90 The sum of possible values of x for $\tan^{-1}(x+1) + \cot^{-1}\left(\frac{1}{x-1}\right) = \tan^{-1}\left(\frac{8}{31}\right)$ is

(a) $-\frac{30}{4}$ (b) $-\frac{31}{4}$ (c) $-\frac{32}{4}$ (d) $-\frac{33}{4}$

Q.91 The real valued function $f(x) = \frac{\operatorname{cosec}^{-1}x}{\sqrt{x-[x]}}$,

where[x] denotes the greatest integer less than or equal to x, is defined for all x belonging to

(a) All non-integers except the interval $[-1,1]$ (b) All integers excent $0, -1.1$

(c) All reals except integers (d) All reals except the interval $[-1,1]$

Q.92 The value of $\tan\left(2\tan^{-1}\left(\frac{3}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right)\right)$ is equal to

(a) $\frac{220}{21}$ (b) $\frac{151}{63}$ (c) $\frac{-181}{69}$ (d) $\frac{-291}{76}$

Q.93 The number of real roots of the equation $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{4}$ is

(a) 2 (b) 1 (c) 4 (d) 0

Q.94 $\cos^{-1}(\cos(-5)) + \sin^{-1}(\sin(6)) - \tan^{-1}(\tan(12))$ is equal to (The inverse trigonometric functions take the principal values)

(a) $3\pi + 1$ (b) $3\pi - 11$ (c) $4\pi - 11$ (d) $4\pi - 9$

Q.95 The domain of the function $\operatorname{cosec}^{-1}\left(\frac{1+x}{x}\right)$ is

(a) $\left[-\frac{1}{2}, 0\right] \cup [1, \infty]$ (b) $\left[-\frac{1}{2}, \infty\right] - \{0\}$ (c) $\left[-1, -\frac{1}{2}\right] \cup (0, \infty)$ (d) $\left[-\frac{1}{2}, \infty\right] - \{0\}$

Q.96 Let M and m respectively be the maximum and minimum values of the function $f(x) = \tan^{-1}(\sin x + \cos x)$ in $[0, \frac{\pi}{2}]$. Then the value of $\tan(M - m)$ is equal to

(a) $2 - \sqrt{3}$ (b) $2 + \sqrt{3}$ (c) $3 + 2\sqrt{2}$ (d) $3 - 2\sqrt{2}$

Q.97 If $(\sin^{-1} x)^2 - (\cos^{-1} x)^2 = a; 0 < x < 1, a \neq 0$

(a) $\cos\left(\frac{2a}{\pi}\right)$ (b) $\sin\left(\frac{4a}{\pi}\right)$ (c) $\cos\left(\frac{4a}{\pi}\right)$ (d) $\sin\left(\frac{2a}{\pi}\right)$

Q.98 The domain of the function $f(x) = \sin^{-1}\left(\frac{3x^2+x-1}{(x-1)^2}\right) + \cos^{-1}\left(\frac{x-1}{x+1}\right)$ is

(a) $\left[0, \frac{1}{4}\right]$ (b) $\left[0, \frac{1}{2}\right]$ (c) $\left[\frac{1}{4}, \frac{1}{2}\right] \cup \{0\}$ (d) $[-2, 0] \cup \left[\frac{1}{4}, \frac{1}{2}\right]$

Q.99 If $\left|\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right| < \frac{\pi}{3}$, then x belongs to the interval

(a) $\left[-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right]$ (b) $\left[-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right]$ (c) $\left[0, \frac{1}{\sqrt{3}}\right]$ (d) $[1,2]$

Q.100 The set of values of x satisfying $|\sin^{-1} x| \leq |\cos^{-1} x|$ is

(a) $\left[-1, \frac{1}{\sqrt{2}}\right]$ (b) $\left[-1, -\frac{1}{\sqrt{2}}\right] \cup \left[\frac{1}{\sqrt{2}}, 1\right]$ (c) $\left[-1, \frac{1}{\sqrt{2}}\right]$ (d) $\left[\frac{1}{\sqrt{2}}, 1\right]$

EXERCISE LEVEL –II

EL– II

Q.1 Find the value of $\tan^{-1}\left(\tan\frac{8\pi}{3}\right)$.

Q.2 Find the value of $\cot(\sin^{-1}x+\cos^{-1}x)$.

Q.3 Find the value of $\tan^{-1}(-1)+\cot^{-1}\left(\tan\left(\frac{3\pi}{4}\right)\right)$.

Q.4 Simplify $\sin^{-1}\left(\frac{1-x^2}{1+x^2}\right), 0<x<1$.

Q.5 Find the value of $\sin^{-1}(\sin 4)$.

Q.6 If $4\sin^{-1}x+\cos^{-1}x=\pi$ then find the value of x.

Q.7 Prove that $\sin\left(2\tan^{-1}\sqrt{\frac{1+x}{1-x}}\right)=\sqrt{1-x^2}, -1\le x<1$.

Q.8 Simplify $\tan^{-1}\frac{x}{\sqrt{a^2-x^2}}, |x|<a$.

Q.9 Find x, if $3\tan^{-1}(2-\sqrt{3})-\tan^{-1}\left(\frac{1}{x}\right)=\cot^{-1}(3)$.

Q.10 Find the value of $\sin(\frac{1}{2}\cot^{-1}(-\frac{3}{4}))$.

Q.11 Let $\tan^{-1}x, \tan^{-1}y, \tan^{-1}z$ be the angles of a triangle ABC, then prove that
$\frac{x}{1+x^2}+\frac{y}{1+y^2}+\frac{z}{1+z^2}=\frac{2xyz}{\sqrt{(1+x^2)(1+y^2)(1+z^2)}}$

Q.13 The domain of definition of the function$f(x)=\sqrt{\cos^{-1}x-\sin^{-1}x}$ is $[a,b]$ where $a,b\in R$ then $5a^2+b^2$ is equal to

Q.14 The range of the function $f(x)=\cos^{-1}\sqrt{\log_{[x]}\frac{|x|}{x}}$
where [.] represents greatest integer function, is set {a} then the fundamental period of $\sin(ax)$ is equal to

Q.15 If $\mathrm{cosec}^{-1}(2^x)+\sec^{-1}(x^2)=\frac{\pi}{2}$ then number of solutions of this equation is

Q.16 If $(\sin^{-1}x)^5+(\sin^{-1}y)^5+(\sin^{-1}z)^5=\frac{3\pi^5}{32}$ then the value of $5x^2+17y^2+19z^2+8xy+5yz+7zx$ is equal to

Q.17 Number of solutions of $4\cos^{-1}(\cos|x|)=|x|$ is equal to

Q.18 The value of $\cot^2(\cot^{-1}3+\cot^{-1}7+\cot^{-1}13+\cot^{-121)}$ is equal to

Q.19 The value of $\sin^{-1}(\sin 9)+\tan^{-1}(\tan 9)$ is equal to

Q.20 If $\alpha=3\cos^{-1}\left(\frac{5}{\sqrt{28}}\right)+3\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$ and$\beta=4\sin^{-1}\left(\frac{7\sqrt{2}}{10}\right)-4\tan^{-1}\left(\frac{3}{4}\right)$
then value of$5\cos\alpha+10\sec\beta$ is equal to

Q.21 The range of $f(x)=\cot^{-1}\left(\frac{x^2}{1+x^2}\right)$ is $(a,b]$ then $\frac{3\pi}{a+b}$ is equal to

Q.22 The number of positive integers in the domain of$f(x)=\cos^{-1}([e^x]-1)+\sin^{-1}([e^x])$,

where [.] represents greatest integer function, is equal to

ANSWER KEY – LEVEL – I

Q.	1	2	3	4	5	6	7	8	9	10
Ans.	a	c	d	d	d	c	a	d	b	b
Q.	11	12	13	14	15	16	17	18	19	20
Ans.	c	b	c	a	a	d	a	a	c	a
Q.	21	22	23	24	25	26	27	28	29	30
Ans.	a	a	c	b	c	d	d	a	a	b
Q.	31	32	33	34	35	36	37	38	39	40
Ans.	d	d	a	b	c	b	b	b	d	c
Q.	41	42	43	44	45	46	47	48	49	50
Ans.	b	d	d	d	a	a	b	a	b	a
Q.	51	52	53	54	55	56	57	58	59	60
Ans.	d	c	d	c	c	b	d	a	c	a
Q.	61	62	63	64	65	66	67	68	69	70
Ans.	b	b	b	d	b	b	a	d	d	c
Q.	71	72	73	74	75	76	77	78	79	80
Ans.	b	b	b	d	d	a	c	d	a	a
Q.	81	82	83	84	85	86	87	88	89	90
Ans.	c	d	c	a	d	c	a	d	a	c
Q.	91	92	93	94	95	96	97	98	**99**	**100**
Ans.	a	a	d	c	b	d	d	c	b	a

ANSWER KEY – LEVEL – II

13. 5.5
14. 4
15. 2
16. 61
17. 7
18. 2.25
19. 0
20. –15
21. 4
22. 0