UNIT-III

Mathematics

(INVERSE TRIGONOMETTIC FUNCTIONS)

1	Write down the principal value range of $Cos^{-1}x$ function.	1
2	What is the domain of $cosec^{-1}$ x function ?	1
3	Evaluate $\tan^{-1}\sqrt{3}-\sec^{-1}(-2)$	1
4	Find the value of $\cot^{-1}(x)+\cot^{-1}(x)$ when x<R.	1
5	Write down the value of $\sin^{-1}\{2x\sqrt{1-x^2}\}$ in terms of $\cos^{-1}x$.	1
6	Evaluate $\cos\{\sec^{-1}x+\operatorname{cosec}^{-1}x\}$.	1
7	What is the principal value of $\sin^{-1}\left\{\sin\frac{3\pi}{5}\right\}$.?	1
8	Evaluate $\sin\left\{\frac{\pi}{3}-\sin^{-1}\left(\frac{-1}{2}\right)\right\}$.	1
9	Given statement is true or false. ? $\sin^{-1}x=\frac{1}{\sin x}$	1
10	Find x if $\tan^{-1}x+\cot^{-1}4=\frac{\pi}{2}$.	1
11	Evaluate the principal value of $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right).\ \tan^{-1}x+\tan^{-1}\frac{2x}{1-x^2}=\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$	1
12	Evaluate $\sin\left\{3\sin^{-1}\frac{2}{5}\right\}$.	1
13	Find the value of $\cos\left\{\sin^{-1}x\right\}$ in terms of x.	1
14	If $\cos^{-1}\frac{1}{x}=\theta$, then write tanθ in terms of x.	1
15	For what value of x, $\sin\left[\sin^{-1}\frac{1}{5}+\cos^{-1}x\right]=1$	1
16	It $\sin x=\frac{\pi}{5}$, then find the value of $\cos^{-1}x$.	1
17	Write the value of $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$.	1
18	Write down the simplest form of the function $\tan^{-1}\left(\frac{x-y}{1+xy}\right)+\tan^{-1}y$.	1
19	Evaluate – $\operatorname{cosec}\left\{\tan^{-1}\left(-\sqrt{3}\right)\right\}$.	1

1	Show that $\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{2}{11}=\tan^{-1}\frac{3}{4}$	1½+1½+1=4
2	Prove that $2\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{1}{7}=\tan^{-1}\frac{31}{17}$	1+2+1=4
3	Prove that $\cos^{-1}\frac{12}{13}+\sin^{-1}\frac{3}{5}=\sin^{-1}\frac{56}{65}$	1+2+1=4
4	Prove that $\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{8}=\pi/4$	1+1+1+1=4
5	Simplify $\tan^{-1}\left(\frac{a\cos x-b\sin x}{b\cos x+a\sin x}\right)$	1+1+1+1=4
6	Simplify $\sin^{-1}\left(\frac{5x+12\sqrt{1-x^2}}{13}\right)$	1+1+1+1=4
7	Simplify $\tan^{-1}\left(\frac{3a^2x-x^3}{a^3-3ax^2}\right)$	1+1½+1½=4
8	Prove that $\cos^{-1}\left(\frac{\sqrt{1}+\sin x+\sqrt{1}-\sin x}{\sqrt{1}+\sin x-\sqrt{1}-\sin x}\right)=\frac{x}{2}$	1+2+1=4
9	Simplify $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right)$	2+1+1=4
10	Prove that $\frac{9\pi}{8}-\frac{9}{4}\sin^{-1}\frac{1}{3}=\frac{9}{4}\sin^{-1}\frac{2\sqrt{2}}{3}$	1+2+1=4
11	Solve for x $2\tan^{-1}(\cos x)=\tan^{-1}(2\operatorname{cosec} x)$	1+1+2=4
12	Solve for x $\tan^{-1}\frac{1-x}{1+x}=\frac{1}{2}\tan^{-1}x$	2+1+1=4
13	Solve for x $\tan^{-1}2x+\tan^{-1}3x=\pi/4$	2+1+1=4
14	Write the value of	
	(a) $\tan^{-1}(1)+\cos^{-1}\left(\frac{-1}{2}\right)+\sin^{-1}\left(\frac{-1}{2}\right)$	1/2×4=2 1+1=2
	(b) $\tan^{-1}(\tan(7\pi/6))$	
15	Prove that $\tan^{-1}x+\tan^{-1}\frac{2x}{1-x^2}=\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$	2+1+1=4

(06 marks each)

1	Prove that $\tan^{-1}\left(\frac{\sqrt{1}+x^2-\sqrt{1-x^2}}{\sqrt{1}+x^2+\sqrt{1-x^2}}\right)=\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x^2$	1+1½+1½+ 1½+1/2=6
2	Simplify a) $\tan^{-1}\left(\frac{\sqrt{1}+x^2-1}{x}\right)$	3+3=6

b) $\tan^{-1}\left(\frac{1+\cos x}{\sin x}\right)$

3 Prove that $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\frac{a}{b}\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\frac{a}{b}\right)=\frac{2b}{a}$ 2+2+1+1=6

4 Find the value of x. if

$$\sin^{-1}\left(\frac{2\alpha}{1+\alpha^2}\right)-\cos^{-1}\left(\frac{1-\beta^2}{1+\beta^2}\right)=\tan^{-1}\left(\frac{2x}{1-x^2}\right)$$ 2+2+1+1=6

5 Find the value of

a) $\tan^{-1}\left[2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right]$

b) $\tan\frac{1}{2}\left[\sin^{-1}\frac{2x}{1+x^2}+\cos^{-1}\frac{1-y^2}{1+y^2}\right]$ 3+3=6

6 If $y=\cos^{-1}\left(\sqrt{\cos x}\right)-\tan^{-1}\left(\sqrt{\cos x}\right)$ show that $\sin y=\tan^2 x_2$ 1+2+1+1 +1=6

7

i) Write the principal of $\cos^{-1} x$

ii) Write the value of $\cos\left(\tan^{-1}\alpha+\cos^{-1}\alpha\right)$

iii) $\sin^{-1}\sqrt{x}+\cos^{-1}\sqrt{x}$ = ----------

iv) $\cos\left(\cos^{-1} x\right)$ = ----------

v) $2\tan^{-1}=\cos^{-1}$ = ----------

vi) Find x if $\sec^{-1} x+\text{cosec}^{-1}3=\pi/2$ 1×6=6

8 a) If $x=\sqrt{a^{\sin^{-1}t}}$ & y $=\sqrt{a^{\cos^{-1}t}}$

Prove that $x^2y^2=a^{\pi/2}=cons\tan t.$

b) Simplify $\sin^{-1}\left(\frac{3x+4\sqrt{1-x^2}}{5}\right)$ 3+3=6

9 Show that $\sin^{-1}\frac{12}{13}+\cos^{-1}\frac{4}{5}+\tan^{-1}\frac{63}{16}=\pi$ 2+1+2+1=6