CLASS XII
SAMPLE PAPER
MATHS

INVERSE TRIGONOMETRIC FUNCTION – 2

Time: - 1 ½ hrs **F.M.: - 50**

1) ***Answer all questions.*** **[10×1½ =15]**

a) Evaluate: $Cos^{-1}\left(Cos\frac{2\pi}{3}\right)=?$

b) Evaluate: $Sin^{-1}\left(Sin\frac{2\pi}{3}\right)=?$ c) Evaluate: $Sin\left(\frac{\pi}{2}-\sin^{-1}\left(-\frac{1}{2}\right)\right)$

d) Evaluate: $Cos\left(Tan^{-1}\frac{3}{4}\right)=?$ e) If A = $\tan^{-1}$ x, then what is the value of Sin2A=?

f) If x + y = 4, xy = 1, then ($\tan^{-1}$ x + $\tan^{-1}$ y) =?

g) State true or false with explanation. Sin (Sin^{-1} 2) = 2.

h) State true or false with explanation. $\left(Sin^{-1}24+Cos^{-1}24\right)=\frac{\pi}{2}$.

i) Which of the following functions admits an inverse and why not the other?

$\text{Sin}:\text{R}\to[-1,1]$, $\text{Sin}:\left[-\frac{3\pi}{2},-\frac{\pi}{2}\right]\to[-1,1]$

c) Write the domain and range of $\text{Tan}^{-1}x$ and draw its graph.

2) ***Answer all questions.*** **[5×3=15]**

a) Prove *that* if $x\in[-1,1],\cos(\sin^{-1}x)=\sin(\cos^{-1}x)$

b) If $x\in[-1,1]$, show that $\cos^{-1}x+\cos^{-1}(-x)=\pi$

c) Prove that $2\tan^{-1}x=\sin^{-1}\left(\frac{2x}{1+x^2}\right)$

d) *Find the value of* $Cos\left(\tan^{-1}\left(\cot\left(\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)\right)\right)\right)$

e) Prove that : $\sin^2(\sin^{-1}x+\sin^{-1}y+\sin^{-1}z)=\cos^2(\cos^{-1}x+\cos^{-1}y+\cos^{-1}z)$

3) ***Answer any FOUR questions.*** **[4×5=20]**

a) *Solve*: $3\tan^{-1}\left(\frac{1}{2+\sqrt{3}}\right)-\tan^{-1}\left(\frac{1}{x}\right)=\tan^{-1}\left(\frac{1}{3}\right)$.

b) *If* $(\sin^{-1}x+\sin^{-1}y+\sin^{-1}z)=\pi$
then show that : $x\sqrt{1-x^2}+y\sqrt{1-y^2}+z\sqrt{1-z^2}=2xyz$

c) *If* $(\cos^{-1}x+\cos^{-1}y+\cos^{-1}z)=\pi$ *then show that* : $x^2+y^2+z^2+2xyz=1$.

d) *If* $r^2=x^2+y^2+z^2$, then prove that : $\tan^{-1}\left(\frac{yz}{xr}\right)+\tan^{-1}\left(\frac{zx}{yr}\right)+\tan^{-1}\left(\frac{xy}{zr}\right)=\frac{\pi}{2}$.

e) *In a triangle ABC if* $A=90^0$, *then prove that*: $\tan^{-1}\left(\frac{b}{a+c}\right)+\tan^{-1}\left(\frac{c}{a+b}\right)=\frac{\pi}{4}$
where a, b, c are sides of the triangle

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