Guess Paper – 2014

Class – XII

Subject – Mathematics

Inverse Trigonometric Functions

Question:1 Write in Simplest Form

I. $\cos^{-1}\left(\frac{3}{5}\cos x+\frac{4}{5}\sin x\right)$

II. $\sin^{-1}\left(\frac{5}{13}\cos x+\frac{12}{13}\sin x\right)$

III. $\sin^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)$

IV. $\cos^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)$

Question:2 If

$x=\cos ec[\tan^{-1}\{\cos(\cot^{-1}(\sec(\sin^{-1}a))\}]$ and $y=\sec[\cot^{-1}\{\sin(\tan^{-1}(\cos ec(\cos^{-1}a))\}]$

Then Find the relation between x and y in terms of a.

Question:3 If $y=\cot^{-1}\left(\sqrt{\cos x}\right)-\tan^{-1}\left(\sqrt{\cos x}\right)$ then prove that $\sin y=\tan^2\left(\sqrt{\cos x}\right)$

Question:4 Evaluate:

I. $\tan\left\{2\tan^{-1}\frac{1}{5}-\frac{\pi}{4}\right\}$

II. $\tan\left\{\frac{1}{2}\cos^{-1}\frac{\sqrt{5}}{3}\right\}$

Question:5 Prove that

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

Question:6 Prove that

$$\frac{\alpha^3}{2}\cos ec^2\left(\frac{1}{2}\tan^{-1}\frac{\alpha}{\beta}\right)+\frac{\beta^3}{2}\sec^2\left(\frac{1}{2}\tan^{-1}\frac{\beta}{\alpha}\right)=(\alpha+\beta)(\alpha^2+\beta^2)$$

Question:7 Prove that

$$\tan^{-1}\left(\frac{1-x}{1+x}\right)-\tan^{-1}\left(\frac{1-y}{1+y}\right)=\sin^{-1}\left(\frac{y-x}{\sqrt{1+x^2}\sqrt{1+y^2}}\right)$$

Question:8 Evaluate:

$$\tan^{-1}\left(\frac{3\sin 2\alpha}{5+3\cos 2\alpha}\right)++\tan^{-1}\left(\frac{1}{4}\tan\alpha\right)\quad where\ \frac{-\pi}{2}\le\alpha\le\frac{\pi}{2}$$

Question:9 Prove that

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

Question:10 Prove that

$$\tan\left\{\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\frac{a}{b}\right\}+\tan\left\{\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\frac{a}{b}\right\}=\frac{2b}{a}$$

Question:11 Prove that

$$\tan^{-1}\left(\frac{1}{2}\tan 2A\right)+\tan^{-1}(\cot A)+\tan^{-1}(\cot^3 A)=0\quad If\ \frac{\pi}{4}\le A\le\frac{\pi}{2}$$

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Question:12 Solve For x

$$\tan^{-1}\sqrt{x^2+x}+\sin^{-1}\sqrt{x^2+x+1}=\pi/2$$

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