Mains - 14.A+B

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Section - E

1) Prove that $\cos\tan^{-1}\sin\cot^{-1}x = \sqrt{\frac{x^2+1}{x^2+2}}$. (2002 - 5 Marks)

SECTION - F

1) Match The Following (2005 - 6M)

Column I	**Column II**
a) $\sum_{i=1} \inf \tan^{-1}\left(\frac{1}{2i^2}\right) = t$, then tan t =	a) 1
b) Sides a, b, c of a triangle ABC are in AP and $\cos\theta_1 = \frac{a}{b+c}, \cos\theta_2 = \frac{b}{a+c}, \cos\theta_3 = \frac{c}{a+b}$ then $tan^2\left(\frac{\theta_1}{2}\right) + \tan^2\left(\frac{\theta_3}{2}\right) =$	b) $\frac{\sqrt{5}}{3}$
c) A line is perpendicular to $x + 2y + 2z = 0$ and passes through (0,1,0). The perpendicular distance of this line from the origin is	c) $\frac{2}{3}$

2) Let (x, y) be such that $\sin^{-1}(ax) + \cos^{-1}(bxy) = \frac{\pi}{2}$.
Match the statements in Column 1 with statements in Column II and indicate your answer by darkening the appropriate bubble in the 4x4 matrix given in the ORS.

a) If $a = 1$ and $b = 0$, then (x, y)	a) lies on the circle $x^2 + y^2 = 1$
b) If $a = 1$ and $b = 1$, then (x, y)	b) lies on $(x^2 - 1)(y^2 - 1) = 0$
c) If $a = 1$ and $b = 2$, then (x, y)	c) lies on $y = x$
d) If $a = 2$ and $b = 2$, then (x, y)	d) lies on $(4x^2 - 1)(y^2 - 1) = 0$

DIRECTIONS(Q.3):*Following questions has matching lists. The codes for the lists have choices (a), (b), (c) and (d) out of which ONLY ONE is correct.*

3) a) $\left(\frac{1}{y^2}\left(\frac{\cos(\tan^{-1}y)+y\sin(\tan^{-1}y)}{\cot(\sin^{-1}y)+\tan(\sin^{-1}y)}\right)^2 + y^4\right)^{\frac{1}{2}}$ takes value	a) $\frac{1}{2}\sqrt{\frac{5}{3}}$
b) If $\cos x + \cos y + \cos z = 0 = \sin x + \sin y + \sin z$ then possible value of $\cos\frac{x-y}{2} is$	b) $\sqrt{2}$
c) If $\cos\left(\frac{\pi}{4} - x\right)\cos 2x + \sin x \sin 2x \sec x = \cos x \sin 2x \sec x + \cos\left(\frac{\pi}{4} + x\right)\cos 2x$ then possible value of $\sec x$ is	c) $\frac{1}{2}$
d) If $\cot\left(\sin^{-1}\sqrt{1 - x^2}\right) = \sin\left(\tan^{-1}\left(x\sqrt{6}\right)\right), x \neq 0$	d) 1

Codes:

	P	**Q**	**R**	**S**
(*a*)	4	3	1	2
(*b*)	4	3	2	1
(*c*)	3	4	2	1
(*d*)	3	4	1	2