

# 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  $\tan t =$
- 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  $\tan^2 \left( \frac{\theta_1}{2} \right) + \tan^2 \left( \frac{\theta_3}{2} \right) =$
- 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

- a) 1
- b)  $\frac{\sqrt{5}}{3}$
- 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
- 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
- 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
- d) If  $\cot(\sin^{-1} \sqrt{1-x^2}) = \sin(\tan^{-1}(x\sqrt{6}))$ ,  $x \neq 0$

- a)  $\frac{1}{2} \sqrt{\frac{5}{3}}$
- b)  $\sqrt{2}$
- c)  $\frac{1}{2}$
- 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

## I - INTEGER VALUE CORRECT TYPE

1) The number of real solutions of the equation  $\sin^{-1}()$