

**NCERT EXEMPLAR SELECTED PROBLEMS :**  
**PROBLEM 4 ON ITF**

If  $\sin^{-1} \frac{2a}{1+a^2} + \cos^{-1} \frac{1-a^2}{1+a^2} = \tan^{-1} \frac{2x}{1-x^2}$ , where  $a, x \in [0, 1)$  then the value of  $x$  is

- (a) 0                      (b)  $\frac{a}{2}$                       (c)  $a$                       (d)  $\frac{2a}{1-a^2}$

(d) We have,  $\sin^{-1} \frac{2a}{1+a^2} + \cos^{-1} \frac{1-a^2}{1+a^2} = \tan^{-1} \frac{2x}{1-x^2}$

$\Rightarrow 2 \tan^{-1} a + 2 \tan^{-1} a = 2 \tan^{-1} x$

$\Rightarrow 2 \tan^{-1} a = \tan^{-1} x$

$\Rightarrow \tan^{-1} \frac{2a}{1-a^2} = \tan^{-1} x$

$\Rightarrow x = \frac{2a}{1-a^2}$

$$\left[ \begin{array}{l} \because 2 \tan^{-1} x = \tan^{-1} \frac{2x}{1-x^2} \\ 2 \tan^{-1} x = \sin^{-1} \frac{2x}{1+x^2} \\ 2 \tan^{-1} x = \cos^{-1} \frac{1-x^2}{1+x^2} \end{array} \right]$$