द्वितीय टेस्ट

Date 18/01/2018

GPC-Alwar
Code-104

किन्हीं तीन प्रश्नों को हल कीजिए

(1) मान ज्ञात कीजिए

(a) $\tan(-945^\circ)$ (b) $\sec(225^\circ)$ $\left(2\frac{1}{2}+2\frac{1}{2}=5\right)$

(2) यदि $\sin A = \frac{1}{\sqrt{5}}$ तथा $\cos B = \frac{3}{\sqrt{10}}$ तो प्रदर्शित कीजिए $A+B=45^\circ$

(3) सिद्ध कीजिए

$$4\sin a \sin\left(a+\frac{\pi}{3}\right)\sin\left(a+\frac{2\pi}{3}\right) = \sin 3a$$

(4) यदि $\tan^2\theta = 2\tan^2\phi + 1$ तो सिद्ध कीजिए कि

$$\cos 2\theta + \sin^2\phi = 0$$

Sol Q ③ $\underline{L.H.S} = 4\sin a \sin\left(a+\frac{\pi}{3}\right)\sin\left(a+\frac{2\pi}{3}\right)$

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$= 2\sin a\left[2\sin\left(a+\frac{\pi}{3}\right)\sin\left(a+\frac{2\pi}{3}\right)\right]$

$= 2\sin a\left[\cos\left(a+\frac{\pi}{3}-a-\frac{2\pi}{3}\right)-\cos\left(a+\frac{\pi}{3}+a+\frac{2\pi}{3}\right)\right]$

$= 2\sin a\left[\cos\frac{\pi}{3}-\cos(\pi+2a)\right]$

$= 2\sin a\left[\cos\frac{\pi}{3}+\cos 2a\right] = 2\sin a\left[\frac{1}{2}+\cos 2a\right]$

$= \sin a + 2\sin a\cos 2a$

$\because 2\sin A\cos B = \sin(A+B)+\sin($

$= \sin a + \sin(a+2a)+\sin(a-2a)$

$= \sin 3a$

Sol Q ④ Given $\tan^2\theta = 2\tan^2\phi + 1$ — ①

To Prove $\cos 2\theta + \sin^2\phi = 0$

$\underline{L.H.S} = \cos 2\theta + \sin^2\phi$

$= \frac{1-\tan^2\theta}{1+\tan^2\theta} + \sin^2\phi$

$\because \cos 2A = \frac{1-\tan^2 A}{1+\tan^2 A}$

$= \frac{\cancel{1}-(2\tan^2\phi+\cancel{1})}{1+(2\tan^2\phi+1)} + \sin^2\phi$

$= \frac{-\cancel{2}\tan^2\phi}{\cancel{2}(1+\tan^2\phi)} + \sin^2\phi$

$= -\frac{\tan^2\phi}{\sec^2\phi} + \sin^2\phi$

$= -\tan^2\phi\cdot\cos^2\phi + \sin^2\phi$

$= -\sin^2\phi + \sin^2\phi = 0 = R.H.S$

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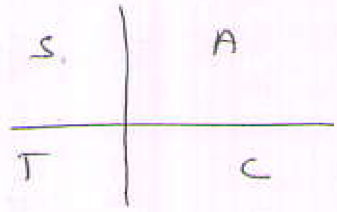
① (a) $\tan(-945^\circ) = \dfrac{\sin(-945^\circ)}{\cos(-945^\circ)} = \dfrac{-\sin(945^\circ)}{\cos(945^\circ)}$

$$= -\frac{\sin(10\times 90+45^\circ)}{\cos(10\times 90+45^\circ)} = \frac{-(-\sin 45^\circ)}{-\cos 45^\circ} = \frac{\frac{1}{\sqrt{2}}}{-\frac{1}{\sqrt{2}}} = -1$$



(b) $\sec(225^\circ) = \dfrac{1}{\cos(225^\circ)}$

$$= \frac{1}{\cos[2\times 90+45^\circ]} = \frac{-1}{\cos 45^\circ} = -\sqrt{2}$$

Sol Q ② given $\sin A = \dfrac{1}{\sqrt{5}}$, $\cos B = \dfrac{3}{\sqrt{10}}$, $\sin B = \sqrt{1-\cos^2 B}$

$\cos A = \sqrt{1-\sin^2 A}$

$= \sqrt{1-\dfrac{1}{5}} = \sqrt{\dfrac{4}{5}} = \dfrac{2}{\sqrt{5}}$, $\quad = \sqrt{1-\left(\dfrac{3}{\sqrt{10}}\right)^2} = \dfrac{1}{\sqrt{10}}$

Now let $\sin(A+B) = \sin A\cos B + \cos A\sin B$

$$= \frac{1}{\sqrt{5}}\times\frac{3}{\sqrt{10}} + \frac{2}{\sqrt{5}}\times\frac{1}{\sqrt{10}}$$

$$= \frac{3}{\sqrt{50}} + \frac{2}{\sqrt{50}} = \frac{5}{\sqrt{50}} = \sqrt{\frac{25}{50}} = \frac{1}{\sqrt{2}}$$

$\Rightarrow \sin(A+B) = \dfrac{1}{\sqrt{2}}$

$\Rightarrow \sin(A+B) = \dfrac{1}{\sqrt{2}} = \sin 45^\circ$

$\Rightarrow \boxed{A+B = 45^\circ}$