5(i) LHS $= (\operatorname{cosec}\theta - \cot\theta)^2$

$= \left(\frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta}\right)^2$

$= \frac{(1-\cos\theta)^2}{\sin^2\theta}$

$= \frac{(1-\cos\theta)^2}{1-\cos^2\theta}$

$= \frac{(1-\cos\theta)^{\cancel{2}}}{\cancel{(1-\cos\theta)}(1+\cos\theta)}$

$= \frac{1-\cos\theta}{1+\cos\theta}$

$=$ RHS

5(ii) LHS

$= \frac{\cos A}{1+\sin A} + \frac{1+\sin A}{\cos A}$

$= \frac{\cos^2 A + (1+\sin A)^2}{\cos A\,(1+\sin A)}$

$= \frac{\cos^2 A + 1 + \sin^2 A + 2\sin A}{\cos A(1+\sin A)}$

$= \frac{1+1+2\sin A}{\cos A(1+\sin A)}$

$= \frac{2+2\sin A}{\cos A(1+\sin A)}$

$= \frac{2\cancel{(1+\sin A)}}{\cos A\cancel{(1+\sin A)}}$

$= 2\sec A$

$=$ RHS

5(iii) LHS $= \frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta}$

$= \frac{\tan\theta}{1-\frac{1}{\tan\theta}} + \frac{\frac{1}{\tan\theta}}{1-\tan\theta}$

$= \frac{\tan\theta}{\frac{\tan\theta-1}{\tan\theta}} + \frac{1}{\tan\theta(1-\tan\theta)}$

$= \frac{\tan^2\theta}{\tan\theta-1} + \frac{1}{\tan\theta(1-\tan\theta)}$

$= \frac{\tan^2\theta}{\tan\theta-1} - \frac{1}{\tan\theta(\tan\theta-1)}$

$= \frac{\tan^3\theta - 1}{\tan\theta(\tan\theta-1)}$

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

$= \frac{\sec^2\theta}{\tan\theta} + \frac{\cancel{\tan\theta}}{\cancel{\tan\theta}}$

$= \frac{\frac{1}{\cos^{\cancel{2}}\theta}}{\frac{\sin\theta}{\cancel{\cos\theta}}} + 1$

$= \frac{1}{\cos\theta\sin\theta} + 1$

$= \sec\theta\operatorname{cosec}\theta + 1$

$=$ RHS