SUCCESS INSTITUTE **Assignment - 85** ***10^{th} Class Expert***

Q1. Prove the following identities :

(i) $\left(1-\sin^2\theta\right)\sec^2\theta = 1$ (ii) $\cos^2\theta\left(1+\tan^2\theta\right) = 1$ (iii) $\cos^2\theta + \dfrac{1}{1+\cot^2\theta} = 1$ (iv) $\dfrac{1}{\sec^2\theta} + \dfrac{1}{\operatorname{cosec}^2\theta} = 1$

(v) $\dfrac{\operatorname{cosec}^2 A}{1+\cot^2 A} = 1$ (vi) $\sin^2\theta + \dfrac{1}{1+\tan^2\theta} = 1$ (vii) $\sqrt{\dfrac{\tan^2\theta}{1+\tan^2\theta}} = \sin\theta$ $(viii)$ $\sqrt{\dfrac{\cot^2\theta}{1+\cot^2\theta}} = \cos\theta$

Q2. Simplify :

(i) $\sin^2\theta + \cos^2\theta + \cot^2\theta$ (ii) $\sin^2 A + \cos^2 A + \tan^2 A$ (iii) $\dfrac{1+\tan^2 A}{1+\cot^2 A}$ (iv) $9\left(\sec^2 A - \tan^2 A\right)$

(v) $\cot^2\theta - \dfrac{1}{\sin^2\theta}$ (vi) $\tan^2\theta - \dfrac{1}{\cos^2\theta}$ (vii) $\left(1+\tan^2\theta\right)(1+\sin\theta)(1-\sin\theta)$

$(viii)$ $\left(1+\cot^2\theta\right)(1+\cos\theta)(1-\cos\theta)$

Ans 2. (i) $\operatorname{cosec}^2\theta$ (ii) $\sec^2 A$ (iii) $\tan^2 A$ (iv) 9 (v) -1 (vi) -1 (vii) 1 (viii) 1

Q3. Prove the following identities :

(i) $\dfrac{1}{1+\sin\theta} + \dfrac{1}{1-\sin\theta} = 2\sec^2\theta$ (ii) $\operatorname{cosec}^2\theta + \sec^2\theta = \operatorname{cosec}^2\theta \cdot \sec^2\theta$

(iii) $(\sec A + \tan A)(1-\sin A) = \cos A$ (iv) $(1+\tan\theta+\sec\theta)(1+\cot\theta-\operatorname{cosec}\theta) = 2$

(v) $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$

(vi) $\dfrac{\tan\theta+\sin\theta}{\tan\theta-\sin\theta} = \dfrac{\sec\theta+1}{\sec\theta-1}$ (vii) $\dfrac{\cot A-\cos A}{\cot A+\cos A} = \dfrac{\operatorname{cosec} A-1}{\operatorname{cosec} A+1}$ $(viii)$ $\sec A\,(1-\sin A)(\sec A+\tan A) = 1$

(ix) $(\operatorname{cosec}\theta-\cot\theta)^2 = \dfrac{1-\cos\theta}{1+\cos\theta}$ (x) $\dfrac{1+\sec A}{\sec A} = \dfrac{\sin^2 A}{1-\cos A}$

(xi) $\dfrac{\cos A}{1+\sin A} + \dfrac{1+\sin A}{\cos A} = 2\sec A$ (xii) $\dfrac{\sin\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{\sin\theta} = 2\operatorname{cosec}\theta$

$(xiii)$ $(\operatorname{cosec} A-\sin A)(\sec A-\cos A) = \dfrac{1}{\tan A+\cot A}$

(xiv) $\dfrac{\sin\theta}{1-\cos\theta} = \operatorname{cosec}\theta+\cot\theta$ (xv) $\sqrt{\dfrac{1-\sin\theta}{1+\sin\theta}} = \sec\theta-\tan\theta$ (xvi) $\sqrt{\dfrac{1+\cos\theta}{1-\cos\theta}} = \operatorname{cosec}\theta+\cot\theta$

$(xvii)$ $\sqrt{\dfrac{1+\sin\theta}{1-\sin\theta}} = \sec\theta+\tan\theta$ $(xviii)$ $\dfrac{\sin\theta-2\sin^3\theta}{2\cos^3\theta-\cos\theta} = \tan\theta$ (xix) $\sec^2\theta - \dfrac{\sin^2\theta-2\sin^4\theta}{2\cos^4\theta-\cos^2\theta} = 1$

(xx) $\dfrac{\tan\theta}{1-\cot\theta} + \dfrac{\cot\theta}{1-\tan\theta} = 1+\tan\theta+\cot\theta = 1+\sec\theta\operatorname{cosec}\theta$

(xxi) $\dfrac{\cos A-\sin A+1}{\cos A+\sin A-1} = \operatorname{cosec} A+\cot A$ $(xxii)$ $\dfrac{\sin\theta-\cos\theta+1}{\sin\theta+\cos\theta-1} = \dfrac{1}{\sec\theta-\tan\theta}$

$(xxiii)$ $\left(\dfrac{1+\tan^2 A}{1+\cot^2 A}\right) = \left(\dfrac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A$