Question 3:

(i)

$$\frac{\sin 50^\circ}{\cos 40^\circ} + \frac{\operatorname{cosec} 40^\circ}{\sec 50^\circ} - 4\cos 52^\circ \operatorname{cosec} 38^\circ$$

$$\Rightarrow \frac{\sin(90^\circ - 40^\circ)}{\cos 40^\circ} + \frac{\operatorname{cosec}(90^\circ - 50^\circ)}{\sec 50^\circ} - 4\cos(90^\circ - 38^\circ)\operatorname{cosec} 38^\circ$$

$$= \frac{\cos 40^\circ}{\cos 40^\circ} + \frac{\sec 50^\circ}{\sec 50^\circ} - \frac{4\sin 38^\circ}{\sin 38^\circ}$$

$$= 1 + 1 - 4 = -2$$

(ii)

$$\frac{\cos 75^\circ}{\sin 15^\circ} + \frac{\sin 12^\circ}{\cos 78^\circ} - \cos 18^\circ \operatorname{cosec} 72^\circ$$

$$\Rightarrow \frac{\cos(90^\circ - 15^\circ)}{\sin 15^\circ} + \frac{\sin(90^\circ - 78^\circ)}{\cos 78^\circ} - \cos(90^\circ - 72^\circ)\operatorname{cosec} 72^\circ$$

$$\left[\because \sin(90^\circ - \theta) = \cos\theta \text{ and } \cos(90^\circ - \theta) = \sin\theta\right]$$

$$= \frac{\sin 15^\circ}{\sin 15^\circ} + \frac{\cos 78^\circ}{\cos 78^\circ} - \sin 72^\circ \operatorname{cosec} 72^\circ$$

$$= 1 + 1 - 1 = 1$$

(iii)

$$\frac{2\operatorname{cosec} 67^\circ}{\sec 23^\circ} - \frac{\tan 70^\circ}{\cot 20^\circ} - \cos 0^\circ + \tan 38^\circ \tan 52^\circ$$

$$= \frac{2\operatorname{cosec}(90^\circ - 23^\circ)}{\sec 23^\circ} - \frac{\tan(90^\circ - 20^\circ)}{\cot 20^\circ} - \cos 0^\circ + \tan(90^\circ - 52^\circ)\tan 52^\circ$$

$$\left[\because \sin(90^\circ - \theta) = \cos\theta \text{ and } \cos(90^\circ - \theta) = \sin\theta\right]$$

$$= \frac{2\sec 23^\circ}{\sec 23^\circ} - \frac{\cot 20^\circ}{\cot 20^\circ} - \cos 0^\circ + \cot 52^\circ \tan 52^\circ$$

$$= 2 - 1 - 1 + \frac{\tan 52^\circ}{\tan 52^\circ} = 2 - 1 - 1 + 1 = 1$$

(iv)

$$\frac{\tan 76^\circ}{\cot 14^\circ} + \frac{\sec 58^\circ}{\operatorname{cosec} 32^\circ} - \sin 35^\circ \sec 55^\circ - 8\sin^2 30^\circ$$

$$\Rightarrow \frac{\tan(90^\circ - 14^\circ)}{\cot 14^\circ} + \frac{\sec(90^\circ - 32^\circ)}{\operatorname{cosec} 32^\circ} - \sin(90^\circ - 55^\circ)\sec 55^\circ - 8\sin^2 30^\circ$$

$$= \frac{\cot 14^\circ}{\cot 14^\circ} + \frac{\operatorname{cosec} 32^\circ}{\operatorname{cosec} 32^\circ} - \frac{\cos 55^\circ}{\cos 55^\circ} - 8 \times \left(\frac{1}{2}\right)^2$$

$$= 1 + 1 - 1 - 2 = -1$$

********** END **********