Question 11:

$$\sec 4A = \operatorname{cosec}(A - 15^\circ)$$

$$\Rightarrow \operatorname{cosec}(90^\circ - 4A) = \operatorname{cosec}(A - 15^\circ)$$

$$\therefore 90^\circ - 4A = A - 15^\circ \text{ or } 5A = 90^\circ + 15^\circ = 105^\circ$$

$$\text{Hence, } A = \frac{105^\circ}{5} = 21^\circ$$

Question 12:

$$\therefore \tan\frac{B+C}{2} = \tan\frac{180 - A}{2} = \tan\left(90^\circ - \frac{A}{2}\right) = \cot\frac{A}{2}$$

Question 13:

$$\frac{\sin 15^\circ \cos 75^\circ + \cos 15^\circ \sin 75^\circ}{\tan 5^\circ \tan 30^\circ \tan 35^\circ \tan 55^\circ \tan 85^\circ}$$

$$= \frac{\sin 15^\circ \cos(90^\circ - 15^\circ) + \cos 15^\circ \sin(90^\circ - 15^\circ)}{\tan 5^\circ \tan 30^\circ \tan 35^\circ \tan(90^\circ - 35^\circ)\tan(90^\circ - 5^\circ)}$$

$$= \frac{\sin 15^\circ \sin 15^\circ + \cos 15^\circ \cos 15^\circ}{\tan 5^\circ \tan 30^\circ \tan 35^\circ \cot 35^\circ \cot 5^\circ}$$

$$= \frac{\sin^2 15^\circ + \cos^2 15^\circ}{(\tan 5^\circ \cot 5^\circ)(\tan 35^\circ \cot 35^\circ)\tan 30^\circ}$$

$$= \frac{1}{\left(\tan 5^\circ \times \frac{1}{\tan 5^\circ}\right)\left(\tan 35^\circ \times \frac{1}{\tan 35^\circ}\right)\tan 30^\circ}$$

$$= \frac{1}{1 \times 1 \times \frac{1}{\sqrt{3}}} = \sqrt{3}$$

Question 14:

$$\frac{3\cos 55^\circ}{7\sin 35^\circ} - \frac{4(\cos 70^\circ \operatorname{cosec} 20^\circ)}{7(\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ)}$$

$$= \frac{3\cos(90^\circ - 35^\circ)}{7\sin 35^\circ} - \frac{4\cos 70^\circ \operatorname{cosec}(90^\circ - 70^\circ)}{7\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan(90^\circ - 25^\circ)\tan(90 - 5^\circ)}$$

$$= \frac{3\sin 35^\circ}{7\sin 35^\circ} - \frac{4\cos 70^\circ \sec 70^\circ}{7\tan 5^\circ \tan 25^\circ \tan 45^\circ \cot 25^\circ \cot 5^\circ}$$

$$= \frac{3}{7} - \frac{4}{7\left(\tan 5^\circ \times \frac{1}{\tan 5^\circ}\right)\left(\tan 25^\circ \times \frac{1}{\tan 25^\circ}\right) \times 1} = \frac{3}{7} - \frac{4}{7} = -\frac{1}{7}$$

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