INTRODUCTION TO TRIGONOMETRY

TRIGONOMETRIC RATIOS OF COMPLEMENTARY ANGLES

EXERCISE

Q.1 Without using trigonometric tables evaluate the following :

(i) $\frac{\sin 20^\circ}{\cos 70^\circ}$ (ii) $\frac{\cos 19^\circ}{\sin 71^\circ}$ (iii) $\frac{\sin 21^\circ}{\cos 69^\circ}$

(iv) $\frac{\tan 10^\circ}{\cot 80^\circ}$ (v) $\frac{\sec 11^\circ}{\operatorname{cosec} 79^\circ}$ (vi) $\frac{\sin 20^\circ 30}{\cos 69^\circ 30}$

Q.2 Without using trigonometric tables evaluate the following :

(i) $\left(\frac{\sin 49^\circ}{\cos 41^\circ}\right)^2 + \left(\frac{\cos 41^\circ}{\sin 49^\circ}\right)^2$

(ii) $\frac{\cot 40^\circ}{\tan 50^\circ} - \frac{1}{2}\left(\frac{\cot 35^\circ}{\sin 55^\circ}\right)$

Q.3 Without using trigonometric tables evaluate the following :

(i) $\frac{\tan 35^\circ}{\cot 55^\circ} + \frac{\cot 78^\circ}{\tan 12^\circ} - 1$

(ii) $\operatorname{cosec}^2 67^\circ - \tan^2 23^\circ$

Q.4 Without using trigonometric tables evaluate the following :

(i) $\sin^2 20^\circ + \sin^2 70^\circ - \tan^2 45^\circ$

(ii) $\sec 50^\circ \sin 40^\circ + \cos 40^\circ \operatorname{cosec} 50^\circ$

Q.5 Without using trigonometric tables prove the following :

(i) $\tan 20^\circ \tan 35^\circ \tan 45^\circ \tan 55^\circ \tan 70^\circ = 1$

(ii) $\sin 48^\circ \sec 42^\circ + \cos 48^\circ \operatorname{cosec} 42^\circ = 2$

(iii) $\sin 63^\circ \cos 27^\circ + \cos 63^\circ \sin 27^\circ = 1$

(iv) $\frac{\sin 70^\circ}{\cos 20^\circ} + \frac{\operatorname{cosec} 20^\circ}{\sec 70^\circ} - \cos 70^\circ \operatorname{cosec} 20^\circ = 1$

(v) $\frac{\cos 80^\circ}{\sin 10^\circ} + \cos 59^\circ \operatorname{cosec} 31^\circ = 2$

Q.6 Prove the following :

(i) $\sin\theta \sin(90^\circ - \theta) - \cos\theta \cos(90^\circ - \theta) = 0$

(ii) $\frac{\sin\theta \cos(90^\circ - \theta)}{\sin(90^\circ - \theta)} + \frac{\cos\theta \sin(90^\circ - \theta)}{\sin(90^\circ - \theta)} = 1$

(iii) $\frac{\sin\theta}{\sin(90^\circ - \theta)} + \frac{\cos\theta}{\cos(90^\circ - \theta)} = \sec\theta \operatorname{cosec}\theta$

(iv) $\sin(90^\circ - \theta) \cos(90^\circ - \theta) = \frac{\tan\theta}{1 + \cot^2(90^\circ - \theta)}$

(v) $\frac{\cos(90^\circ - \theta)}{1 + \sin(90^\circ - \theta)} + \frac{1 + \sin(90^\circ - \theta)}{\cos(90^\circ - \theta)} = 2\operatorname{cosec}\theta$

(vi) $\frac{1}{1 + \cos(90^\circ - \theta)} + \frac{1}{1 - \cos(90^\circ - \theta)} = 2 \operatorname{cosec}^2(90^\circ - \theta)$

(vii) $\sin^2(90^\circ - \theta)(1 + \cot^2(90^\circ - \theta)) = 1$

(viii) $\frac{\cos(90°-\theta)\sec(90°-\theta)\tan\theta}{\operatorname{cosec}(90°-\theta)\sin(90°-\theta)\cot(90°-\theta)} + \frac{\tan(90°-\theta)}{\cot\theta} = 2$

(ix) $\frac{\tan(90°-A)\cot A}{\operatorname{cosec}^2 A} - \cos^2 A = 0$

(x) $\frac{\cos(90°-A)\sin(90°-A)}{\tan(90°-A)} = \sin^2 A$

Ex.7 Express each of the following in terms of trigonometric ratios of angles between 0º and 45º;

(i) cosec 69º + cot 69º

(ii) sin 81º + tan 81º

(iii) sin 72º + cot 72º

Ex.8 If A, B, C are the interior angles of a triangle ABC, prove that $\tan\frac{B+C}{2} = \cot\frac{A}{2}$

Ex.9 If tan A = cot B, prove that A + B = 90°.

Ex.10 Express sin 67° + cos 75° in terms of trigonometric ratios of angles between 0° and 45°.

ANSWER KEY

1. (i) 1 (ii) 1 (iii) 1 (iv) 1 (v) 1 (vi) 1

2. (i) 2 (ii) $\frac{1}{2}$

3. (i) 1 (ii) 1

4. (i) 0 (ii) 2

7 (i) sec 21º + tan 21º

(ii) cos 9º + cot 9º

(iii) cos 18º + tan 18º

10 cos 23° + sin 15°.