

9. TRIGONOMETRIC EQUATIONS

1 x 4 = 4 Marks

 IMP FORMULAS, KEY CONCEPTS 

1) If α is the Principal Value (P.V) of θ satisfying $\sin\theta = k$ then $\alpha \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

2) If α is the Principal Value (P.V) of θ satisfying $\cos\theta = k$ then $\alpha \in [0, \pi]$

3) If α is the Principal Value (P.V) of θ satisfying $\tan\theta = k$ then $\alpha \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

4) Basic Trigonometric equations and their General Solutions:

Basic trigonometric equation

General Solution(G.S)

1) $\sin\theta = 0$

$\theta = n\pi, n \in \mathbb{Z}$

2) $\cos\theta = 0$

$\theta = (2n+1)\frac{\pi}{2}, n \in \mathbb{Z}$

3) $\tan\theta = 0$

$\theta = n\pi, n \in \mathbb{Z}$

4) $\sin\theta = k = \sin\alpha,$
 $-1 \leq k \leq 1, \alpha \in [-\pi/2, \pi/2]$

$\theta = n\pi + (-1)^n \alpha, n \in \mathbb{Z}$

5) $\cos\theta = k = \cos\alpha,$
 $-1 \leq k \leq 1, \alpha \in [0, \pi]$

$\theta = 2n\pi \pm \alpha, n \in \mathbb{Z}$

6) $\tan\theta = k = \tan\alpha,$
 $k \in \mathbb{R}, \alpha \in (-\pi/2, \pi/2)$

$\theta = n\pi + \alpha, n \in \mathbb{Z}$

7) $\sin^2\theta = \sin^2\alpha$
 $\cos^2\theta = \cos^2\alpha$
 $\tan^2\theta = \tan^2\alpha$
 where α is corresponding principal value

$\theta = n\pi \pm \alpha, n \in \mathbb{Z}$

8) In simultaneous trigonometric equations, the principal value ' α ' satisfying both the given equations can be obtained by locating the quadrant in which α lies (observe the signs of the given trigonometric functions.)

$\theta = 2n\pi + \alpha, n \in \mathbb{Z}$