

# 7. TRIGONOMETRIC EQUATIONS

1 x 4 = 4 Marks

 IMP FORMULAS, KEY CONCEPTS 

- 1) If  $\alpha$  is the Principal Value (P.V) of  $\theta$  satisfying  $\sin\theta = k$  then  $\alpha \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
- 2) If  $\alpha$  is the Principal Value (P.V) of  $\theta$  satisfying  $\cos\theta = k$  then  $\alpha \in [0, \pi]$
- 3) If  $\alpha$  is the Principal Value (P.V) of  $\theta$  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)  $\sin\theta = 0$

$\theta = n\pi, n \in Z$

2)  $\cos\theta = 0$

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

3)  $\tan\theta = 0$

$\theta = n\pi, n \in Z$

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

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

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

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

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

$\theta = n\pi + \alpha, n \in Z$

7)  $\sin^2\theta = \sin^2\alpha$   
 $\cos^2\theta = \cos^2\alpha$   
 $\tan^2\theta = \tan^2\alpha$

$\theta = n\pi \pm \alpha, n \in Z$

where  $\alpha$  is corresponding principal value

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

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