

### Chapter 3: Trigonometric functions

#### **Concept:**

Radian measure- relation between degree and radian- trigonometric functions- sign of trigonometric functions- trigonometric functions of sum and difference of two angles- trigonometric equations- sine formula- cosine formula- their applications.

#### **Notes:**

- If in a circle of radius  $r$ , an arc of length ' $l$ ' subtends an angle of  $\theta$  radians then  $l = r\theta$ .
- Radian measure  $= (\pi/180) \times$  degree measure.
- $\sin(-x) = -\sin x$
- $\cos(-x) = \cos x$
- $\cos(2n\pi+x) = \cos x$
- $\sin(2n\pi+x) = \sin x$
- $\sin x = 0$  gives  $x = n\pi$  where  $n \in \mathbf{Z}$
- $\cos x = 0$  gives  $x = (2n+1)\pi/2$  where  $n \in \mathbf{Z}$
- Refer text book for other formulas.

#### **Text book questions**

Ex:3.1

Questions: 1\*, 2\*, 3\*, 6

Ex:3.2

Questions: 6, 7, 8, 9, 10

Ex:3.3

Questions: 5, 6, 7\*, 11, 12\*, 14\*, 15\*, 16,

18, 21\*,

22\*\*, 23\*\*, 24\*, 25\*

Ex:3.4

Questions: 5, 6, 7, 8, 9\*\*

Misc. Ex:

Questions: 2, 3, 5, 6, 7, 8\*, 9\*, 10\*

Examples:

Questions: 24\*\*, 25\*\*, 26\*, 27\*, 29\*\*

#### **Supplementary text**

Ex:3.5  
14\*\*, 15\*\*, 16\*\*

Questions: 1, 3, 6, 7, 10, 11, 13,

Examples:

Questions: 27\*\*, 28\*

### Extra/ HOT Questions

1. The angles of a triangle are in A.P and the greatest angle is double the least. Express the angles in degrees and radians
2. Show that the equation  $\operatorname{cosec} x = 4ab/(a+b)^2$  ( $ab > 0$ ) is possible if  $a=b$
3. Show that a)  $\sin 150 \cos 120 + \cos 330 \sin 660 = -1$

$$\text{b) } \frac{\cos(90+x) \sec(-x) \tan(180-x)}{\sec(360-x) \sin(180+x) \cot(90=x)} = 1$$

4. If  $\tan x = \frac{m}{m+1}$  and  $\tan y = \frac{1}{2m+1}$ , show that  $x+y = 45^\circ$

5. Show that the following:

a)  $\cos 10 \cos 50 \cos 60 \cos 70 = 3/16$

b)  $\sin 10 \sin 50 \sin 60 \sin 70 = \sqrt{3}/16$

c)  $\cos 20 \cos 40 \cos 60 = 1/8$

6. If  $\sin x \sin y = 1/4$  and  $3 \tan x = 4 \tan y$  then prove that  $\sin(x+y) = 7/16$

7. Prove that  $\frac{\sin 11x \sin x + \sin 7x \sin 3x}{\cos 11x \sin x + \cos 7x \sin 3x} = \tan 8x$

8. If  $m \tan(x-30) = n \tan(x+120)$  then show that  $\frac{m-n}{2(m+n)} = \frac{1}{4} \sec 2x$

9. Solve the equation  $4 \sin x \cos x + 2 \sin x + 2 \cos x + 1 = 0$

10. Solve the triangle when  $c=3.4\text{cm}$ ,  $A=25^\circ$ ,  $B=85^\circ$   
[ans;  $a=1.53\text{cm}$ ,  $b=3.6\text{cm}$ ,  $C=80^\circ$ ]

11. Show that for any parallelogram, if  $a$  and  $b$  are the sides of two non parallel sides,  $x$  is the angle between these two sides and  $d$  is the length of the diagonal that has a common vertex with sides  $a$  and  $b$ , then  $d^2 = a^2 + b^2 + 2ab \cos x$