

## Trigonometric Functions

### VERY SHORT ANSWER TYPE – 1 MARK QUESTIONS:

1. Find the degree measure corresponding to the following radian measures (Use  $\pi = \frac{22}{7}$ ):
  - a.  $11^\circ$
  - b.  $\left(\frac{18\pi}{5}\right)$
  - c.  $-3^\circ$
2. Find the radian measure corresponding to the following degree measures:
  - (i)  $-200^\circ$
  - (ii)  $7^\circ 30' 42''$
  - (iii)  $125^\circ 15'$
3. Find the values of the following trigonometric ratios:
  - a.  $\sin 3060^\circ$ ;
  - b.  $\operatorname{cosec}(-1200^\circ)$ ;
  - c.  $\tan(-585^\circ)$ ;
  - d.  $\sin\left(\frac{-14\pi}{3}\right)$ ;
  - e.  $\tan\frac{13\pi}{12}$ .
4. The minute hand of a clock is 10 cm long. How far does the tip of the hand move in 20 minutes?
5. Evaluate:  $\sin 130^\circ \cos 110^\circ + \cos 130^\circ \sin 110^\circ$
6. Find the value of  $\cot 30^\circ \tan 60^\circ \cos 120^\circ \sin 150^\circ$ .
7. Prove that:
  - a.  $\tan 15^\circ + \tan 30^\circ + \tan 15^\circ \tan 30^\circ = 1$ .
  - b.  $\tan A \tan 5A \tan 6A = \tan 6A - \tan 5A - \tan A$ .
  - c.  $\frac{\cos(\pi+x) \cos(-x)}{\sin(\pi-x) \cos\left(\frac{\pi}{2}+x\right)} = \cot^2 x$
  - d.  $\frac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \tan 54^\circ$
  - e.  $\sin a + \sin\left(a + \frac{2\pi}{3}\right) + \sin\left(a + \frac{4\pi}{3}\right) = 0$
  - f.  $\operatorname{cosec}^3 \frac{\pi}{6} \cos \frac{\pi}{3} \tan^2 \frac{\pi}{4} \sin \frac{\pi}{2} \sec^2 \frac{\pi}{4} \cot \frac{\pi}{6} = 8\sqrt{3}$ .
8. Find the principal solutions of the equation : (1)  $\sqrt{3} \operatorname{cosec} x = -2$       (2)  $\tan x = -\frac{1}{\sqrt{3}}$
9. In a right triangle, the difference between two acute angles is  $\frac{\pi}{18}$ . Express the angles in degrees.
10. If the arcs of the same lengths in two circles subtend angles  $45^\circ$  and  $90^\circ$  at the centre, find the ratio of their radii.
11. If  $q$  lies in second quadrant, in which quadrant the following will lie?
  - (1)  $q/2$
  - (2)  $2q$
  - (3)  $-q$ .
12. What is The minimum value of  $\sec^2 \theta + \operatorname{cosec}^2 \theta$  ?
13. If  $2 \cos x + 3 \sin x = a$ , then  $2 \sin x - 3 \cos x = b$ , then evaluate  $a^2 + b^2$ .
14. Without calculating the values of  $\cos 75^\circ$  and  $\cos 15^\circ$ , find the value of  $\cos 75^\circ \cos 15^\circ$ .
15. Given a triangle  $ABC$  with  $AC=8$ ,  $BC=6$  and  $\angle C = 60^\circ$ , find the value of  $AB$ .

### SHORT ANSWER TYPE – 4 MARK QUESTIONS:

16. The angle of a triangle are in AP. The number of degrees in the least is to the number of radians in the greatest as  $60: \pi$ . Find the angles in degrees.
17. The moon's distance from the earth is 360000kms and its diameter subtends an angle of  $31'$  at the eye of the observer. Find the diameter of the moon.
18. Find the angle between the minute hand of a clock and the hour hand when the time is 7:20 AM.

19. The large hand of a big clock is 35cm long. How many cm does its tip move from 8:55am to 9:00 pm.
20. A railway train is travelling on a circular curve of 1500 metres radius at the rate of 66 km/hr. Through what angle in degrees has it turned in 10 seconds?
21. Find  $\tan 15^\circ$  and hence show that  $\tan 15^\circ + \cot 15^\circ = 4$ .
22. Find all other trigonometric functions if  $\sin \theta = -\frac{2\sqrt{6}}{5}$ ,  $\theta$  lies in third quadrant.
23. If  $\tan A = x \tan B$ , prove that  $\frac{\sin(A-B)}{\sin(A+B)} = \frac{x-1}{x+1}$
24. If  $\tan a = \frac{m}{m+1}$  and  $\tan b = \frac{1}{2m+1}$ , show that  $a + b = \frac{\pi}{4}$ ,
25. Prove:
- $\frac{\cos^3 x - \sin^3 x}{\cos x - \sin x} = \frac{1}{2}(2 + 2\sin 2x)$
  - $\frac{\tan 5x + \tan 3x}{\tan 5x - \tan 3x} = 4\cos 2x \cos 4x$
  - $\sqrt{2 + \sqrt{2 + 2\cos 4\theta}} = 2\cos \theta$
  - $\cot x \cot 2x - \cot 2x \cot 3x - \cot 3x \cot x = 1$ .
  - $\cos^2 \frac{\pi}{8} + \cos^2 \frac{3\pi}{8} + \cos^2 \frac{5\pi}{8} + \cos^2 \frac{7\pi}{8} = 2$
  - $\frac{\sin 3A + \sin 5A + \sin 7A + \sin 9A}{\cos 3A + \cos 5A + \cos 7A + \cos 9A} = \tan 6A$
  - $\frac{\sin(\theta + \phi) - 2\sin \theta + \sin(\theta - \phi)}{\cos(\theta + \phi) - 2\cos \theta + \cos(\theta - \phi)} = \tan \theta$
  - $\cos \frac{2\pi}{15} \cos \frac{4\pi}{15} \cos \frac{8\pi}{15} \cos \frac{14\pi}{15} = \frac{1}{16}$
  - $16\sin^5 \theta - 20\sin^3 \theta + 5\sin \theta = \sin 5\theta$ .
26. Solve the following equation:
- $2\cos^2 x - 5\cos x + 2 = 0$ .
  - $\tan 2x = -\cot \left(x + \frac{\pi}{3}\right)$ .
  - $\cos q + \sin q = \cos 2q + \sin 2q$ .
  - $\sin q + \sin 2q + \sin 3q + \sin 4q = 0$ .
  - $\sqrt{2} \sec \theta + \tan \theta = 1$ .
  - $\cos 2x + \sin x = 0$ .
  - $3\tan x + \cot x = 5\operatorname{cosec} x$ .
27. If  $\sin \theta = \frac{3}{5}$ ,  $\cos \varphi = -\frac{12}{13}$  and  $\theta, \varphi$  both lie in II quadrant, find the value of  $\tan(\theta + \varphi)$ .

### LONG ANSWER TYPE – 6 MARKS QUESTIONS:

28. If  $\tan x = \frac{3}{4}$ ,  $\pi < x < \frac{3\pi}{2}$ , Find the values of  $\cos \frac{x}{2}$ ,  $\sin \frac{x}{2}$ ,  $\tan \frac{x}{2}$
29. If  $\cos \theta = \frac{1}{2}\left(x + \frac{1}{x}\right)$ , prove that (i)  $\cos 2\theta = \frac{1}{2}\left(x^2 + \frac{1}{x^2}\right)$ , (ii)  $\cos 3\theta = \frac{1}{2}\left(x^3 + \frac{1}{x^3}\right)$ .
30. If  $\tan \frac{\alpha}{2}$  and  $\tan \frac{\beta}{2}$  are the roots of the equation  $4x^2 - 12x + 3 = 0$ , then evaluate  $\cos(\alpha + \beta)$ .

### ANSWERS:

