TRIGONOMETRY

CLASS XI (2025-26)

SUJITHKUMAR KP 20-6-25

1 Find the value of $\tan\frac{13\pi}{12}$

2 Show that : $\frac{\tan 69° + \tan 66°}{1 - \tan 69°.\ \tan 66°} = -1$

3 Convert $40° 20'$ into radian measure.

4 Express the following angle in radian : $5° 37' 30''$

5 Express the following angle in radian : $450°$

6 Find the value of $sin\ 75°\ cos\ 15° + cos\ 75°\ sin\ 15°$

7 Find the value $of\ \ sin\ 32°\ cos\ 28° + cos\ 32°\ sin\ 28°$

8 Find the value of $cos\ 47°\ sin\ 17° - sin\ 47°\ cos\ 17°$

9 Express the following as sum or difference : $cos\ 5\theta\ cos\ 3\theta$

10 Express the following as sum or difference : $2\ sin\ 5\theta\ sin\ 3\theta$

11 Express each of the following as a product : $sin\ 32° + sin\ 54°$

12 Express each of the following as a product : $cos\ 6\theta + cos\ 4\theta$

13 Evaluate, $sin\ 105° + cos\ 105°$.

14 Show that : $\frac{1}{2}\left(\sqrt{3}\,cos35° - sin35°\right) = \cos 65°$

15 Show that: $\sin(150° + x) + \sin(150° - x) = cosx$.

16 Prove that : $\frac{cos\ 29° + sin29°}{cos29° - sin29°} = tan74°$

17 Prove that : $tan36° = \frac{cos\ 9° - sin\ 9°}{cos\ 9° + sin\ 9°}$

18 If $tanA = \frac{1}{2}$, $tanB = \frac{1}{3}$, find the value of $\tan(2A + B)$.

19 If $tanx = \frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$, find the value of $\sin\frac{x}{2}$.

20 Find the value of $\sqrt{3}\ cosec\ 20^{\circ} - sec20^{\circ}$.

21 Prove that : $tan\ 50° = tan\ 40° + 2\ tan\ 10°$.

22 Prove that : $\cos 2\theta\ \cos\ \frac{\theta}{2} - \cos\ 3\theta \cos\ \frac{9\theta}{2} = \sin 5\theta \sin\frac{5\theta}{2}$.

23 Find the value of the expression $cos^4\frac{\pi}{8} + \cos^4\ \frac{3\pi}{8} + \cos^4\frac{5\pi}{8} + \cos^4\ \frac{7\pi}{8}$.

24 Prove that: $\cos^2 x + \cos^2\left(x + \frac{\pi}{3}\right) + \cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

25 Show that $tan3A - tan2A - tanA = tan3A\ tan2A\ tanA$.

26 Show that : $\frac{cos3A + sin3A}{cosA - sinA} = 1 + 2\ sin2A$

27 Find the value of $2\,sin^2\left(\frac{3\pi}{4}\right) + 2cos^2\left(\frac{3\pi}{4}\right) - 2tan^2\left(\frac{3\pi}{4}\right)$.

28 What is the value of $cos\left(\frac{\pi}{4} - x\right)\ cos\left(\frac{\pi}{4} - y\right) - sin\left(\frac{\pi}{4} - x\right) sin\left(\frac{\pi}{4} - y\right)$

29 Prove that: $\cos^2 x + \cos^2\left(x + \frac{\pi}{3}\right) + \cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

30 Find the value of i) $sin\,15°$. ii) $cos 15°$ iii) $tan 15°$

31 Find the value of the following : $tan\,(-1125°)$

32 Find the value of the following : $sin\,(-330°)$

33 Prove: $tan\,720° - cos\,270° - sin\,150°\,cos\,120° = \frac{1}{4}$

34 Prove: $cos\,570°\,sin\,510° + sin\,(-330°)\,cos\,(-390°) = 0$

35 Prove: $24° + cos\,55° + cos\,125° + cos\,204° + cos\,300° = \frac{1}{2}$.

36 Find the value of $cos\,42°\,cos\,12° + sin\,42°\,sin\,12°$

37 Find the value of $cos\,85°\,cos\,40° + sin\,40°\,sin\,85°$.

38 Find the value of $\frac{\tan 69° + \tan 66°}{1 - \tan 69°.\ \tan 66°} = -1.$

39 Prove the following : $cos\,20° + cos\,100° + cos\,140° = 0.$

40 Prove the following : $sin\,10° + sin\,20° + sin\,40° + sin\,50° = sin\,70° + sin\,80°.$

41 Prove the following : $\frac{sinA + \sin 3A}{\cos A + cos3A} = \tan 2A$

42 Prove the following : $\frac{\sin 7\alpha - \sin\alpha}{\sin 8\alpha - \sin 2\alpha} = \cos 4\alpha . sec 5\alpha$.

43 Prove that: $\cos\left(\frac{3\pi}{4} + x\right) - \cos\left(\frac{3\pi}{4} - x\right) = -\sqrt{2}sinx$

44 Prove that : $\frac{sinx - sin3x}{sin^2x - cos^2x} = 2sinx$

45 If $\sin A = \frac{1}{2}, \cos B = \frac{\sqrt{3}}{2}, where\ \frac{\pi}{2} < A < \pi,\ 0 < B < \frac{\pi}{2}, find\ \tan(A + B)\ and\ \tan(A - B).$

46 If $sinx = \frac{3}{5}$ and $cosy = \frac{-12}{13}$ and x, y both lie in the second quadrant , find the value of:
i. $\sin(x + y)$ ii. $\cos(x + y)$.

47 If $\sin x = \frac{3}{5}$, $\cos y = -\frac{12}{13}$ and x, y both lie in the second quadrant, find the values of $\tan (x + y)$

48 Show that $sin\alpha + \sin\left(\alpha + \frac{2\pi}{3}\right) + \sin\left(\alpha + \frac{4\pi}{3}\right) = 0$

49 Prove that : $\frac{sin3x + sin5x + \sin 7x + sin9x}{\cos 3x + \cos 5x + \cos 7x\ cos9x} = tan6x$

50 Show that : $\sqrt{2 + \sqrt{2 + 2cos4x}} = 2\cos x.$

51 Prove that $(sin\ 3x + sin\ x)\ sin\ x + (cos\ 3x - cos\ x)\ cos\ x = 0$

52 Prove the following : $tan\ 13A - tan\ 7A - tan\ 6A = tan\ 13A\ tan\ 7A\ tan\ 6A$

53 Prove that : $tan\ 80° = tan\ 10° + 2\ tan\ 70°$

54 Prove that : $4\ sin\ \alpha\ .sin\ (60 - \alpha)\ .sin\ (60 + \alpha) = sin\ 3\alpha.$

55 Prove that : $cos\ \alpha\ .cos\ (60 - \alpha)\ cos\ (60 + \alpha) = \frac{1}{4}\ cos\ 3\alpha.$

56 Show that : $cos^2 A + cos^2 B - 2\ cos\ A\ cos\ B\ cos\ (A + B) = sin^2\ (A + B).$

57 Show that : $cos\ A + cos\ (120° - A) + cos\ (120° + A) = 0.$

58 Find the value of $\sqrt{3}\ cosec\ 20^{\circ} - sec 20^{\circ}$.

59 Show that: $\sin(150° + x) + \sin(150° - x) = cosx$.

60 Prove that : $cos\ 4x = 1 - 8\ sin^2 x\ cos^2 x$

61 Prove each of the following : $\frac{\sec 8A - 1}{sec4A - 1} = \frac{tan8A}{tan2A}$

62 $If\ \ \tan(x + y) = \frac{3}{4},\ \tan(x - y) = \frac{8}{15}$ Find i) $tan2x$ ii) $tan2y$

63 Prove that : $tan62° = \frac{cos\ 17° + sin\ 17°}{cos\ 17° - sin\ 17°}$

64 Prove that : $tan74° = \frac{cos\ 29° + sin\ 29°}{cos\ 29° - sin\ 29°}$

65 Prove that : $tan34° = \frac{cos\ 10° - sin\ 10°}{cos\ 10° + sin\ 10°}$

66 Show that : $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2cos8\theta.}}}$ = 2cos θ.

67 Prove that: $sinA.\sin(60 - A)\sin(60 + A) = \frac{1}{4}\sin 3A$

68 Find $\sin\frac{x}{2}$, $\cos\frac{x}{2}$ and $\tan\frac{x}{2}$, if $\tan x = -\frac{4}{3}$, where x lies in 2nd quadrant

69 Prove that $\cos 55° + \cos 65° + \cos 175° = 0$

70 If $sin\ (A - B) = \frac{1}{\sqrt{10}}\ and\ \cos(A + B) = \frac{2}{\sqrt{29}}\ where\ A, B\ lie\ between\ 0\ and\ \frac{\pi}{4}$, find $tan2A$.

71 If $A + B = 45°$ show that: $(1 + tan\ A)\ (1 + tan\ B) = 2$

72 Prove that : $\sqrt{\frac{1+sinA}{1-sinA}} = tan\left(\frac{\pi}{4} + \frac{A}{2}\right)$

73 Show that : $\frac{sin3A}{sinA} - \frac{cos3A}{cosA} = 2.$

74 Prove that: $\frac{sin\ 38° - cos68°}{cos68° + \sin\ 38°} = \sqrt{3}\tan 8°$

75 Prove that : $cos20°cos40°cos80° = \frac{1}{8}$

76. Show that: $\sin(y + z - x) + \sin(z + x - y) + \sin(x + y - z) - \sin(x + y + z) = 4sinx\ siny\ sinz.$

77 Show that: $(\cos\alpha + cos\beta)^2 + (\sin\alpha + sin\beta)^2 = 4\ cos^2\left(\frac{\alpha - \beta}{2}\right)$.

78 Prove that : $\frac{\sin(x+y)}{\sin(x-y)} = \frac{tanx + tany}{tanx - tany}$

79 Prove that : $\sin(40° + A)\cos(10° + A) - \cos(40° + A)\sin(10° + A) = \frac{1}{2}$

80 If $tanA = \frac{m}{m+1}\ and\ tanB = \frac{1}{2m+1}$, then show that A + B = $\frac{\pi}{4}$.

HOME WORK

81 In a circle of diameter 60 cm the length of the chord is 30 cm. Find the length of minor arc corresponding to the chord. Ans: $10\pi\ cms$

82 A circular wheel is rotating at the rate of 450 revolutions per minute. If the radius of the wheel is 70 cm, find the distance covered by a point on the rim in one second. Ans: 3300cms.

83 The angles of a triangle are in the ratio 3: 7: 8 . Find the angle in degrees and in radians.

84. If angles of a triangle are in the ratio 3: 4: 5 find the smallest angle in degrees and the greatest angle in radians. Ans: $45°, \frac{5\pi}{12}$

85 Find the angle in radian through which a pendulum swings if its length is 75 cm and tip describes an arc of length 21 cm. Ans: $\frac{7}{25} rad.$

86 The minute hand of a clock is 1.5 cm long. How far does the tip of the hand move in 50 minutes? Ans: 7.86cms

87
1. Show that : $\sin 780° . \sin 120° + \cos 240°. \sin 390° = \frac{1}{2}$
2. Show that : $\cos 135° . \sin 45° - \cos 45°. \sin 135° + cos 180° = -2$
3. Show that : $\tan 225° . \cot 405° + \tan 405°. \cot 675° = 0$
4. Show that : $sin^2 \frac{\pi}{18} + sin^2 \frac{\pi}{9} + sin^2 \frac{7\pi}{18} + sin^2 \frac{4\pi}{9} = 2$

88 Find all values of $\theta\ such\ that\ 0 \leq \theta \leq 360°\ and\ \cos\theta = \frac{-1}{2}$

89
1. Show that : $\cos\left(\frac{3\pi}{4} + x\right) - \cos\left(\frac{3\pi}{4} - x\right) = -\sqrt{2}\ sinx.$
2. Show that : $\frac{\tan(\frac{\pi}{4} + \theta) + \tan(\frac{\pi}{4} - \theta)}{\tan(\frac{\pi}{4} + \theta) - \tan(\frac{\pi}{4} - \theta)} = cosec\ 2\theta.$
3. If $\tan(A - B) = \frac{7}{24}\ and\ \tan A = \frac{4}{3}$ show that $A + B = \frac{\pi}{2}$.
4. Show that : $\sin(A + B).\ \sin(A - B) = sin^2 A - sin^2 B$ and hence show $sin^2(A + B) - sin^2(A - B) = sin2A\ .sin2B$.
5. Show that: : $\cos(A + B).\ \cos(A - B) = cos^2 A - sin^2 B$
6. Show that: $cos^2\left(\frac{\pi}{4} + x\right) - sin^2\left(\frac{\pi}{4} - x\right)$ is independent of x.
7. Show that: $\cos 20° + cos 100° + cos 140° = 0$

90 Find x, if $\frac{x\ sin^2 300.\ sec^2 240}{cos^2 225\ .cosec^2 240} = cot^2 315.\ tan^2 300$. Ans: $\frac{2}{3}$

91 If $cosx = \frac{4}{5},\ and\ x\ is\ acute$, find the value of $tan2x$.

(A) $\frac{24}{7}$ (B) $\frac{7}{24}$ (C) $\frac{7}{25}$ (D) $-\frac{24}{7}$

ANS: (A) $\frac{24}{7}$