CLASS: XI: MATHEMATICS

TRIGONOMETRY FORMULAES

PRACTICE QUESTIONS ON COMPOUND ANGLES

FORMULA USED

1. $\sin(A+B) = \sin A\cos B + \cos A\sin B$
2. $\sin(A-B) = \sin A\cos B - \cos A\sin B$
3. $\cos(A+B) = \cos A\cos B - \sin A\sin B$
4. $\cos(A-B) = \cos A\cos B + \sin A\sin B$
5. $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A\tan B}$
6. $\tan(A-B) = \dfrac{\tan A - \tan B}{1 + \tan A\tan B}$
7. $\cot(A+B) = \dfrac{\cot A\cot B - 1}{\cot A + \cot B}$
8. $\cot(A-B) = \dfrac{\cot A\cot B + 1}{\cot B - \cot A}$

Some Useful Results:

1. $\sin(A+B).\sin(A-B) = \sin^2 A - \sin^2 B = \cos^2 B - \cos^2 A$
2. $\cos(A+B).\cos(A-B) = \cos^2 A - \sin^2 B = \cos^2 B - \sin^2 A$

1. Evaluate: $(i)\cos 105^0$ $(ii)\tan 75^0 + \cot 75^0$
2. Find the value of (i) $\cos 70^0\cos 10^0 + \sin 70^0\sin 10^0$ (ii) $\cos 130^0\cos 40^0 + \sin 130^0\sin 40^0$
3. Find the value of $\sin 780^0\sin 480^0 + \cos 240^0\cos 300^0$
4. Show that: $\tan 70^0 = 2\tan 50^0 + \tan 20^0$
5. Show that $\tan 75^0 - \tan 30^0 - \tan 75^0\tan 30^0 = 1$
6. Show that $2\tan 70^0 = \tan 80^0 - \tan 10^0$.
7. Prove that $\tan 3A\tan 2A\tan A = \tan 3A - \tan 2A - \tan A$.
8. Prove that : $\dfrac{\sec 8A - 1}{\sec 4A - 1} = \dfrac{\tan 8A}{\tan 2A}$
9. Prove that $\cot x\cot 2x - \cot 2x\cot 3x - \cot 3x\cot x = 1$
10. Prove that: $\dfrac{\cos 8^0 - \sin 8^0}{\cos 8^0 + \sin 8^0} = \tan 37^0$
11. Prove that: $\tan 9^0 = \dfrac{\cos 36^0 - \sin 36^0}{\cos 36^0 + \sin 36^0}$
12. Show that: $\dfrac{\sin(A-B)}{\sin(A+B)} = \dfrac{\tan A - \tan B}{\tan A + \tan B}$

13. Show that: $\frac{\sin(A-B)}{\cos A\cos B}+\frac{\sin(B-C)}{\cos B\cos C}+\frac{\sin(C-A)}{\cos C\cos A}=0$

14. Prove that: $\frac{1+\sin A-\cos A}{1+\sin A+\cos A}=\tan\frac{A}{2}$

15. Prove that: $\sin^2\left(\frac{\pi}{8}+\frac{A}{2}\right)-\sin^2\left(\frac{\pi}{8}-\frac{A}{2}\right)=\frac{1}{\sqrt{2}}\sin A$

16. Show that: $\frac{\cos 11^0+\sin 11^0}{\cos 11^0-\sin 11^0}=\tan 56^0$

17. If $\cos\alpha=-\frac{12}{13},\cot\beta=\frac{24}{7}$, α lies in II quadrant, β lies in III quadrant. Find (i) $\sin(\alpha+\beta)$ (ii) $\cos(\alpha+\beta)$ (iii) $\tan(\alpha+\beta)$

18. If $\tan x=\frac{3}{4},\pi<x<\frac{3\pi}{2}$, find the value of $\sin\frac{x}{2},\cos\frac{x}{2}$ *and* $\tan\frac{x}{2}$

19. Show that $\sin^2(A+B)-\sin^2(A-B)=\sin 2A\sin 2B$

20. Prove that $\sin^2 A=\cos^2(A-B)+\cos^2 B-2\cos(A-B)\cos A\cos B$

21. If A, B, C and D are angles of a cyclic quadrilateral, prove that $\cos A+\cos B+\cos C+\cos D=0$

22. If $3\tan\theta\tan\phi=1$, prove that $2\cos(\theta+\phi)=\cos(\theta-\phi)$.

23. If $\cot\alpha.\cot\beta=2$, show that $\frac{\cos(\alpha+\beta)}{\cos(\alpha-\beta)}=\frac{1}{3}$

24. Show that $\cos^2\frac{\theta-\phi}{2}-\sin^2\frac{\theta+\phi}{2}=\cos\theta.\cos\phi$

25. If $\tan A=\frac{m}{m-1}$ and $\tan B=\frac{1}{2m-1}$, prove that $A-B=\frac{\pi}{4}$.

26. If $\tan\beta=\frac{n\sin\alpha.\cos\alpha}{1-n\sin^2\alpha}$, prove that $\tan(\alpha-\beta)=(1-n)\tan\alpha$.

27. If $\sin x+\sin y=a$ *and* $\cos x+\cos y=b$, show that $\cos(x-y)=\frac{1}{2}(a^2+b^2-2)$.

28. If $\tan\theta+\tan\phi=a$ *and* $\cot\theta+\cot\phi=b$, prove that $\cot(\theta+\phi)=\frac{1}{a}-\frac{1}{b}$.

29. If $\sin(\alpha+\beta)=1$ and $\sin(\alpha-\beta)=\frac{1}{2}$, where $0\le\alpha,\beta\le\frac{\pi}{2}$, find the values of $\tan(\alpha+2\beta)$ and $\tan(2\alpha+\beta)$.

30. If $\tan\frac{\alpha}{2}$ and $\tan\frac{\beta}{2}$ are the roots of the equation $8x^2-26x+15=0$, then find the value of $\cos(\alpha+\beta)$.