COMPOUND ANGLES

SYNOPSIS

- $\sin(A+B) = \sin A\cos B + \cos A\sin B$
- $\sin(A-B) = \sin A\cos B - \cos A\sin B$
- $\sin(A+B)+\sin(A-B) = 2\sin A\cos B$
- $\sin(A+B) - \sin(A-B) = 2\cos A\sin B$
- $\sin(A+B)\sin(A-B) = \sin^2 A - \sin^2 B = \cos^2 B - \cos^2 A$
- $\cos(A+B) = \cos A\cos B - \sin A\sin B$
- $\cos(A-B) = \cos A\cos B + \sin A\sin B$
- $\cos(A+B) + \cos(A-B) = 2\cos A\cos B$
- $\cos(A+B) - \cos(A-B) = -2\sin A\sin B$
- $\cos(A+B)\cos(A-B) = \cos^2 A - \sin^2 B = \cos^2 B - \sin^2 A$
- $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A\ \tan B}$ for

  A,B, $A+B \in R-(2n+1)\dfrac{\pi}{2},\ n\in Z$
- $\tan(A-B) = \dfrac{\tan A - \tan B}{1 + \tan A\tan B}$ for

  $A, B, A-B \in R-(2n+1)\dfrac{\pi}{2},\ n \in Z$
- $\tan(A+B)\tan(A-B) = \dfrac{\tan^2 A - \tan^2 B}{1-\tan^2 A\tan^2 B}$
- $\tan(45^0+\theta) = \dfrac{1+\tan\theta}{1-\tan\theta} = \dfrac{\cos\theta+\sin\theta}{\cos\theta-\sin\theta} = \cot(45^0-\theta)$
- $\tan(45^0-\theta) = \dfrac{1-\tan\theta}{1+\tan\theta} = \dfrac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta} = \cot(45^0+\theta)$
- $\cot(A+B) = \dfrac{\cot A\ \cot B - 1}{\cot B + \cot A}$, for

  A, B, $A+B \in R-n\pi,\ n\in Z$
- $\cot(A-B) = \dfrac{\cot A\ \cot B + 1}{\cot B - \cot A}$, for

  A, B, $A-B \in R-n\pi,\ n\in Z$
- $\cot(A+B)\cot(A-B) = \dfrac{\cot^2 A\cot^2 B - 1}{\cot^2 B - \cot^2 A}$
- $\sin(A+B+C) = \sin A\cos B\cos C + \cos A\sin B\cos C + \cos A\cos B\sin C - \sin A\sin B\sin C$
- $\cos(A+B+C) = \cos A\cos B\cos C - \cos A\sin B\sin C - \sin A\cos B\sin C - \sin A\sin B\cos C$
- $\tan(A+B+C) = \dfrac{\tan A+\tan B+\tan C-\tan A\tan B\tan C}{1-\tan A\tan B-\tan B\tan C-\tan C\tan A}$
- $\cot(A+B+C) = \dfrac{\cot A+\cot B+\cot C-\cot A\cot B\cot C}{1-\cot A\cot B-\cot B\cot C-\cot C\cot A}$
- $\sin 15^0 = \dfrac{\sqrt{3}-1}{2\sqrt{2}} = \cos 75^0$
- $\cos 15^0 = \dfrac{\sqrt{3}+1}{2\sqrt{2}} = \sin 75^0$
- $\tan 15^0 = 2-\sqrt{3} = \cot 75^0$
- $\cot 15^0 = 2+\sqrt{3} = \tan 75^0$
- $\sec 15^0 = \sqrt{6}-\sqrt{2} = \operatorname{cosec} 75^0$
- $\operatorname{cosec} 15^0 = \sqrt{6}+\sqrt{2} = \sec 75^0$
- $\tan A + \tan B + \tan(A+B)\tan A\tan B = \tan(A+B)$

LEVEL-I

1. $\sin 20^0 + \sin 40^0 - \sin 80^0 =$
   1. -1 2. 1 3. 2 4. 0
2. $\sin\alpha - \sin(120^0-\alpha) + \sin(120^0+\alpha) =$
   1. 1/2 2. 1 3. 3/2 4. 0
3. $\sin 20^0 - \sin 100^0 + \sin 140^0 =$
   1. 0 2. 1/2 3. 1 4. 3/2
4. $\sin 40^0 - \sin 80^0 + \sin 160^0 =$
   1. 0 2. -1 3. 1 4. 1/2
5. $\cos A + \cos(120^0+A) + \cos(120^0-A) =$
   1. 1 2. -1 3. 0 4. 2
6. $\cos 20^0 + \cos 100^0 + \cos 140^0 =$
   1. 0 2. 1 3. 2 4. 3
7. $\cos 42^0 + \cos 78^0 + \cos 162^0 =$
   1. 1 2. -1 3. 0 4. 2
8. $\cos 35^0 + \cos 85^0 + \cos 155^0 =$
   1. -1 2. 0 3. 1 4. 1/2
9. $\sin A - \sin(240^0-A) + \sin(240^0+A) =$
   1. 1 2. 2 3. 3 4. 0
10. $\sin 40^0 - \sin 200^0 + \sin 280^0 =$
    1. -1 2. 1 3. 0 4. 2

11. $\cos A+\cos\left(240^0+A\right)+\cos\left(240^0-A\right)=$

1. 0 2. 1 3. 2 4. -1

12. $\tan 18^0+\tan 27^0+\tan 18^0\tan 27^0=$

1. -1 2. 0 3. 1 4. 2

13. $\tan 40^0+\tan 80^0-\sqrt{3}\tan 40^0\tan 80^0=$

1. $\sqrt{3}$ 2. $-\sqrt{3}$ 3. $\frac{1}{\sqrt{3}}$ 4. $-\frac{1}{\sqrt{3}}$

14. $\sqrt{3}(\tan 11^0+\tan 19^0)+\tan 11^0\tan 19^0=$

1. 1 2. -1 3. $\sqrt{3}$ 4. $-\sqrt{3}$

15. $\tan 65^0-\tan 20^0-\tan 65^0\tan 20^0=$

1. -1 2. 1 3. $\sqrt{3}$ 4. $-\sqrt{3}$

16. $\tan 20^0-\tan 80^0+\sqrt{3}\tan 20^0\tan 80^0=$

1. $\sqrt{3}$ 2. $\frac{1}{\sqrt{3}}$ 3. $-\sqrt{3}$ 4. $-\frac{1}{\sqrt{3}}$

17. $\tan 4x+\tan 5x-\tan 9x=k\tan 4x\tan 5x\tan 9x$
$\Rightarrow k=$

1. 1 2. -1 3. ± 1 4. 2

18. $\tan 8x-\tan 5x-\tan 3x=m\tan 8x\tan 5x\tan 3x$
$\Rightarrow m=$

1. 1 2. -1 3. ± 1 4. $-\sqrt{3}$

19. $\tan 25^0+\tan 35^0-\sqrt{3}=k\tan 25^0\tan 35^0\Rightarrow k=$

1. 1 2. -1 3. $\sqrt{3}$ 4. $-\sqrt{3}$

20. $\tan 20^0-\tan 80^0+\sqrt{3}=$

1. $\tan 20^0\tan 80^0$ 2. $-\tan 20^0\tan 80^0$
3. $\sqrt{3}\tan 20^0\tan 80^0$ 4. $-\sqrt{3}\tan 20^0\tan 80^0$

21. $a=\tan 25^0+\tan 35^0-\sqrt{3}$,
$b=\cot 25^0+\cot 35^0+\sqrt{3}\Rightarrow ab=$

1. 3 2. 1/3 3. -3 4. -1/3

22. $\tan 35^0+2\tan 20^0=\tan x\Rightarrow x=$

1. 15^0 2. 5^0 3. 55^0 4. 50^0

23. $\tan 40^0+2\tan 10^0=\cot x\Rightarrow x=$

1. 75^0 2. 85^0 3. 30^0 4. 40^0

24. $\tan 50^0-2\tan 10^0=$

1. $\tan 50^0$ 2. $\cot 50^0$ 3. $\tan 10^0$ 4. $\cot 10^0$

25. $\tan 100^0+2\tan 70^0=$

1. $\tan 10^0$ 2. $\cot 10^0$
3. $-\tan 10^0$ 4. $-\cot 10^0$

26. $\tan 70^0-\tan 20^0=k\cot 40^0\Rightarrow k=$

1. 1 2. 2 3. -1 4. -2

27. $\frac{\cos 9^0+\sin 9^0}{\cos 9^0-\sin 9^0}=\tan x\Rightarrow x=$

1. 45^0 2. 54^0 3. 27^0 4. 18^0

28. $\frac{\cos 15^0+\sin 15^0}{\cos 15^0-\sin 15^0}=$

1. 1 2. $\sqrt{3}$ 3. $\frac{1}{\sqrt{3}}$ 4. $2+\sqrt{3}$

29. $0<\theta<\frac{\pi}{2},\tan\theta=\frac{\cos 29^0+\sin 29^0}{\cos 29^0-\sin 29^0}\Rightarrow\theta=$

1. 16^0 2. 74^0 3. 37^0 4. 8^0

30. $\frac{\tan 225^0-\cot 81^0\cot 69^0}{\cot 261^0+\tan 21^0}=$

1. 1 2. $\frac{1}{\sqrt{2}}$ 3. $\sqrt{3}$ 4. $\frac{1}{\sqrt{3}}$

31. $\frac{\tan 69^0+\tan 66^0}{1-\tan 69^0\tan 66^0}=$

1. 1 2. -1 3. $\sqrt{3}$ 4. $-\sqrt{3}$

32. $\frac{\tan 40^0+\tan 20^0}{\cot 45^0-\cot 50^0\cot 70^0}=$

1. $\sqrt{3}$ 2. $1/\sqrt{3}$ 3. 1 4. $-1/\sqrt{3}$

33. $\frac{\tan 40^0+\tan 20^0}{\tan 225^0-\cot 70^0\cot 50^0}=$

1. $\sqrt{3}$ 2. $1/\sqrt{3}$ 3. 1 4. 0

34. $\frac{1-\tan 2^0\cot 62^0}{\tan 152^0-\cot 88^0}=K\sqrt{3}\Rightarrow K=$

1. 1 2. -1 3. 1/2 4. -1/2

35. In a Δ ABC, A is obtuse, $\sin A=\frac{3}{5}$, $\sin B=\frac{5}{13}$ then $\sin C=$

1. $\frac{33}{65}$ 2. $\frac{16}{65}$ 3. $\frac{4}{5}$ 4. $\frac{12}{13}$

36. If $\cos A=\frac{5}{13}$, $\tan B=-\frac{15}{8}$, $270^0<A<360^0$, $90^0<B<180^0$, then the quadrant to which A + B belongs is

1. IV 2. III 3. II 4. I

37. $\tan A = 1/3, \tan B = 1/7 \Rightarrow 2A+B =$

1. $\frac{\pi}{3}$ 2. $\frac{\pi}{4}$ 3. $\frac{\pi}{2}$ 4. $\frac{3\pi}{2}$

38. $\sin A = \frac{12}{13}, \cos B = -\frac{3}{5};$

$0 < A < \frac{\pi}{2}, \pi < B < \frac{3\pi}{2} \Rightarrow \sin(A+B) =$

1. $\frac{33}{65}$ 2. $-\frac{1}{63}$ 3. $-\frac{56}{65}$ 4. $\frac{63}{65}$

39. $0<A, B<\frac{\pi}{2},$

$Sin A = \frac{1}{\sqrt{10}}, \; Sin B = \frac{1}{\sqrt{5}} \Rightarrow A+B =$

1. $\frac{3\pi}{4}$ 2. $\frac{2\pi}{3}$ 3. $\frac{\pi}{4}$ 4. $\frac{\pi}{3}$

40. $\cos A = \frac{13}{14}, \cos B = \frac{1}{7}, 0 < A,B < \frac{\pi}{2} \Rightarrow A-B=$

1. $\frac{\pi}{6}$ 2. $\frac{\pi}{4}$ 3. $\frac{\pi}{2}$ 4. $\frac{\pi}{3}$

41. $0 < A,B < \frac{\pi}{4}, \cos(A+B) = \frac{4}{5},$

$\sin(A-B) = \frac{5}{13} \Rightarrow \tan 2A =$

1. $\frac{16}{63}$ 2. $\frac{56}{33}$ 3. $\frac{1}{65}$ 4. $\frac{45}{77}$

42. $\tan A = \frac{1}{2}, \tan B = \frac{1}{3} \Rightarrow \tan(A+B) =$

1. 1 2. -1 3. $\sqrt{3}$ 4. $1/\sqrt{3}$

43. $\tan A = \frac{17}{18}, \tan B = \frac{1}{35} \Rightarrow \cos(A+B) =$

1. 1 2. $\sqrt{2}$ 3. -1 4. $1/\sqrt{2}$

44. $\tan(A+B) = m, \tan(A-B) = n \Rightarrow \tan 2A =$

1. $\frac{m+n}{1-mn}$ 2. $\frac{m-n}{1+mn}$ 3. $\frac{m+n}{1+mn}$ 4. $\frac{m-n}{1-mn}$

45. $\tan(A+B) = m, \tan(A-B) = n \Rightarrow \cot 2B =$

1. $\frac{m+n}{1-mn}$ 2. $\frac{1+mn}{m-n}$ 3. $\frac{1-mn}{m+n}$ 4. $\frac{m-n}{1-mn}$

46. $\frac{\tan A+\tan B}{\tan(A+B)} + \frac{\tan A-\tan B}{\tan(A-B)} =$

1. 0 2. 1 3. 2 4. 1/2

47. $\sin(\theta+\alpha) = \cos(\theta+\alpha) \Rightarrow \tan\theta =$

1. $\frac{1-\tan\alpha}{1+\tan\alpha}$ 2. $\frac{1+\tan\alpha}{1-\tan\alpha}$

3. $\frac{1+\sin\alpha}{1-\sin\alpha}$ 4. $\frac{1+\text{Cos}\alpha}{1-\text{Cos}\alpha}$

48. $\tan A = \frac{n}{n+1}, \tan B = \frac{1}{2n+1} \Rightarrow A+B =$

1. 30^0 2. 45^0 3. 60^0 4. 90^0

49. If $\tan A = 1, \tan B = 2, \tan C = 3$ then $A+B+C=$

1. $\frac{n\pi}{2}, n \in Z$ 2. $n\pi, n \in Z$

3. $\frac{n\pi}{4}, n \in Z$ 4. $\frac{2n\pi}{3}, n \in z$

50. $\sin 463^0 . \text{Cos } 373^0 + \text{Cos } 823^0 . \text{Sin } 193^0 =$

1. 0 2. 1/2 3. $\frac{\sqrt{3}}{2}$ 4. 1

51. $\cos(n+1)A\cos(n+2)A + \sin(n+1)A\sin(n+2)A =$

1. cos nA 2. cosA 3. cos2nA 4. cos 2A

52. $\cos(45^0-A)\cos(45^0-B) - \sin(45^0-A)\sin(45^0-B) =$

1. sin(A-B) 2. sin(A+B)
3. cos(A+B) 4. cos(A-B)

53. $\tan 75^0 + \cot 75^0 =$

1. 1 2. 2 3. 3 4. 4

54. $\sin 105^0 + \cos 105^0 =$

1. $1/\sqrt{2}$ 2. $-1/\sqrt{2}$ 3. 0 4. 1

55. $\tan 15^0 - \cot 15^0 =$

1. -4 2. $2\sqrt{3}$ 3. 4 4. $-2\sqrt{3}$

56. $\cot 15^0 + \cot 75^0 + \cot 135^0 - \text{cosec } 30^0 =$

1. 4 2. 3 3. 2 4. 1

57. $\text{Cos}^2 45^0 - \text{Sin}^2 15^0 =$

1. $\frac{\sqrt{3}}{2}$ 2. $\frac{1}{2}$ 3. $\frac{\sqrt{3}}{4}$ 4. $\frac{1}{\sqrt{3}}$

58. $\cos^2 52\frac{1}{2}^0 - \sin^2 22\frac{1}{2}^0 =$

1. $\frac{\sqrt{3}+1}{4\sqrt{2}}$ 2. $\frac{\sqrt{3}-1}{4\sqrt{2}}$

3. $\frac{3+\sqrt{3}}{4\sqrt{2}}$ 4. $\frac{3-\sqrt{3}}{4\sqrt{2}}$

59. $\sin^2 52\frac{1}{2}^0 - \sin^2 22\frac{1}{2}^0 =$

1. $\frac{\sqrt{3}+1}{4\sqrt{2}}$ 2. $\frac{\sqrt{3}-1}{4\sqrt{2}}$

3. $\frac{3+\sqrt{3}}{4\sqrt{2}}$ 4. $\frac{3-\sqrt{3}}{4\sqrt{2}}$

60. $\cot\left(\frac{\pi}{4}+\theta\right)\cot\left(\frac{\pi}{4}-\theta\right) =$

1. 0 2. -1 3. 1 4. 1/2

61. $\tan\left(\frac{\pi}{4}+\theta\right)\tan\left(\frac{3\pi}{4}+\theta\right) =$

1. 1 2. -1 3. 2 4. -2

62. $\alpha+\beta=\frac{\pi}{4} \Rightarrow (1+\tan\alpha)(1+\tan\beta) =$

1. 1 2. -1 3. 2 4. -2

63. $(1+\tan 18^0)(1+\tan 27^0) =$

1. 1 2. -1 3. 2 4. -2

64. $\frac{(1+\tan 13^0)(1+\tan 32^0)}{(1+\tan 12^0)(1+\tan 33^0)} =$

1. 1 2. 2 3. 3 4. 4

65. $\frac{(1+\tan 21^0)(1+\tan 24^0)}{(1+\tan 22^0)(1+\tan 23^0)} =$

1. 1 2. 2 3. 3 4. 4

66. $A+B=135^0 \Rightarrow (1+\cot A)(1+\cot B) =$

1. 1 2. 2 3. 3 4. 4

67. $\alpha+\beta=\frac{3\pi}{4} \Rightarrow (1-\tan\alpha)(1-\tan\beta) =$

1. 0 2. -1 3. 2 4. 1

68. $A+B=225^0 \Rightarrow \frac{(1+\cot A)(1+\cot B)}{\cot A \cot B} =$

1. 1 2. 2 3. 3 4. 4

69. $x+y=(4n+1)\frac{\pi}{4}, n\in Z \Rightarrow (1+\tan x)(1+\tan y) =$

1. 1 2. -1 3. 2 4. -2

70. $x+y=(4n+3)\frac{\pi}{4}, n\in Z \Rightarrow \frac{(1+\tan x)(1+\tan y)}{\tan x \tan y} =$

1. 1 2. 2 3. 3 4. 4

71. $\cos(A-B) = 3\cos(A+B) \Rightarrow \tan A \tan B =$

1. 2 2. 3/2 3. 1 4. 1/2

72. $\sum[\sin(A+B).\sin(A-B)] =$

1. 0 2. 1 3. 2 4. 1/2

73. $\sum\left[\frac{\sin(A-B)}{\cos A \cos B}\right] =$

1. 0 2. 1 3. 2 4. 1/2

74. $\sum\left[\frac{\sin(A+B)\sin(A-B)}{\sin^2 A \sin^2 B}\right] =$

1. 0 2. 1 3. 2 4. 1/2

75. $\sum\left[\frac{\sin(A+B)\sin(A-B)}{\cos^2 A \cos^2 B}\right] =$

1. 0 2. 1 3. 2 4. 1/2

76. $A+B+C = 180^0 \Rightarrow$
Cosec A [Sin B cos C + cos B sin C] =

1. 1 2. -1 3. 0 4. 2

77. $A+B+C = 180^0 \Rightarrow$
Sec A [cos B cos C - Sin B sin C]

1. 1 2. -1 3. 0 4. 2

78. $A+B+C=90^0 \Rightarrow \sum\frac{\cos(A+B)}{\cos A \cos B} =$

1. 4 2. 3 3. 2 4. 1

79. If $A+B+C=180^0$, $\tan\frac{A}{2}=\frac{5}{6}$, and

$\tan\frac{B}{2}=\frac{20}{37}$ then $\tan\frac{C}{2}=$

1. $\frac{5}{2}$ 2. $\frac{307}{122}$ 3. $\frac{7}{4}$ 4. $\frac{2}{5}$

80. $A+B+C=\pi \Rightarrow \tan A+\tan B+\tan C=$

1. $\sin A\sin B\sin C$ 2. $\cos A\cos B\cos C$
3. $\tan A\tan B\tan C$ 4. $\cot A\cot B\cot C$

81. $A+B+C=\frac{\pi}{2}\Rightarrow$

$\tan A\tan B+\tan B\tan C+\tan C\tan A=$

1. 1 2. -1 3. 0 4. 2

82. tan (A-B) + tan (B-C) + tan (C-A)=

1. tan A tan B tan C 2. cot A cot B Cot C
3. tan (A-B) tan (B-C) tan (C-A) 4. 0

83. tan 5x - tan 3x - tan 2x =

1. tan 5x tan 3x tan 2x

2. $\frac{\sin 5x-\sin 3x-\sin 2x}{\cos x}$

3. 0 4.- tan 5x tan3x tan 2x

84. $A+B+C=0^0\Rightarrow \tan A+\tan B+\tan C=$

1. $\sin A\sin B\sin C$ 2. $\cos A\cos B\cos C$
3. $\tan A\tan B\tan C$ 4. $\cot A\cot B\cot C$

85. $A+B+C=360^0\Rightarrow \tan\frac{A}{2}+\tan\frac{B}{2}+\tan\frac{C}{2}=$

1. $\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

2. $\cos\frac{A}{2}\cos\frac{B}{2}\cos\frac{C}{2}$

3. $\tan\frac{A}{2}\tan\frac{B}{2}\tan\frac{C}{2}$

4. $\cot\frac{A}{2}\cot\frac{B}{2}\cot\frac{C}{2}$

86. $\tan 27^0\tan 32^0+\tan 32^0\tan 31^0+\tan 31^0\tan 27^0=$

1. 1 2. 2 3. 3 4. 4

87. $A+B+C=360^0$,

$\cot\frac{A}{4}+\cot\frac{B}{4}+\cot\frac{C}{4}=k\cot\frac{A}{4}\cot\frac{B}{4}\cot\frac{C}{4}\Rightarrow k=$

1. 4 2. 3 3. 2 4. 1

88. $A+B+C=\frac{\pi}{2}\Rightarrow \cot A+\cot B+\cot C=$

1. $\sin A\sin B\sin C$ 2. $\cos A\cos B\cos C$
3. $\tan A\tan B\tan C$ 4. $\cot A\cot B\cot C$

89. $A+B+C=180^0\Rightarrow \sum\left(\frac{\cot A+\cot B}{\tan A+\tan B}\right)=$

1. -1 2. 0 3. 1 4. 2

90. In a Δ^{le} ABC, if $\cot A+\cot B+\cot C=\sqrt{3}$,

then Δ^{le} ABC is

1. an equilateral triangle
2. a right angled triangle
3. an isosceles triangle
4. a right angled isosceles triangle

91. A+C = B => tan A tan B tan C =

1. tan A + tan B + tan C
2. tan B-tan C - tan A
3. tan C + tan A-tan B
4. -[tanA+tanB+tanC]

92. $A+B=300^0\Rightarrow\left(1+\sqrt{3}\cot A\right)\left(1+\sqrt{3}\cot B\right)=$

1. 4 2. 3 3. 2 4. 1

93. $\frac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}=\frac{a+b}{a-b}\Rightarrow\frac{\tan\alpha}{\tan\beta}=$

1. $\frac{a}{b}$ 2. $\frac{b}{a}$ 3. $\frac{a}{2b}$ 4. $-\frac{a}{b}$

94. $\tan\theta_1=k\cot\theta_2\Rightarrow\frac{\cos(\theta_1-\theta_2)}{\cos(\theta_1+\theta_2)}=$

1. $\frac{1+k}{1-k}$ 2. $\frac{1-k}{1+k}$ 3. $\frac{k+1}{k-1}$ 4. $\frac{k-1}{k+1}$

95. Cot A Cot B =2, Cos (A+B) = 3/5 $\Rightarrow$ sinA.sin B=

1. 2/5 2. 1/5 3. 4/5 4. 3/5

96. $\cos(x-y)=3\cos(x+y)\Rightarrow \cot x\cot y=$

1. 1 2. 2 3. 3 4. 4

97. $\sin x\cos y=\frac{1}{4},3\tan x=4\tan y\Rightarrow \sin(x-y)=$

1. $\frac{1}{16}$ 2. $\frac{7}{16}$ 3. $\frac{3}{4}$ 4. $\frac{3}{16}$

98. If A and B are acute angles, $\sin A=\frac{1}{5\sqrt{2}}$ and $\tan B=\frac{1}{3}$ then A+2B=

1. $\frac{\pi}{2}$ 2. $\frac{\pi}{3}$ 3. $\frac{\pi}{4}$ 4. $\frac{\pi}{6}$

99. $0<\theta<\frac{\pi}{2},2\sin\theta=\sqrt{3}\cos 10^0+\sin 10^0$

$\Rightarrow \theta=$

1. 50^0 2. 70^0 3. 40^0 4. 80^0

100. $\sin^2\theta+\sin^2(\theta+60^0)+\sin^2(\theta-60^0)=$

1. 1/2 2. 3/2 3. 1 4. 0

101. $\sin^2 27^0+\sin^2 87^0+\sin^2 33^0=$

1. 1/2 2. 3/2 3. 1 4. 0

102. $\cos^2\theta+\cos^2(60^0-\theta)+\cos^2(60^0+\theta)=$

1. 1/2 2. 3/2 3. 1 4. 0

103. $\cos^2 20^0+\cos^2 40^0+\cos^2 80^0=$

1. 1/2 2. 3/2 3. 1 4. 0

104. $\sin^2\alpha+\sin^2(120^0+\alpha)+\sin^2(120^0-\alpha)=$

1. 1/2 2. 3/2 3. 1 4. 0

105. $\cos^2\alpha+\cos^2(120^0+\alpha)+\cos^2(120^0-\alpha)=$

1. 1/2 2. 3/2 3. 1 4. 0

KEY

1. 4	2. 4	3. 1	4. 1	5. 3
6. 1	7. 3	8. 2	9. 4	10 3
11. 1	12. 3	13. 2	14. 1	15. 2
16. 3	17. 2	18. 1	19. 4	20. 4
21. 3	22. 3	23. 4	24. 2	25. 3
26. 2	27.2	28. 2	29. 2	30. 3
31. 2	32. 1	33. 1	34. 2	35. 2
36. 4	37. 2	38. 3	39. 3	40 .4
41. 2	42. 1	43. 4	44. 1	45. 2
46. 3	47. 1	48. 2	49. 2	50.1
51. 2	52. 2	53. 4	54. 1	55. 4
56. 4	57. 3	58. 4	59. 1	60 .3
61. 1	62 .3	63. 3	64. 1	65. 1
66. 2	67. 3	68. 2	69. 3	70. 2
71. 4	72. 1	73. 1	74. 1	75. 1
76. 1	77. 2	78. 3	79. 4	80. 3
81.1	82. 3	83. 1	84.3	85. 3
86. 1	87. 4	88. 4	89.3	90. 1
91. 2	92. 1	93. 1	94. 1	95. 4
96. 2	97. 1	98. 3	99. 2	100. 2
101. 2	102. 2	103. 2	104. 2	105. 2

HINTS

21. $\tan 25^0+\tan 35^0+\sqrt{3}\tan 25^0\tan 35^0=\sqrt{3}$

$\therefore a=-\sqrt{3}\tan 25^0\tan 35^0$,multiply 'a' and 'b'

25. If $2A+B=$ odd multiple of 90^0 then $\tan A+2\tan B=\tan(A+B)$

42. $\tan A=\frac{p}{q},\tan B=\frac{q-p}{q+p}\Rightarrow A+B=\frac{\pi}{4}$.

93. apply componendo and dividendo.

LEVEL-II

1. $2\tan A\tan B = 1 \Rightarrow \frac{\cos(A-B)}{\cos(A+B)} =$

   1. 1 2. 2 3. 3 4. 4

2. $\frac{\cos(A-B)}{\cos(A+B)} + \frac{\cos(C+D)}{\cos(C-D)} = 0 \Rightarrow$

   $\tan A\tan B\tan C\tan D =$

   1. 0 2. 1 3. -1 4. 2

3. $\frac{\cos(A-B)}{\cos(A+B)} + \frac{\cos(C+D)}{\cos(C-D)} = 0 \Rightarrow$

   $\tan A\tan B\tan C =$

   1. tan D 2. cot D 3. -tan D 4. -cot D

4. $\frac{\cos(A+B)}{\cos(A-B)} + \frac{\cos(C-D)}{\cos(C+D)} = 0 \Rightarrow$

   $\cot A\cot B\cot C\cot D =$

   1. -1 2. 0 3. 1 4. 2

5. $\frac{\cos(A+B)}{\cos(A-B)} + \frac{\cos(C-D)}{\cos(C+D)} = 0 \Rightarrow$

   $\cot A\cot B\,\text{Cot}\,C =$

   1. tan D 2. cot D 3. -tan D 4. -cot D

6. $\tan\theta + \cot\theta = 3 \Rightarrow \tan^4\theta + \cot^4\theta =$

   1. 47 2. 162 3. 24 4. 48

7. $\text{Cot}\,B = 2\tan(A-B) \Rightarrow 2\tan B + \text{Cot}\,B =$

   1. tan A 2. Cot A
   3. 2 tan A 4. 2 Cot A

8. $\tan(45^0+A)+\tan(45^0-A) =$

   1. 2 cosec 2A 2. 2 sec 2A
   3. 2 tan 2A 4. 2 cot 2A

9. $\sec(45^0+A)\sec(45^0-A) =$

   1. sec 2A 2. cos 2A
   3. 2 cos 2A 4. 2 sec 2A

10. $\frac{\cos(45^0+A)-\cos(45^0-A)}{\sin(120^0+A)-\sin(120^0-A)} =$

    1. 2 2. -2 3. $\sqrt{2}$ 4. $-\sqrt{2}$

11. $\frac{1}{\sin 10^0} - \frac{\sqrt{3}}{\cos 10^0} =$

    1. 4 2. 3 3. 2 4. -1

12. $\sqrt{3}\,\text{cosec}\,20^0 - \sec 20^0 =$

    1. 2 2. 3 3. 1 4. 4

13. $\frac{1}{\cos 290^0} + \frac{1}{\sqrt{3}\sin 250^0} =$

    1. $\frac{4}{\sqrt{3}}$ 2. $\frac{2}{\sqrt{3}}$ 3. $\frac{2\sin 50^0}{\sin 40^0}$ 4. 0

14. If $\alpha+\beta = \frac{\pi}{2}$ and $\beta+\gamma = \alpha$ then $\tan\alpha =$

    1. $2(\tan\beta+\tan\gamma)$ 2. $\tan\beta+\tan\gamma$
    3. $\tan\beta+2\tan\gamma$ 4. $2\tan\beta+\tan\gamma$

15. If $\tan\alpha, \tan\beta$ are the roots of the equation $x^2+px+q=0(p\neq 0)$ then

    1. $\tan(\alpha+\beta) = \frac{1-q}{p}$

    2. $\tan(\alpha+\beta) = \frac{-p}{q-1}$

    3. $\tan(\alpha+\beta) = \frac{p}{q-1}$

    4. $\cot(\alpha+\beta) = p$

16. $\tan\alpha = \frac{m}{m-1}, \tan\beta = \frac{1}{2m-1}, \Rightarrow \alpha-\beta =$

    1. $\pi/2$ 2. $\pi/4$ 3. π 4. $\pi/6$

17. $x=\tan A, y=\tan B, z=\tan C$, and $x+y+z=xyz \Rightarrow A+B+C =$

    1. $\frac{n\pi}{3}$ 2. $\frac{n\pi}{2}$ 3. $n\pi$ 4. $\frac{n\pi}{4}$

18. If $\sin(A+B+C)=1$ and $\sec(A+C)=2$, A,B,C being acute angles then B=

    1. 90^0 2. 45^0 3. 30^0 4. 60^0

19. If $A+B+C=\pi$ and $\cos A = \cos B\cos C$ then the value of $\tan A$ in terms of B and C is

    1. $\tan B\tan C$ 2. $\tan B+\tan C$
    3. $\tan B-\tan C$ 4. $\tan C-\tan B$

KEY

1. 3	2. 3	3. 4	4. 1	5. 3
6. 1	7. 1	8. 2	9. 4	10. 3
11. 1	12. 4	13. 1	14. 3	15. 3
16. 2	17. 3	18. 3	19. 2	

HINTS

6. $\tan^2\theta+\cot^2\theta=9-2=7$

$\tan^4\theta+\cot^4\theta=7^2-2$

14. $\dfrac{\tan\beta+\tan\gamma}{1-\tan\beta\tan\gamma}=\tan\alpha$

$\Rightarrow \tan\beta+\tan\gamma=\tan\alpha-\tan\gamma\,(\text{Q }\tan\alpha.\tan\beta=1)$

19. $\sin A=\sin B\cos C+\cos B\sin C$

divide with $\cos A$, $\tan A=\tan B+\tan C$

LEVEL - III

1. If $\tan B=\dfrac{2\sin A\sin C}{\sin(A+C)}$ then

$\tan A,\ \tan B,\ \tan C$ are in

1. A.P 2. G,P 3. H.P 4. AGP

2. If $\alpha+\beta+\gamma=\dfrac{\pi}{2}$ and $\cot\alpha,\ \cot\beta,\ \cot\gamma$ are in A.P. then the value of $\cot\alpha.\cot\gamma$ is

1. 1 2. 2 3. 3 4. 4

3. If $\tan A=\dfrac{x\sin B}{1-x\cos B}$ and $\tan B=\dfrac{y\sin A}{1-y\cos A}$

then $\dfrac{\sin A}{\sin B}=$

1. $\dfrac{x}{y}$ 2. $\dfrac{y}{x}$ 3. $x+y$ 4. $x-y$

4. $\dfrac{\sin(\theta+\alpha)}{\cos(\theta-\alpha)}=\dfrac{1-m}{1+m}\Rightarrow\tan\left(\dfrac{\pi}{4}-\theta\right)\tan\left(\dfrac{\pi}{4}-\alpha\right)=$

1. $\dfrac{1}{m}$ 2. m 3. $\dfrac{2}{m}$ 4. $2m$

5. $\cos(x-y)+\cos(y-z)+\cos(z-x)=-\dfrac{3}{2}$

$\Rightarrow\sum(\cos x)=$

1. 0 2. 1 3. 2 3. 3

6. In a Δ^{le} ABC, if $\cos A\cos B\cos C=\dfrac{1}{3}$, then the value of $\tan A\tan B+\tan B\tan C+\tan C\tan A$ is

1. 1 2. 4/3 3. 4 4. 3

7. In a Δ^{le} ABC, if $\sin A\sin B\sin C=\dfrac{1}{3}$ then the value of $\cot A\cot B+\cot B\cot C+\cot C\cot A$ is

1. 1 2. 4/3 3. 4 4. 3

KEY

1. 3 2. 3 3. 1 4. 2 5. 1
6. 3 7. 1

HINTS

1. $(\sin A\cos C+\cos A\sin C)\sin B$

$=\cos B(2\sin A\sin C)$

divide with $\sin A\sin B\sin C$

2. $\dfrac{\cot\alpha.\cot\gamma-1}{\cot\gamma+\cot\alpha}=\cot\left(\dfrac{\pi}{2}-\beta\right)$

$\Rightarrow\cot\alpha.\cot\gamma=1+\tan\beta.2\cot\beta=3$

3. $\dfrac{\sin A}{\cos A}=\dfrac{x\sin B}{1-x\cos B}$

$\Rightarrow\sin A=x(\sin A\cos B+\cos A\sin B)$

$\Rightarrow\sin A=x\sin(A+B)$

Similarly $\sin B=y\sin(A+B)$

5. $2\cos x\cos y+2\sin x\sin y+2\cos y\cos z+$

$2\sin y\sin z+2\cos z\cos x+2\sin z\sin x+3=0$

$(\cos x+\cos y+\cos z)^2+(\sin x+\sin y+\sin z)^2=0$

$\Rightarrow\Sigma\cos x=0$

LEVEL- IV

1. Assertion (A):

$tan40^0 + \tan 80^0 - \sqrt{3}\tan 40^0 \tan 80^0 = -\sqrt{3}$

Reason (R):

$\tan(A+B) = \tan A + \tan B + \tan(A+B)\tan A \tan B$

1. A is true, R is true and R is correct explanation of A
2. A is true, R is true and R is not correct explanation of A
3. A is true, R is false
4. A is false, R is true.

2. Assertion (A):

$\cos^2\theta + \cos^2(60^0 - \theta) + \cos^2(60^0 + \theta) = \frac{3}{2}$

Reason (R):

$\sin\alpha - \sin(120^0 - \alpha) + \sin(120^0 + \alpha) = 0$

1. A is true, R is true and R is correct explanation of A
2. A is true, R is true and R is not correct explanation of A
3. A is true, R is false
4. A is false, R is true.

3. Statement (I): If $\sin\alpha = \frac{12}{13}, \left(0 < \alpha < \frac{\pi}{2}\right)$ and

$\cos\beta = -\frac{3}{5}, \left(\pi < \beta < \frac{3\pi}{2}\right)$ then

$\sin(\alpha+\beta) = \frac{56}{65}$.

Statement (II): If θ and ϕ are angles in the first quardrant such that $\tan\theta = \frac{1}{7}$ and $\sin\phi = \frac{1}{\sqrt{10}}$

then $\theta + 2\phi = 45^0$

Which of the above statements is correct?

1. Only I
2. Only II
3. Both I and II
4. Neither I nor II

4. Statement (I): In a Δ^{le} ABC, $\sum \tan A = \pi \tan A$

Statement (II): In a Δ^{le} ABC, $\sum \cot A = \pi \cot A$

Which of the above statements is correct?

1. Only I
2. Only II
3. Both I and II
4. Neither I nor II

5. Statement (I): If $m\cos(\theta+\alpha) = n\cos(\theta-\alpha)$

then $\tan\theta.\tan\alpha = \frac{m+n}{m-n}$

Statement (II): If $\frac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)} = \frac{a+b}{a-b}$ then

$\tan\alpha.\cot\beta = \frac{a}{b}$

Which of the above statements is correct?

1. Only I
2. Only II
3. Both I and II
4. Neither I nor II

6. Statement (I): If $A+B+C=\pi$ $(A,B,C>0)$ and the angle C is obtuse than $\tan A \tan B < 1$.

Statement (II): If A,B,C are acute positive angles such that $A+B+C=\pi$ and

$\cot A \cot B \cot C = K$ then $K \le \frac{1}{3\sqrt{3}}$

Which of the above statements is correct?

1. Only I
2. Only II
3. Both I and II
4. Neither I nor II

7. Match the following:

List -I	List -II
1. $\cot\left(\frac{\pi}{4}+\theta\right).\cot\left(\frac{\pi}{4}-\theta\right)$	a. 0
2. $\sin(45^0+\theta) - \cos(45^0-\theta)$	b. $\tan 56^0$
3. $\frac{\cos 11^0 + \sin 11^0}{\cos 11^0 - \sin 11^0}$	c. $\frac{\sqrt{3}}{2}$
4. $\sin^2 75^0 - \sin^2 15^0$	d. 1

1. 1-d, 2-a, 3-b,4-c
2. 1-a,2-b,3-c,4-d
3. 1-c,2-b,3-d,4-c
4. 1-b,2-c,3-a,4-d

8. Match the following

List - I	List-II
1. $\sin 50^0 - \sin 70^0 + \sin 10^0$	a. 4
2. $\sqrt{3}\cos ec 20^0 - \sec 20^0$	b. $-2\sqrt{3}$
3. $\tan 15^0 - \cot 15^0$	c. 0
4. $\sin 15^0 \cos 15^0$	d. $\frac{1}{4}$

1. 1-a,2-b,3-c,4-d 2. 1-b,2-c,3-d,4-a
3. 1-c,2-a,3-b,4-d 4. 1-d,2-b,3-c,4-a

9. Arrange the following values in the ascending order of their magnitudes

A: If $A+B+C=\pi$ then

$$\frac{\cos A}{\sin B \sin C}+\frac{\cos B}{\sin A \sin C}+\frac{\cos C}{\sin A \sin B}=$$

B: If $A+B+C=\pi$ then $\sum \cot A.\cot B =$

C: If $A+B+C=\pi$ then

$\tan 3A+\tan 3B+\tan 3C =$

$2K \tan 3A \tan 3B \tan 3C$, then K=

D: If $A+B+C=\pi$ then

$\sec A\left(cosB\cos C-\sin B\sin C\right) =$

1. D,C,B,A 2. A,B,C,D
3. A,B,D,C 4. D,A,B,C

10. If $A=\sin 15^0+\cos 15^0$,

$B=\tan 15^0+\cot 15^0$,

$C=\tan 22\frac{1}{2}^0-\cot 22\frac{1}{2}^0$ then the

descending order is

1. A,B,C 2. B,A,C 3. C,B,A 4. B,C,A

KEY

1. 1	2. 2	3. 2	4 1	5 .2
6. 3	7. 1	8. 3	9. 1	10. 2