Assignment

Measurement of Angles, Trigonometrical Ratios , Function and

Basic Level

1. Which of the following relation is correct **[WB JEE 1991]**

(a) $\sin 1^o > \sin 1$ (b) $\sin 1 > \sin 1^o$ (c) $\sin 1 = \sin 1^o$ (d) $\frac{\pi}{180}\sin 1 = \sin 1^o$

2. The radius of the circle whose arc of length 15 *cm* makes an angle of 3/4 radian at the centre is

(a) 10 *cm* (b) 20 *cm* (c) $11\frac{1}{4}cm$ (d) $22\frac{1}{2}cm$

3. If $\tan\theta = \frac{-4}{3}$, then $\sin\theta =$ **[Orissa JEE 2002; IIT 1979]**

(a) $\frac{-4}{5}$ but not $\frac{4}{5}$ (b) $-\frac{4}{5}$ or $\frac{4}{5}$ (c) $\frac{4}{5}$ but not $-\frac{4}{5}$ (d) None of these

4. If $f(x) = \cos^2 x + \sec^2 x$, then

(a) $f(x) < 1$ (b) $f(x) = 1$ (c) $1 < f(x) < 2$ (d) $f(x) \geq 2$

5. If $x = \sec\theta + \tan\theta$, then $x + \frac{1}{x} =$

(a) 1 (b) $2\sec\theta$ (c) 2 (d) $2\tan\theta$

6. If A lies in the second quadrant and $3\tan A + 4 = 0$ then the value of $2\cot A - 5\cos A + \sin A$ is equal to **[Harayana CEE 199**

(a) $\frac{-53}{10}$ (b) $\frac{-7}{10}$ (c) $\frac{7}{10}$ (d) $\frac{23}{10}$

7. $\tan 1^o \tan 2^o \tan 3^o \tan 4^o \ldots\ldots\ldots \tan 89^o =$ **[MP PET 1998, 2001]**

(a) 1 (b) 0 (c) ∞ (d) 1/2

8. The incorrect statement is

(a) $\sin\theta = -\frac{1}{5}$ (b) $\cos\theta = 1$ (c) $\sec\theta = \frac{1}{2}$ (d) $\tan\theta = 20$

9. If $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$, then $\cos\theta + \sin\theta$ is equal to **[WB JEE 1988]**

(a) $\sqrt{2}\cos\theta$ (b) $\sqrt{2}\sin\theta$ (c) $2\cos\theta$ (d) $-\sqrt{2}\cos\theta$

10. If $\sec\theta + \tan\theta = p$, then $\tan\theta$ is equal to **[MP PET 1994]**

(a) $\frac{2p}{p^2-1}$ (b) $\frac{p^2-1}{2p}$ (c) $\frac{p^2+1}{2p}$ (d) $\frac{2p}{p^2+1}$

11. If $\sin\theta - \cos\theta = 1$, then $\sin\theta\cos\theta =$ **[Karnataka CET 1998]**

(a) 0 (b) 1 (c) 2 (d) 1/2

12. The value of $\cos 1^o \cos 2^o \cos 3^o \ldots\ldots \cos 179^o$ is **[Karnataka CET 1999]**

(a) $\frac{1}{\sqrt{2}}$ (b) 0 (c) 1 (d) None of these

13. If $\tan\theta = +\frac{1}{\sqrt{5}}$ and θ lies in the 1st quadrant, then $\cos\theta$ is

(a) $\frac{1}{\sqrt{6}}$ (b) $-\frac{1}{\sqrt{6}}$ (c) $\frac{\sqrt{5}}{\sqrt{6}}$ (d) $-\frac{\sqrt{5}}{\sqrt{6}}$

14. If A lies in the third quadrant and $3\tan A - 4 = 0$, then $5\sin 2A + 3\sin A + 4\cos A =$ **[EAMCET 1994]**

(a) 0 (b) $\frac{-24}{5}$ (c) $\frac{24}{5}$ (d) $\frac{48}{5}$

15. $(\sec^2\theta - 1)(\text{cosec}^2\theta - 1) =$ **[Karnataka CET 1998]**

(a) 0 (b) 1 (c) $\sec\theta.\ \text{cosec}\,\theta$ (d) $\sin^2\theta - \cos^2\theta$

16. If $\tan\theta = \frac{20}{21}, \cos\theta$ will be **[MP PET 1994]**

(a) $\pm\frac{20}{41}$ (b) $\pm\frac{1}{21}$ (c) $\pm\frac{21}{29}$ (d) $\pm\frac{20}{21}$

17. If $\text{cosec}\,A + \cot A = \frac{11}{2}$, then $\tan A$ equal to **[Roorkee 1995]**

(a) $\frac{21}{22}$ (b) $\frac{15}{16}$ (c) $\frac{44}{117}$ (d) $\frac{117}{43}$

18. If $\sin\theta = \frac{24}{25}$ and θ lies in the second quadrant, then $\sec\theta + \tan\theta$ equal to **[MP PET 1997]**

(a) – 3 (b) – 5 (c) –7 (d) – 9

19. If $5\tan\theta = 4$, then $\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 2\cos\theta}$ equal to **[Karnataka CET 1998]**

(a) 0 (b) 1 (c) 1/6 (d) 6

20. $\frac{1+\cos\theta}{\sin^2\theta}$ equal to **[Karnataka CET 1998]**

(a) 0 (b) 1 (c) $\frac{1}{1-\cos\theta}$ (d) $\frac{1}{1+\cos\theta}$

21. The expression $\frac{1}{\tan A + \cot A}$ simplifies to **[SCRA 1999]**

(a) $\sec A\,\text{cosec}\,A$ (b) $\sin A\cos A$ (c) $\tan 2A$ (d) $\sin 2A$

22. If for real values of x, $\cos\theta = x + \frac{1}{x}$, then **[MP PET 1996]**

(a) θ is an acute angle (b) θ is a right angle (c) θ is an obtuse angle (d) No value of θ is possible

23. If $\sin x + \text{cosec}\,x = 2$, then $\sin^n x + \text{cosec}^n x$ is equal to **[UPSEAT 2002]**

(a) 2 (b) 2^n (c) 2^{n-1} (d) 2^{n-2}

Advance Level

24. One root of the equation $\cos x - x + \frac{1}{2} = 0$ lies in the interval

(a) $\left[0, \frac{\pi}{2}\right]$ (b) $\left[-\frac{\pi}{2}, 0\right]$ (c) $\left[\frac{\pi}{2}, \pi\right]$ (d) $\left[\pi, \frac{3\pi}{2}\right]$

25. If $\frac{2\sin\alpha}{\{1+\cos\alpha+\sin\alpha\}} = y$, then $\frac{\{1-\cos\alpha+\sin\alpha\}}{1+\sin\alpha}$ = **[BIT Ranchi 1996]**

(a) $\frac{1}{y}$ (b) y (c) $1-y$ (d) $1+y$

26. If $\sin\theta+\sin^2\theta+\sin^3\theta=1$, then $\cos^6\theta-4\cos^4\theta+8\cos^2\theta$ =

(a) 4 (b) 2 (c) 1 (d) None of these

27. If θ and ϕ are angles in the 1st quadrant such that $\tan\theta=1/7$ and $\sin\phi=1/\sqrt{10}$. Then

(a) $\theta+2\phi=90^o$ (b) $\theta+2\phi=60^o$ (c) $\theta+2\phi=30^o$ (d) $\theta+2\phi=45^o$

28. The value of θ lying between 0 and $\pi/2$ and satisfying the equation $\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix}=0$

[IIT 1988; MNR 1992; Kurukshetra CEE 1998; DCE 1996]

(a) $\frac{7\pi}{24}$ or $\frac{11\pi}{24}$ (b) $\frac{5\pi}{24}$ (c) $\frac{\pi}{24}$ (d) None of these

29. If $\frac{3\pi}{4}<\alpha<\pi$, then $\sqrt{\text{cosec}^2\alpha+2\cot\alpha}$ is equal to **[Pb. CET 2000, AMU 2001]**

(a) $1+\cot\alpha$ (b) $1-\cot\alpha$ (c) $-1-\cot\alpha$ (d) $-1+\cot\alpha$

30. If for all real values of $x, \frac{4x^2+1}{64x^2-96x.\sin\alpha+5}<\frac{1}{32}$, then α lies in the interval **[Roorkee 1998]**

(a) $\left(0,\frac{\pi}{3}\right)$ (b) $\left(\frac{\pi}{3},\frac{2\pi}{3}\right)$ (c) $\left(\frac{2\pi}{3},\pi\right)$ (d) $\left(\frac{4\pi}{3},\frac{5\pi}{3}\right)$

31. If $\tan\theta=\sqrt{\frac{3}{2}}$, then the sum of the infinite series $1+2(1-\cos\theta)+3(1-\cos\theta)^2+4(1-\cos\theta)^3+....\infty$ is

(a) $\frac{2}{3}$ (b) $\frac{\sqrt{3}}{4}$ (c) $\frac{5}{2\sqrt{2}}$ (d) $\frac{5}{2}$

32. Let $A_0A_1A_2A_3A_4A_5$ be a regular hexagon inscribed in a circle of unit radius. Then the product of the lengths of the line segments A_0A_1, A_0A_2 and A_0A_4 is

(a) $\frac{3}{4}$ (b) $3\sqrt{3}$ (c) 3 (d) $\frac{3\sqrt{3}}{2}$

Trigonometrical Ratios of Allied Angles

Basic Level

33. If $x\sin 45^o\cos^2 60^o=\frac{\tan^2 60^o\,\text{cosec}\,30^o}{\sec 45^o\cot^2 30^o}$, then x = **[Kerala (Engg.) 2002]**

(a) 2 (b) 4 (c) 8 (d) 16

34. $\cos A+\sin(270^o+A)-\sin(270^o-A)+\cos(180^o+A)=$ **[MP PET 1990]**

(a) –1 (b) 0 (c) 1 (d) None of these

35. $\sin(\pi+\theta)\sin(\pi-\theta)\text{cosec}^2\theta=$ **[EAMCET 1980]**

(a) 1 (b) –1 (c) $\sin\theta$ (d) $-\sin\theta$

36. The value of $\sin 600^o\cos 330^o+\cos 120^o\sin 150^o$ is **[MP PET 1994]**

(a) –1 (b) 1 (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{\sqrt{3}}{2}$

37. If $A = 130^o$ and $x = \sin A + \cos A$, then **[Karnataka CET 1989]**

(a) $x > 0$ (b) $x < 0$ (c) $x = 0$ (d) $x \le 0$

38. $\tan\theta \sin\left(\frac{\pi}{2}+\theta\right)\cos\left(\frac{\pi}{2}-\theta\right) =$ **[EAMCET 1981]**

(a) 1 (b) 0 (c) $\frac{1}{\sqrt{2}}$ (d) None of these

39. $\sin^2 5^o + \sin^2 10^o + \sin^2 15^o + ... + \sin^2 85^o + \sin^2 90^o =$ **[Karnataka CET 1999, 1995]**

(a) 7 (b) 8 (c) 9 (d) $9\frac{1}{2}$

40. Values of $\theta(0 < \theta < 360^o)$ satisfying $\text{cosec}\,\theta + 2 = 0$ are **[EAMCET 1994]**

(a) $210^o, 300^o$ (b) $240^o, 300^o$ (c) $210^o, 240^o$ (d) $210^o, 330^o$

41. The value of $\tan(-945^o)$ is **[MP PET 1997]**

(a) –1 (b) – 2 (c) – 3 (d) – 4

42. The value of $\frac{\cot 54^o}{\tan 36^o} + \frac{\tan 20^o}{\cot 70^o}$ is **[Karnataka CET 1999]**

(a) 2 (b) 3 (c) 1 (d) 0

43. $\tan 9^o - \tan 27^o - \tan 63^o + \tan 81^o =$ **[Roorkee 1989]**

(a) 1/2 (b) 2 (c) 4 (d) 8

44. $\cos 1^o + \cos 2^o + \cos 3^o + ... + \cos 180^o =$ **[Karnataka CET 2003]**

(a) 0 (b) 1 (c) –1 (d) 2

45. If $\tan(A-B) = 1,\ \sec(A+B) = \frac{2}{\sqrt{3}}$, then the smallest positive value of B is **[Kerala (Engg.) 2002]**

(a) $\frac{25}{24}\pi$ (b) $\frac{19}{24}\pi$ (c) $\frac{13}{24}\pi$ (d) $\frac{11}{24}\pi$

46. If $x = \sin 130^o \cos 80^o, y = \sin 80^o \cos 130^o, z = 1 + xy$, which one of the following is true **[AMU 1999]**

(a) $x > 0, y > 0, z > 0$ (b) $x > 0, y < 0, 0 < z < 1$ (c) $x > 0, y < 0, z > 1$ (d) $x < 0, y < 0, 0 < z < 1$

47. If $\alpha = 22^o 30'$, then $(1+\cos\alpha)(1+\cos 3\alpha)(1+\cos 5\alpha)(1+\cos 7\alpha)$ equals **[AMU 1999]**

(a) 1/8 (b) 1/4 (c) $\frac{1+\sqrt{2}}{2\sqrt{2}}$ (d) $\frac{\sqrt{2}-1}{\sqrt{2}+1}$

Trigonometrical Ratios of Sum & Difference of Two Angles, Tranformation of Product into Sum & Difference, Transformation of Sum & Difference into Product

Basic Level

48. If *A, B, C, D* are the angles of a cyclic quadrilateral then $\cos A + \cos B + \cos C + \cos D =$ **[IIT 1970]**

(a) $2(\cos A + \cos C)$ (b) $2(\cos A + \cos B)$ (c) $2(\cos A + \cos D)$ (d) 0

49. $\frac{\cos 17^o + \sin 17^o}{\cos 17^o - \sin 17^o}$ **[MP PET 1998 (Similar to EAMCET 1982)]**

(a) $\tan 62^o$ (b) $\tan 56^o$ (c) $\tan 54^o$ (d) $\tan 73^o$

50. $\cot(45^o+\theta)\cot(45^o-\theta)=$ **[MNR 1973]**

(a) –1 (b) 0 (c) 1 (d) ∞

51. $\tan 75^o-\cot 75^o=$ **[MNR 1982]**

(a) $2\sqrt{3}$ (b) $2+\sqrt{3}$ (c) $2-\sqrt{3}$ (d) None of these

52. $\sqrt{3}\,\text{cosec}\,20^o-\sec 20^o=$ **[IIT 1988]**

(a) 2 (b) $\frac{2\sin 20^o}{\sin 40^o}$ (c) 4 (d) $\frac{4\sin 20^o}{\sin 40^o}$

53. $\sin 15^o+\cos 105^o=$ **[MP PET 1992]**

(a) 0 (b) $2\sin 15^o$ (c) $\cos 15^o+\sin 15^o$ (d) $\sin 15^o-\cos 15^o$

54. If $\cos(A+B)=\alpha\cos A\cos B+\beta\sin A\sin B$, then $(\alpha,\beta)=$ **[MP PET 1992]**

(a) $(-1,-1)$ (b) $(-1,1)$ (c) $(1,-1)$ (d) $(1,1)$

55. $\cos^2\alpha+\cos^2(\alpha+120^o)+\cos^2(\alpha-120^o)$ is equal to **[MP PET 1993]**

(a) $\frac{3}{2}$ (b) 1 (c) $\frac{1}{2}$ (d) 0

56. The value of $\cos 105^o+\sin 105^o$ is **[MNR 1975]**

(a) $\frac{1}{2}$ (b) 1 (c) $\sqrt{2}$ (d) $\frac{1}{\sqrt{2}}$

57. $\cos^2 48^o-\sin^2 12^o=$ **[MNR 1977]**

(a) $\frac{\sqrt{5}-1}{4}$ (b) $\frac{\sqrt{5}+1}{8}$ (c) $\frac{\sqrt{3}-1}{4}$ (d) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

58. $\sin 20^o\sin 40^o\sin 60^o\sin 80^o=$ **[MNR 1976, 1981]**

(a) –3/16 (b) 5/16 (c) 3/16 (d) –5/16

59. $\cos 20^o\cos 40^o\cos 80^o=$ **[MP PET 1989]**

(a) 1/2 (b) 1/4 (c) 1/6 (d) 1/8

60. $\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{8\pi}{15}\cos\frac{16\pi}{15}=$ **[IIT 1985]**

(a) 1/2 (b) 1/4 (c) 1/8 (d) 1/16

61. If $x=\cos 10^o\cos 20^o\cos 40^o$, then the value of x is **[Roorkee 1995]**

(a) $\frac{1}{4}\tan 10^o$ (b) $\frac{1}{8}\cot 10^o$ (c) $\frac{1}{8}\,\text{cosec}\,10^o$ (d) $\frac{1}{8}\sec 10^o$

62. The value of $\cos 52^o+\cos 68^o+\cos 172^o$ is **[MP PET 1997]**

(a) 0 (b) 1 (c) 2 (d) $\frac{3}{2}$

63. $\cos 40^o+\cos 80^o+\cos 160^o+\cos 240^o=$ **[EAMCET 1996]**

(a) 0 (b) 1 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

64. $1+\cos 56^o+\cos 58^o-\cos 66^o=$ **[IIT 1964]**

(a) $2\cos 28^o\cos 29^o\cos 33^o$ (b) $4\cos 28^o\cos 29^o\cos 33^o$ (c) $4\cos 28^o\cos 29^o\sin 33^o$ (d) $2\cos 28^o\cos 29^o\sin 33^o$

65. $\cos 15^o=$ **[MP PET 1998; MNR 1978]**

(a) $\sqrt{\frac{1+\cos 30^o}{2}}$ (b) $\sqrt{\frac{1-\cos 30^o}{2}}$ (c) $\pm\sqrt{\frac{1+\cos 30^o}{2}}$ (d) $\pm\sqrt{\frac{1-\cos 30^o}{2}}$

66. $\tan 5x \tan 3x \tan 2x =$ **[EAMCET 1991]**

(a) $\tan 5x - \tan 3x - \tan 2x$ (b) $\frac{\sin 5x - \sin 3x - \sin 2x}{\cos 5x - \cos 3x - \cos 2x}$ (c) 0 (d) None of these

67. If $\cos\alpha + \cos\beta = 0 = \sin\alpha + \sin\beta$, then $\cos 2\alpha + \cos 2\beta =$ **[EAMCET 1994]**

(a) $-2\sin(\alpha+\beta)$ (b) $-2\cos(\alpha+\beta)$ (c) $2\sin(\alpha+\beta)$ (d) $2\cos(\alpha+\beta)$

68. If $\tan A = -\frac{1}{2}$ and $\tan B = -\frac{1}{3}$, then $A+B$ = **[IIT 1967; UPSEAT 1987; MP PET 1989]**

(a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{4}$ (d) None of these

69. If $\cos(A-B) = \frac{3}{5}$ and $\tan A \tan B = 2$, then **[MP PET 1997]**

(a) $\cos A \cos B = \frac{1}{5}$ (b) $\sin A \sin B = -\frac{2}{5}$ (c) $\cos A \cos B = -\frac{1}{5}$ (d) $\sin A \sin B = -\frac{1}{5}$

70. $\frac{\sin 3\theta - \cos 3\theta}{\sin\theta + \cos\theta} + 1 =$

(a) $2\sin 2\theta$ (b) $2\cos 2\theta$ (c) $\tan 2\theta$ (d) $\cot 2\theta$

71. $\tan 3A - \tan 2A - \tan A =$ **[MNR 1982; Pb. CET 1991]**

(a) $\tan 3A \tan 2A \tan A$ (b) $-\tan 3A \tan 2A \tan A$

(c) $\tan A \tan 2A - \tan 2A \tan 3A - \tan 3A \tan A$ (d) None of these

72. If $\cos A = m\cos B$, then **[UPSEAT 1990]**

(a) $\cot\frac{A+B}{2} = \frac{m+1}{m-1}\tan\frac{B-A}{2}$ (b) $\tan\frac{A+B}{2} = \frac{m+1}{m-1}\cot\frac{B-A}{2}$

(c) $\cot\frac{A+B}{2} = \frac{m+1}{m-1}\tan\frac{A-B}{2}$ (d) None of these

73. The value of $\cos 12^o + \cos 84^o + \cos 156^o + \cos 132^o$ is **[Kerala CEE 1993]**

(a) 1/2 (b) 1 (c) -1/2 (d) 1/8

74. $\tan 100^o + \tan 125^o + \tan 100^o \tan 125^o =$ **[DCE 1999]**

(a) 0 (b) $\frac{1}{2}$ (c) -1 (d) 1

75. If $\cos P = \frac{1}{7}$ and $\cos Q = \frac{13}{14}$ where P and Q both are acute angles. Then the value of $P - Q$ is **[Orissa JEE 2002; Karnataka CET 2002]**

(a) 30^o (b) 60^o (c) 45^o (d) 75^o

76. If $\sin A = \frac{1}{\sqrt{10}}$ and $\sin B = \frac{1}{\sqrt{5}}$, where A and B are positive acute angles, then $A+B =$

(a) π (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$

77. $\sin\left(\frac{\pi}{10}\right)\sin\left(\frac{3\pi}{10}\right) =$ **[MNR 1984]**

(a) 1/2 (b) -1/2 (c) 1/4 (d) 1

78. $\sin 50^o - \sin 70^o + \sin 10^o =$ **[MNR 1979]**

(a) 1 (b) 0 (c) 1/2 (d) 2

79. If $\sin A = \sin B$ and $\cos A = \cos B$, then **[EAMCET 1994]**

(a) $\sin\frac{A-B}{2} = 0$ (b) $\sin\frac{A+B}{2} = 0$ (c) $\cos\frac{A-B}{2} = 0$ (d) $\cos(A+B) = 0$

80. $\sin 12^o \sin 48^o \sin 54^o =$ **[IIT 1982]**

(a) 1/16 (b) 1/32 (c) 1/8 (d) 1/4

81. If $(1+\tan\theta)(1+\tan\phi) = 2$, then $\theta + \phi$ = **[Karnataka CET 1993]**

(a) 30° (b) 45° (c) 60° (d) 75°

82. $\cos^2\left(\frac{\pi}{6}+\theta\right) - \sin^2\left(\frac{\pi}{6}-\theta\right) =$ **[EAMCET 2001]**

(a) $\frac{1}{2}\cos 2\theta$ (b) 0 (c) $-\frac{1}{2}\cos 2\theta$ (d) $\frac{1}{2}$

83. If $\sin\theta + \sin 2\theta + \sin 3\theta = \sin\alpha$ and $\cos\theta + \cos 2\theta + \cos 3\theta = \cos\alpha$, then θ is equal to **[AMU 2001]**

(a) $\alpha/2$ (b) α (c) 2α (d) $\alpha/6$

84. $\cos\alpha.\sin(\beta-\gamma) + \cos\beta.\sin(\gamma-\alpha) + \cos\gamma.\sin(\alpha-\beta) =$ **[EAMCET 2003]**

(a) 0 (b) 1/2 (c) 1 (d) $4\cos\alpha\cos\beta\cos\gamma$

85. Given that $\cos\left(\frac{\alpha-\beta}{2}\right) = 2\cos\left(\frac{\alpha+\beta}{2}\right)$, then $\tan\frac{\alpha}{2}\tan\frac{\beta}{2}$ is equal to

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{8}$

Advance Level

86. If $\sin A + \sin B = C$, $\cos A + \cos B = D$, then the value of $\sin(A+B) =$

(a) CD (b) $\frac{CD}{C^2+D^2}$ (c) $\frac{C^2+D^2}{2CD}$ (d) $\frac{2CD}{C^2+D^2}$

87. If $A + B = 225^o$, then $\frac{\cot A}{1+\cot A}.\frac{\cot B}{1+\cot B} =$ **[MNR 1974]**

(a) 1 (b) -1 (c) 0 (d) $\frac{1}{2}$

88. $\frac{1}{\sin 10^o} - \frac{\sqrt{3}}{\cos 10^o}$ **[IIT 1974]**

(a) 0 (b) 1 (c) 2 (d) 4

89. $\frac{\sin 3\theta + \sin 5\theta + \sin 7\theta + \sin 9\theta}{\cos 3\theta + \cos 5\theta + \cos 7\theta + \cos 9\theta} =$ **[Roorkee 1973]**

(a) $\tan 3\theta$ (b) $\cot 3\theta$ (c) $\tan 6\theta$ (d) $\cot 6\theta$

90. If $\cos(\theta-\alpha), \cos\theta$ and $\cos(\theta+\alpha)$ are in H.P., then $\cos\theta \sec\frac{\alpha}{2}$ is equal to **[IIT 1997]**

(a) $\pm\sqrt{2}$ (b) $\pm\sqrt{3}$ (c) $\pm 1/\sqrt{2}$ (d) None of these

91. $\frac{\sin(B+A)+\cos(B-A)}{\sin(B-A)+\cos(B+A)}$ = **[Roorkee 1970; IIT 1966]**

(a) $\frac{\cos B+\sin B}{\cos B-\sin B}$ (b) $\frac{\cos A+\sin A}{\cos A-\sin A}$ (c) $\frac{\cos A-\sin A}{\cos A+\sin A}$ (d) None of these

92. If $\sin 2x = n\sin 2y$, then the value of $\frac{\tan(x+y)}{\tan(x-y)}$ is

(a) $\frac{n+1}{n-1}$ (b) $\frac{n-1}{n+1}$ (c) $\frac{1-n}{n+1}$ (d) $\frac{1+n}{1-n}$

93. If $3\sin\alpha = 5\sin\beta$, then $\frac{\tan\frac{\alpha+\beta}{2}}{\tan\frac{\alpha-\beta}{2}}$ = **[EAMCET 1996]**

(a) 1 (b) 2 (c) 3 (d) 4

94. If $\frac{\pi}{2}<\alpha<\pi, \pi<\beta<\frac{3\pi}{2}$, $\sin\alpha=\frac{15}{17}$ and $\tan\beta=\frac{12}{5}$, the value of $\sin(\beta-\alpha)$ is **[Roorkee 2000]**

(a) $\frac{-171}{221}$ (b) $\frac{-21}{221}$ (c) $\frac{21}{221}$ (d) $\frac{17}{221}$

95. $\cos^2 76^o + \cos^2 16^o - \cos 76^o \cos 16^o$ = **[EAMCET 2002]**

(a) $-\frac{1}{4}$ (b) $\frac{1}{2}$ (c) 0 (d) $\frac{3}{4}$

96. The value of $\cos^2\frac{\pi}{12}+\cos^2\frac{\pi}{4}+\cos^2\frac{5\pi}{12}$ is **[Karnataka CET 2002]**

(a) $\frac{3}{2}$ (b) $\frac{2}{3}$ (c) $\frac{3+\sqrt{3}}{2}$ (d) $\frac{2}{3+\sqrt{3}}$

97. If angle θ be divided into two parts such that the tangents of one part is K times the tangent of the other and ϕ is their difference, then $\sin\theta$ =

(a) $\frac{K+1}{K-1}\sin\phi$ (b) $\frac{K-1}{K+1}\sin\phi$ (c) $\frac{2K-1}{2K+1}\sin\phi$ (d) None of these

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

(a) $\sin^2(\alpha+\beta)+p\sin(\alpha+\beta)\cos(\alpha+\beta)+q\cos^2(\alpha+\beta)=q$ (b) $\tan(\alpha+\beta)=\frac{p}{q-1}$

(c) $\cos(\alpha+\beta)=1-q$ (d) $\sin(\alpha+\beta)=-p$

99. If $\tan\alpha$ equals the integral solution of the inequality $4x^2-16x+15<0$ and $\cos\beta$ equals to the slope of the bisector of first quadrant, then $\sin(\alpha+\beta)\sin(\alpha-\beta)$ is equal to

(a) $\frac{3}{5}$ (b) $\frac{-3}{5}$ (c) $\frac{2}{\sqrt{5}}$ (d) $\frac{4}{5}$

100. $\frac{\sqrt{2}-\sin\alpha-\cos\alpha}{\sin\alpha-\cos\alpha}$ = **[AMU 1999]**

(a) $\sec\left(\frac{\alpha}{2}-\frac{\pi}{8}\right)$ (b) $\cos\left(\frac{\pi}{8}-\frac{\alpha}{2}\right)$ (c) $\tan\left(\frac{\alpha}{2}-\frac{\pi}{8}\right)$ (d) $\cot\left(\frac{\alpha}{2}-\frac{\pi}{2}\right)$

101. The sum $S=\sin\theta+\sin 2\theta+.....+\sin n\theta$, equals **[AMU 2002]**

(a) $\sin\frac{1}{2}(n+1)\theta\sin\frac{1}{2}n\theta/\sin\frac{\theta}{2}$

(b) $\cos\frac{1}{2}(n+1)\theta\sin\frac{1}{2}n\theta/\sin\frac{\theta}{2}$

(c) $\sin\frac{1}{2}(n+1)\theta\cos\frac{1}{2}n\theta/\sin\frac{\theta}{2}$

(d) $\cos\frac{1}{2}(n+1)\theta\cos\frac{1}{2}n\theta/\sin\frac{\theta}{2}$

Trigonometrical Ratios of Multiple and Sub-multiple of an Angle

Basic Level

102. $2\cos^2\theta-2\sin^2\theta=1$, then $\theta=$ **[Karnataka CET 1998]**

(a) 15° (b) 30^o (c) 45^o (d) 60^o

103. If $\cos A=\frac{3}{4}$, then $32\sin\frac{A}{2}\cos\frac{5}{2}A=$ **[EAMCET 1982]**

(a) $\sqrt{7}$ (b) $-\sqrt{7}$ (c) 7 (d) –7

104. $\cot x-\tan x=$ **[MP PET 1986]**

(a) $\cot 2x$ (b) $2\cot^2 x$ (c) $2\cot 2x$ (d) $\cot^2 2x$

105. $\cos^2 A(3-4\cos^2 A)^2+\sin^2 A(3-4\sin^2 A)^2=$

(a) $\cos 4A$ (b) $\sin 4A$ (c) 1 (d) None of these

106. $2\sin^2\beta+4\cos(\alpha+\beta)\sin\alpha\sin\beta+\cos 2(\alpha+\beta)=$ **[UPSEAT 1993]**

(a) $\sin 2\alpha$ (b) $\cos 2\beta$ (c) $\cos 2\alpha$ (d) $\sin 2\beta$

107. If $\tan A=\frac{1-\cos B}{\sin B}$, then the value of $\tan 2A$ in terms of $\tan B$

(a) $\tan 2A=\tan B$ (b) $\tan 2A=\tan^2 B$ (c) $\tan 2A=\tan^2 B+2\tan B$ (d) None of these

108. If $\tan A=\frac{1}{2}$, $\tan B=\frac{1}{3}$, then $\cos 2A=$ **[Karnataka CET 1986, 89]**

(a) $\sin B$ (b) $\sin 2B$ (c) $\sin 3B$ (d) None of these

109. If $a\cos 2\theta+b\sin 2\theta=c$ has α and β as its solution, then the value of $\tan\alpha+\tan\beta$ is **[Haryana CEE 1998]**

(a) $\frac{c+a}{2b}$ (b) $\frac{2b}{c+a}$ (c) $\frac{c-a}{2b}$ (d) $\frac{b}{c+a}$

110. $\frac{3\cos\theta+\cos 3\theta}{3\sin\theta-\sin 3\theta}$ is equal to **[EAMCET 1996]**

(a) $1+\cot^2\theta$ (b) $\cot^4\theta$ (c) $\cot^3\theta$ (d) $2\cot\theta$

111. $\sin^2\frac{\pi}{8}+\sin^2\frac{3\pi}{8}+\sin^2\frac{5\pi}{8}+\sin^2\frac{7\pi}{8}=$ **[Karnataka CET 1998]**

(a) 1 (b) –1 (c) 0 (d) 2

112. If $k = \sin\frac{\pi}{18}.\sin\frac{5\pi}{18}.\sin\frac{7\pi}{18}$, then the numerical value of k is **[IIT 1993; UPSEAT 1974]**

(a) 1/4 (b) 1/8 (c) 1/16 (d) None of these

113. $\cos\frac{\pi}{7}\cos\frac{2\pi}{7}\cos\frac{4\pi}{7} =$ **[MP PET 1998]**

(a) 0 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $-\frac{1}{8}$

114. If $\cos\theta = \frac{1}{2}\left(a+\frac{1}{a}\right)$, then the value of $\cos 3\theta$ is **[MP PET 2001]**

(a) $\frac{1}{8}\left(a^3+\frac{1}{a^3}\right)$ (b) $\frac{3}{2}\left(a+\frac{1}{a}\right)$ (c) $\frac{1}{2}\left(a^3+\frac{1}{a^3}\right)$ (d) $\frac{1}{3}\left(a^3+\frac{1}{a^3}\right)$

115. $2\sin A\cos^3 A - 2\sin^3 A.\cos A =$ **[Roorkee 1975, Kerala (Engg.) 2002]**

(a) $\sin 4A$ (b) $\frac{1}{2}\sin 4A$ (c) $\frac{1}{4}\sin 4A$ (d) None of these

116. If $\cos A = \frac{3}{4}$, then $32\sin\left(\frac{A}{2}\right)\sin\left(\frac{5A}{2}\right) =$ **[DCE 1996]**

(a) 7 (b) 8 (c) 11 (d) None of these

117. If α is a root of $25\cos^2\theta + 5\cos\theta - 12 = 0, \pi/2 < \alpha < \pi$, then $\sin 2\alpha$ is equal to **[UPSEAT 2001]**

(a) 24/25 (b) –24/25 (c) 13/18 (d) –13/18

Advance Level

118. $\tan 20^o \tan 40^o \tan 60^o \tan 80^o =$ **[IIT 1974]**

(a) 1 (b) 2 (c) 3 (d) $\sqrt{3}/2$

119. If $\cos\theta = \frac{3}{5}$ and $\cos\phi = \frac{4}{5}$, where θ and ϕ are positive acute angles, then $\cos\frac{\theta-\phi}{2} =$ **[MP PET 1988]**

(a) $\frac{7}{\sqrt{2}}$ (b) $\frac{7}{5\sqrt{2}}$ (c) $\frac{7}{\sqrt{5}}$ (d) $\frac{7}{2\sqrt{5}}$

120. If $\cos(\alpha+\beta) = \frac{4}{5}, \sin(\alpha-\beta) = \frac{5}{13}$ and α, β lie between 0 and $\frac{\pi}{4}$, then $\tan 2\alpha =$ **[IIT 1979; EAMCET 2002]**

(a) $\frac{16}{63}$ (b) $\frac{56}{33}$ (c) $\frac{28}{33}$ (d) None of these

121. If $x\cos\theta = y\cos\left(\theta+\frac{2\pi}{3}\right) = z\cos\left(\theta+\frac{4\pi}{3}\right)$, then the value of $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}$ is equal to **[IIT 1984]**

(a) 1 (b) 2 (c) 0 (d) $3\cos\theta$

122. If $a\tan\theta = b$, then $a\cos 2\theta + b\sin 2\theta =$ **[EAMCET 1981, 82; MP PET 1996]**

(a) a (b) b (c) $-a$ (d) $-b$

123. If $2\sec 2\alpha = \tan\beta + \cot\beta$, then one of the values of $\alpha + \beta$ is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) π (d) 2π

124. If $\cos x + \cos y + \cos\alpha = 0$ and $\sin x + \sin y + \sin\alpha = 0$, then $\cot\left(\frac{x+y}{2}\right) =$ **[Karnataka CET 2001]**

(a) $\sin\alpha$ (b) $\cos\alpha$ (c) $\cot\alpha$ (d) $\sin\left(\frac{x+y}{2}\right)$

125. If $\sin 2\theta + \sin 2\phi = \frac{1}{2}$ and $\cos 2\theta + \cos 2\phi = \frac{3}{2}$, then $\cos^2(\theta - \phi) =$ **[MP PET 2000]**

(a) $\frac{3}{8}$ (b) $\frac{5}{8}$ (c) $\frac{3}{4}$ (d) $\frac{5}{4}$

126. If $(\sec\alpha + \tan\alpha)(\sec\beta + \tan\beta)(\sec\gamma + \tan\gamma) = \tan\alpha\ \tan\beta\ \tan\gamma$, then $(\sec\alpha - \tan\alpha)(\sec\beta - \tan\beta)(\sec\gamma - \tan\gamma) =$ **[Haryana CEE 1998]**

(a) $\cot\alpha\ \cot\beta\ \cot\gamma$ (b) $\tan\alpha\ \tan\beta\ \tan\gamma$ (c) $\cot\alpha + \cot\beta + \cot\gamma$ (d) $\tan\alpha + \tan\beta + \tan\gamma$

127. If $\cos 2B = \frac{\cos(A+C)}{\cos(A-C)}$, then $\tan A, \tan B, \tan C$ are in

(a) A.P (b) G.P (c) H.P (d) None of these

128. $\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right) =$ **[IIT 1994; WB JEE 1992]**

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{8}$ (d) $\frac{1}{16}$

129. If $\frac{\sin^4 A}{a} + \frac{\cos^4 A}{b} = \frac{1}{a+b}$, then the value of $\frac{\sin^8 A}{a^3} + \frac{\cos^8 A}{b^3}$ is equal to **[WB JEE 1971]**

(a) $\frac{1}{(a+b)^3}$ (b) $\frac{a^3b^3}{(a+b)^3}$ (c) $\frac{a^2b^2}{(a+b)^2}$ (d) None of these

130. $\sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6}$ is equal to **[IIT 1966, 1975]**

(a) $\cot\ 7\frac{1}{2}^o$ (b) $\sin\ 7\frac{1}{2}^o$ (c) $\sin 15^o$ (d) $\cos 15^o$

131. If $\sin\beta$ is the geometric mean between $\sin\alpha$ and $\cos\alpha$, then $\cos 2\beta$ is equal to

(a) $2\sin^2\left(\frac{\pi}{4} - \alpha\right)$ (b) $2\cos^2\left(\frac{\pi}{4} - \alpha\right)$ (c) $2\cos^2\left(\frac{\pi}{4} + \alpha\right)$ (d) $2\sin^2\left(\frac{\pi}{4} + \alpha\right)$

132. The value of k, for which $(\cos x + \sin x)^2 + k\sin x\cos x - 1 = 0$ is an identity, is **[Kerala (Engg.) 2001]**

(a) –1 (b) – 2 (c) 0 (d) 1

133. If $\sin^3 x\sin 3x = \sum_{m=0}^{n} c_m \cos mx$ where $c_0, c_1, c_2, ..., c_n$ are constants and $c_n \neq 0$, then the value of n is

(a) 15 (b) 6 (c) 1 (d) 0

134. Let $0 < x < \frac{\pi}{4}$. Then $\sec 2x - \tan 2x$ = **[IIT 1994]**

(a) $\tan\left(x - \frac{\pi}{4}\right)$ (b) $\tan\left(\frac{\pi}{4} - x\right)$ (c) $\tan\left(x + \frac{\pi}{4}\right)$ (d) $\tan^2\left(x + \frac{\pi}{4}\right)$

135. If x is A.M. of $\tan\frac{\pi}{9}$ and $\tan\frac{5\pi}{18}$ and y *is* A.M. of $\tan\frac{\pi}{9}$ and $\tan\frac{7\pi}{18}$, then

(a) $x > y$ (b) $x = y$ (c) $2x = y$ (d) $x = 2y$

136. If $\cos^4\theta\sec^2\alpha, \frac{1}{2}$ and $\sin^4\theta\,\text{cosec}^2\alpha$ are in A.P. , then $\cos^8\theta\sec^6\alpha, \frac{1}{2}$ and $\sin^8\theta\,\text{cosec}^6\alpha$ are in

(a) A.P. (b) G.P. (c) H.P. (d) None of these

137. Let $f_n(\theta) = \tan\frac{\theta}{2}(1+\sec\theta)(1+\sec 2\theta)(1+\sec 4\theta).....(1+\sec 2^n\theta)$. Then **[IIT Screening 1999; 2001]**

(a) $f_2\left(\frac{\pi}{16}\right) = 1$ (b) $f_3\left(\frac{\pi}{32}\right) = 1$ (c) $f_4\left(\frac{\pi}{64}\right) = 1$ (d) All of these

138. If A, B, C, D are the smallest positive angles in ascending order of magnitude which have their sines equal to the positive quantity k, then the value of $4\sin\frac{A}{2} + 3\sin\frac{B}{2} + 2\sin\frac{C}{2} + \sin\frac{D}{2}$ is equal to

(a) $2\sqrt{1-k}$ (b) $2\sqrt{1+k}$ (c) $2\sqrt{k}$ (d) None of these

139. If α, β are different values of x satisfying $a\cos x + b\sin x = c$, then $\tan\left(\frac{\alpha+\beta}{2}\right)$ = **[Orissa JEE 2003; EAMCET 1986]**

(a) $a+b$ (b) $a-b$ (c) $\frac{b}{a}$ (d) $\frac{a}{b}$

Maximum and Minimum value

Basic Level

140. The maximum value of $a\cos x + b\sin x$ is **[MNR 1991; MP PET 1999]**

(a) $a+b$ (b) $a-b$ (c) $|a|+|b|$ (d) $(a^2+b^2)^{1/2}$

141. The minimum value of $\cos\theta + \sin\theta$ is **[MNR 1976]**

(a) 0 (b) $-\sqrt{2}$ (c) 1/2 (d) $\sqrt{2}$

142. The minimum value of $3\cos x + 4\sin x + 8$ is **[UPSEAT 1991]**

(a) 5 (b) 9 (c) 2 (d) 3

143. If θ is an acute angle and $\sin\theta = \frac{p-6}{8-p}$, then p must satisfy

(a) $6 \le p < 8$ (b) $6 \le p < 7$ (c) $3 \le p \le 4$ (d) $4 \le p < 7$

Advance Level

144. Maximum value of $\cos^2 x + \cos^2 y - \cos^2 z$ is

(a) 0 (b) 1 (c) 3 (d) 2

145. Let n be a positive integer such that $\sin\left(\frac{\pi}{2^n}\right) + \cos\left(\frac{\pi}{2^n}\right) = \frac{\sqrt{n}}{2}$, then

(a) $6 \le n \le 8$ (b) $4 < n \le 8$ (c) $4 \le n < 8$ (d) $4 < n < 8$

146. If $\alpha \in \left(0, \frac{\pi}{2}\right)$, then $\sqrt{x^2 + x} + \frac{\tan^2 \alpha}{\sqrt{x^2 + x}}$ is always greater than or equal to **[IIT Screening 2003]**

(a) $2\tan\alpha$ (b) 1 (c) 2 (d) $\sec^2 \alpha$

147. The maximum value of $(\cos\alpha_1).(\cos\alpha_2).....(\cos\alpha_n)$, under the restrictions, $0 \le \alpha_1, \alpha_2 ..... \alpha_n \le \frac{\pi}{2}$ and $(\cot\alpha_1).(\cot\alpha_2).....(\cot\alpha_n) = 1$ is **[IIT Screening 2001]**

(a) $\frac{1}{2^{n/2}}$ (b) $\frac{1}{2^n}$ (c) $\frac{1}{2n}$ (d) 1

148. Let $f(\theta) = \sin\theta(\sin\theta + \sin 3\theta)$. Then **[IIT Screening 2000]**

(a) $f(\theta) \ge 0$ only when $\theta \ge 0$ (b) $f(\theta) \le 0$ only when $\theta \le 0$

(c) $f(\theta) \ge 0$ for all real θ (d) None of these

149. The minimum value of $2^{\sin x} + 2^{\cos x}$ is

(a) 1 (b) 2 (c) $2^{-\frac{1}{\sqrt{2}}}$ (d) $2^{1-\frac{1}{\sqrt{2}}}$

Conditional Trigonometrical Identities

Basic Level

150. If $A + B + C = \pi$, then $\frac{\tan A + \tan B + \tan C}{\tan A.\tan B.\tan C} =$ **[EAMCET 1989]**

(a) 0 (b) 2 (c) 1 (d) –1

151. If $A + B + C = \pi$ and $\cos A = \cos B \cos C$, then $\tan B \tan C$ is equal to **[AMU 2001]**

(a) $\frac{1}{2}$ (b) 2 (c) 1 (d) $-\frac{1}{2}$

Advance Level

152. If $\alpha + \beta - \gamma = \pi$, then $\sin^2\alpha + \sin^2\beta - \sin^2\gamma =$ **[IIT 1980]**

(a) $2\sin\alpha\sin\beta\cos\gamma$ (b) $2\cos\alpha\cos\beta\cos\gamma$ (c) $2\sin\alpha\sin\beta\sin\gamma$ (d) None of these

153. If $A + B + C = \frac{3\pi}{2}$, then $\cos 2A + \cos 2B + \cos 2C + 4\sin A \sin B \sin C =$ **[EAMCET 2003; 1989]**

(a) 0 (b) 1 (c) 2 (d) 3

154. If *A, B, C* are the angles of a triangle, then $\sin^2 A + \sin^2 B + \sin^2 C - 2\cos A \cos B \cos C$ = **[Karnataka CET 1989]**

(a) 1 (b) 2 (c) 3 (d) 4

155. If $\alpha + \beta = \frac{\pi}{2}$ and $\beta + \gamma = \alpha$, then $\tan\alpha$ equals **[IIT Screening 2001]**

(a) $2(\tan\beta + \tan\gamma)$ (b) $\tan\beta + \tan\gamma$ (c) $\tan\beta + 2\tan\gamma$ (d) $2\tan\beta + \tan\gamma$

156. Let *A*, *B* and *C* are the angles of a plain triangle and $\tan\frac{A}{2} = \frac{1}{3}, \tan\frac{B}{2} = \frac{2}{3}$. Then $\tan\frac{C}{2}$ is equal to

(a) 7/9 (b) 2/9 (c) 1/3 (d) 2/3

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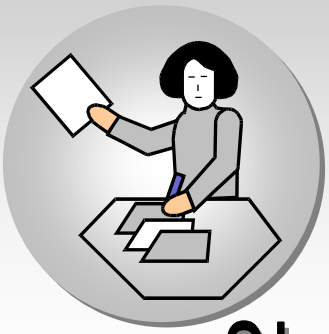

Answer Sheet

Trigonometrical Ratios, Functions and Assignment (Basic & Advance Level)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
b	b	b	d	b	d	a	c	a	b	a	b	c	a	b	c	c	c	c	c
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
b	d	a	a	b	a	d	a	c	b,d	d	c	c	b	b	a	a	d	d	d
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
a	a	c	c	b	b	a	d	a	c	a	c	a	c	a	d	b	c	d	d
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
b	a	d	c	a	a	b	b	a	a	a	a	c	d	b	d	c	b	a	c

81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
b	a	a	a	b	d	d	d	c	a	b	a	d	d	d	a	a	a, b	d	c
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
a	b	b	c	c	c	a	b	b	c	d	b	d	c	b	c	b	c	b	b
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
c	a	a	c	b	a	b	c	a	a	a, c	b	b	b	c	a	d	b	c	d
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156				
b	d	b	d	b	a	a	c	d	c	b	a	b	b	c	a				