42. If $\mu_n = \cos^n a + \sin^n a$, then the value of $2\mu_6 - 3\mu_4 + 1$ is
(A) 0 (B) 1
(C) 4 (D) 6

43. If $x_n = \sin^n\theta + \cos^n\theta$ and $y_n = \sin^n\theta . \cos^n\theta$ then the value of $x_4 + 2y_2$.
(A) 1 (B) 0
(C) –1 (D) 2

44. The value of cos 10°– sin10° is :
(A) Positive (B) Negative
(C) 0 (D) 1

45. $\dfrac{\sqrt{1+\sin\theta}+\sqrt{1-\sin\theta}}{\sqrt{1+\sin\theta}-\sqrt{1-\sin\theta}} = ?$
(A) cosec θ + cot θ
(B) cosecθ + tanθ
(C) secθ + tanθ
(D) cosecθ+ cosθ

46. If tanθ+ sinθ = m and tanθ – sinθ = n, then the value of $m^2 - n^2$ is :
(A) $4\sqrt{mn}$ (B) $2\sqrt{mn}$
(C) $\sqrt{mn}$ (D) $-\sqrt{mn}$

47. If cosec θ – sinθ = m and sec θ – cos θ = n, then the value of $m^2n^2 (m^2 + n^2 + 3)$ is:
(A) 0 (B) 1
(C) 3 (D) 4

48. If sinθ+ cosecθ = 2, then the value of $\sin^{100}\theta + \dfrac{1}{\sin^{100}\theta}$ is:
(A) 0 (B) 1
(C) 2 (D) –1

49. If tanθ+ cotθ = 2, then the value of $\tan^{100}\theta + \dfrac{1}{\tan^{100}\theta}$ is:
(A) 0 (B) 1
(C) 3 (D) 2

50. If cos θ + sec θ = 2, then the value of $\cos^{66}\theta + \dfrac{1}{\cos^{66}\theta}$ is:
(A) 0 (B) 1
(C) 2 (D) –1

51. If $\text{cosec}^2\theta + \cot^2\theta = \dfrac{7}{12}$, then the value of $\text{cosec}^4\theta - \cot^4\theta$ is:
(A) $\dfrac{7}{12}$ (B) $\dfrac{1}{2}$
(C) $\dfrac{5}{12}$ (D) 1

52. If $\sin\theta + \cos\theta = \sqrt{2}$, then the value of θ is:
(A) $\dfrac{\pi}{4}$ (B) $\dfrac{\pi}{3}$
(C) $\dfrac{\pi}{6}$ (D) $\dfrac{\pi}{2}$

53. If $\dfrac{1+\tan 20°}{1-\tan 20°} = \tan\theta$, then the value of θ is:
(A) 20° (B) 40°
(C) 65° (D) 25°

54. If $\tan(2x + y)\tan(x - y) = 1$, then the value of sin$x$ is :
(A) $\dfrac{1}{2}$ (B) $\dfrac{\sqrt{3}}{2}$
(C) $\dfrac{1}{\sqrt{2}}$ (D) 1

55. $1 - \dfrac{\sin^2\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{\sin\theta} - \dfrac{\sin\theta}{1-\cos\theta}$ is:
(A) 0 (B) 1
(C) sin θ (D) cosθ

56. If A, B, and C be the angles of a triangle, then which of the following is incorrect:
(A) $\sin\left(\dfrac{A+B}{2}\right) = \cos\dfrac{C}{2}$
(B) $\cos\left(\dfrac{A+B}{2}\right) = \sin\dfrac{C}{2}$
(C) $\tan\left(\dfrac{A+B}{2}\right) = \sin\dfrac{C}{2}$
(D) $\cot\left(\dfrac{A+B}{2}\right) = \tan\dfrac{C}{2}$

57. If $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 3$ then $\cos\theta_1 + \cos\theta_2 + \cos\theta_3 = ?$
(A) 3 (B) 2
(C) 1 (D) 0

58. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = q$, then the value of $q(p^2 - 1)$ is :
(A) p (B) $2p$
(C) $3p$ (D) 0

59. If $\sec\theta + \tan\theta = x$ then the value of $\frac{x^2-1}{x^2+1}$ is :
(A) $\cos\theta$ (B) $\sin\theta$
(C) $\sec\theta$ (D) $\operatorname{cosec}\theta$

60. If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, then the value of $a^2 + b^2$ is :
(A) $m^2 - n^2$ (B) m^2n^2
(C) $n^2 - m^2$ (D) $m^2 + n^2$

61. $\cot^2\theta\left(\frac{\sec\theta-1}{1+\sin\theta}\right) + \sec^2\theta\left(\frac{\sin\theta-1}{1+\sec\theta}\right) = ?$
(A) 1 (B) 0
(C) $\cot\theta$ (D) $\sec\theta$

62. $\frac{\sin A - \sin B}{\cos A + \cos B} + \frac{\cos A - \cos B}{\sin A + \sin B} = ?$
(A) 1 (B) 0
(C) -1 (D) 2

63. The value of $(\sec\theta - \cos\theta)(\operatorname{cosec}\theta - \sin\theta)(\tan\theta + \cot\theta)$ is :
(A) 1 (B) 0
(C) 2 (D) -1

64. If $1 + \sin\theta + \sin^2\theta + \sin^3\theta \ldots\ldots \infty = 4 + 2\sqrt{3}$ $(0 < \theta < \pi)$ then the value of θ is
(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$
(C) $\frac{\pi}{3}$ or $\frac{\pi}{6}$ (D) $\frac{\pi}{3}$ or $\frac{2\pi}{3}$

65. If $\sec\theta + \tan\theta = 2 + \sqrt{5}$ then the value of $\sin\theta + \cos\theta$ is:
(A) $\frac{3}{\sqrt{5}}$ (B) $\sqrt{5}$
(C) $\frac{7}{\sqrt{5}}$ (D) $\frac{1}{\sqrt{5}}$

66. If $4x = \sec\theta$ and $\frac{4}{x} = \tan\theta$ then the value of $8\left(x^2 - \frac{1}{x^2}\right)$ is:
(A) $\frac{1}{2}$ (B) $\frac{1}{4}$
(C) $\frac{1}{16}$ (D) $\frac{1}{8}$

67. If $(1 - \sin\alpha)(1 - \sin\beta)(1 - \sin\gamma) = (1 + \sin\alpha)(1 + \sin\beta)(1 + \sin\gamma)$ then each side is equal to :
(A) $\pm \sin\alpha \sin\beta \sin\gamma$
(B) $\pm \cos\alpha \cos\beta \cos\gamma$
(C) $\pm \operatorname{cosec}\alpha \operatorname{cosec}\beta \operatorname{cosec}\gamma$
(D) $\pm \sec\alpha \sec\beta \sec\gamma$

68. If $x + y < 90°$ and $\sin(2x - 20°) = \cos(2y + 20°)$ then the value of $\sec(x + y)$ is :
(A) $\sqrt{2}$ (B) $\frac{1}{\sqrt{2}}$
(C) 1 (D) 0

69. If $12\sin\theta + 5\cos\theta = 13$ then the value of $\tan\theta$ is:
(A) $\frac{12}{5}$ (B) $\frac{5}{12}$
(C) $\frac{12}{13}$ (D) $\frac{5}{13}$

70. If $\tan\theta - \cot\theta = a$ and $\cos\theta - \sin\theta = b$ then the value of $(a^2 + 4)(b^2 - 1)^2$ is:
(A) 1 (B) 2
(C) 3 (D) 4

71. $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = ?$
(A) $\frac{1+\sin\theta}{\cos\theta}$ (B) $\frac{1-\sin\theta}{\cos\theta}$
(C) $-\frac{\cos\theta}{1+\sin\theta}$ (D) $-\frac{\cos\theta}{1-\sin\theta}$

72. $(\sec\theta.\sec a + \tan\theta.\tan a)^2 - (\sec\theta.\tan a + \tan\theta.\sec a)^2$ is equal to :
(A) 1 (B) 0
(C) 2 (D) -1

73. $\frac{7\pi}{12}$ radian is equal to:
(A) 75° (B) 105°
(C) 135° (D) 165°

74. If $(\text{cosec}A - \cot A)(\text{cosec}B - \cot B)(\text{cosec}C - \cot C) = (\text{cosec}A + \cot A)(\text{cosec}B + \cot B)(\text{cosec}C + \cot C)$ then each side is equal to :
(A) 0 (B) 1
(C) −1 (D) ± 1

75. If the arcs of the same length in two circles subtend angles of 75° and 120° at the centre, then the ratio of their diameters is:
(A) 5 : 8 (B) 8 : 5
(C) 4 : 5 (D) 5 : 4

76. The length of arc 40 cm in a circle subtend angle $22\frac{1^\circ}{2}$ at the centre, then the radius is equal to :
(A) 92 cm (B) 102 cm
(C) 96 cm (D) 108 cm

77. The length of arc 16 cm in a circle and radius 50 cm. Find the angle subtended at the centre by this arc. (approximately)
(A) 18° 25′ (B) 18° 35′
(C) 18° 20′ (D) 18° 18′

78. The maximum value of $3\cos\theta + 4\sin\theta$ is:
(A) 5 (B) 7
(C) 10 (D) 1

79. The maximum value of $3\cos\theta + 4\sin\theta + 5$ is:
(A) 5 (B) 10
(C) 0 (D) 1

80. The maximum value of $\sin\left(x+\frac{\pi}{6}\right) + \cos\left(x+\frac{\pi}{6}\right)$ is:
(A) $\sqrt{2}$ (B) 1
(C) $\sqrt{7}$ (D) 2

81. The minimum value of $2\sin^2\theta + 3\cos^2\theta$ is:
(A) 1 (B) 2
(C) 3 (D) 5

82. The maximum value of $3\sin^2\theta + 4\cos^2\theta$ is:
(A) 1 (B) 2
(C) 3 (D) 4

83. The minimum value of $4\tan^2\theta + 9\cot^2\theta$ is:
(A) 13 (B) 12
(C) 4 (D) 9

84. The minimum value of $9\cos^2\theta + 16\sec^2\theta$ is:
(A) 25 (B) 24
(C) 9 (D) 16

85. The minimum value of $25\sin^2\theta + 49\,\text{cosec}^2\theta$ is:
(A) 74 (B) 70
(C) 25 (D) 4

86. The minimum value of $4\sec^2\theta + 9\,\text{cosec}^2\theta$ is:
(A) 13 (B) 24
(C) 25 (D) 4

87. The maximum value of $\sin^8\theta + \cos^{14}\theta$ is:
(A) 1 (B) 2
(C) $\sqrt{2}$ (D) $\frac{1}{\sqrt{2}}$

88. If $A = \cos^2 x + \sec^2 x$, its value always is:
(A) $f(x) < 1$ (B) $f(x) = 1$
(C) $f(x)$ 2 (D) $f(x) \le 2$

89. The minimum value of $2^{3\sin\theta}.16^{\cos\theta}$ is:
(A) 32 (B) $\frac{1}{32}$
(C) 64 (D) $\frac{1}{64}$

90. The maximum value of $64^{\sin\theta} \times 256^{\cos\theta}$ is:
(A) 1024 (B) $\frac{1}{1024}$
(C) $\frac{1}{512}$ (D) 512

91. The minimum value of $\sin^2\theta + \cos^2\theta + \sec^2\theta + \text{cosec}^2\theta + \tan^2\theta + \cot^2\theta$ is: $(0 < \theta < 90°)$

(A) 4 (B) 6
(C) 7 (D) 8

92. The minimum and maximum value of $\sin\theta + \cos\theta$ is:

(A) $-\sqrt{2}$ and $\sqrt{2}$ (B) -2 and 2
(C) $-\sqrt{2}$ and $\frac{1}{\sqrt{2}}$ (D) $-\sqrt{2}$ and 1

93. If $\tan^5\theta + \cot^5\theta = 2525$ then the value of $\sec\theta.\text{cosec}\,\theta$ is :

(A) 3 (B) 4
(C) 5 (D) None of these

94. If $\cos\theta + \sec\theta = 4$ then the value of $\cos^4\theta + \sec^4\theta$ is :

(A) 196 (B) 194
(C) 198 (D) 14

95. If $\sin\theta + \text{cosec}\,\theta = t$ then the value of $\sin^5\theta + \text{cosec}^5\theta$ is :

(A) $t^5 - 5t^3 + 5t$ (B) $t^5 + 5t^3 + 5t$
(C) $t^5 - 5t^3 - 5t$ (D) $t^5 + 5t^3 - 5t$

96. If $\tan^2\theta + \cot^2\theta + 1 = 0$ then the value of $\tan^{66}\theta + \tan^{36}\theta + \tan^{18}\theta + \tan^{12}\theta + 1$ is :

(A) 1 (B) 0
(C) 5 (D) None of these

97. If $\tan^2\theta - 30\tan\theta = -225$ then the value of $\tan^5\theta - 16\tan^4\theta + 16\tan^3\theta - 16\tan^2\theta + 16\tan\theta + 16$ is:

(A) 30 (B) 31
(C) 1 (D) 0

98. $\sin20°.\sin40°.\sin80° = ?$

(A) 1 (B) 16
(C) $\frac{\sqrt{3}}{16}$ (D) $\frac{\sqrt{3}}{8}$

99. $\sin\theta.\sin(60 - \theta).\sin(60 + \theta) = ?$

(A) $\sin3\theta$ (B) $\frac{1}{4}\sin3\theta$
(C) $\frac{1}{2}\sin3\theta$ (D) $4\sin3\theta$

100. $4\cos\theta.\cos(60 - \theta).\cos(60 + \theta) = ?$

(A) $\cos3\theta$ (B) $\frac{1}{4}\cos3\theta$
(C) $\frac{1}{2}\cos\theta$ (D) $4\cos3\theta$

101. $\tan\theta.\tan(60 - \theta).\tan(60 + \theta) = ?$

(A) $\tan3\theta$ (B) $\frac{1}{4}\tan3\theta$
(C) $\frac{1}{2}\tan3\theta$ (D) $4\tan3\theta$

102. $\cos20°.\cos40°.\cos60°.\cos80° = ?$

(A) 1 (B) 16
(C) $\frac{1}{16}$ (D) $\frac{1}{8}$

103. $\tan20°.\tan40°.\tan60°.\tan80° = ?$

(A) 1 (B) 2
(C) 3 (D) $\sqrt{3}$

104. The $\sin12°\sin48°\sin54°$ is :

(A) $\frac{1}{4}$ (B) $\frac{1}{8}$
(C) $\frac{1}{16}$ (D) $\frac{1}{64}$

105. The value of $\tan6°\tan42°\tan66°\tan78°$ is :

(A) 1 (B) $\frac{1}{2}$
(C) $\frac{1}{8}$ (D) $\frac{1}{4}$

106. The value of $\cos6°\cos42°\cos66°\cos78°$ is :

(A) 1 (B) $\frac{1}{2}$
(C) $\frac{1}{4}$ (D) $\frac{1}{16}$

107. $\cos15°.\sin7\frac{1°}{2}\cos7\frac{1°}{2} = ?$

(A) $\frac{1}{8}$ (B) $\frac{1}{2}$
(C) $\frac{1}{4}$ (D) $\frac{1}{16}$

108. $\sin\frac{\pi}{24}.\cos\frac{\pi}{24}.\cos\frac{\pi}{12} = ?$

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$

(C) $\frac{1}{8}$ (D) $\frac{1}{16}$

109. $\tan9° - \tan27° - \tan 63° + \tan81° = ?$

(A) 2 (B) 3

(C) 4 (D) 1

110. $\sin\frac{\pi}{9}.\sin\frac{2\pi}{9}.\sin\frac{3\pi}{9}.\sin\frac{4\pi}{9} = ?$

(A) $\frac{1}{16}$ (B) $\frac{3}{16}$

(C) $\frac{1}{8}$ (D) $\frac{3}{8}$

111. $\cos\frac{\pi}{9}.\cos\frac{2\pi}{9}.\cos\frac{3\pi}{9}.\cos\frac{4\pi}{9} = ?$

(A) $\frac{1}{16}$ (B) $\frac{3}{16}$

(C) $\frac{1}{8}$ (D) $\frac{3}{8}$

112. If (secA – tanA) (secB – tanB) (secC – tanC) = (secA + tanA) (secB + tanB) (secC + tanC) then each side is equal to :

(A) 0 (B) 1

(C) –1 (D) ± 1

113. Find the value of

$\cos^4\frac{\pi}{8} + \cos^4\frac{3\pi}{8} + \cos^4\frac{5\pi}{8} + \cos^4\frac{7\pi}{8}$.

(A) 1 (B) – 1

(C) 0 (D) $\frac{3}{2}$

114. $\frac{2}{\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4x}}}} = ?$

(A) sec$x$ (B) sec$\frac{x}{2}$

(C) cosec$x$ (D) 1

115. $\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right) = ?$

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$

(C) $\frac{1}{8}$ (D) $\frac{1}{16}$

116. $\tan\alpha = \frac{n}{n+1}$ and $\tan\beta = \frac{1}{2n+1}$ then $\alpha+\beta$ is :

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$

(C) $\frac{\pi}{5}$ (D) $\frac{\pi}{6}$

117. $\tan\alpha = \frac{5}{6}$ and $\tan\beta = \frac{1}{11}$ then $\alpha+\beta$ is :

(A) $\frac{\pi}{4}$ (B) $-\frac{\pi}{4}$

(C) $\frac{\pi}{3}$ (D) $-\frac{\pi}{3}$

118. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$ then the value of $\frac{\tan x}{\tan y}$ is :

(A) 1 (B) 0

(C) $\frac{a}{b}$ (D) $\frac{b}{a}$

119. $\sin\theta.\cos^3\theta - \cos\theta.\sin^3\theta = ?$

(A) $\frac{1}{4}\sin4\theta$ (B) $\frac{1}{2}\sin4\theta$

(C) $\sin4\theta$ (D) $\frac{1}{8}\sin4\theta$

120. $\frac{1}{\tan3A - \tan A} - \frac{1}{\cot3A - \cot A} = ?$

(A) tan2A (B) cot2A

(C) tan$A$ (D) cot$A$

121. $\frac{\sin\theta + \sin 3\theta + \sin 5\theta + \sin 7\theta}{\cos\theta + \cos 3\theta + \cos 5\theta + \cos 7\theta} = ?$

(A) $\tan 4\theta$ (B) $\tan 6\theta$

(C) $\tan 8\theta$ (D) $\tan 16\theta$

122. $\frac{\sin 2\theta - \sin 2\alpha}{\cos 2\theta + \cos 2\alpha} = ?$

(A) $\tan 2(\theta - \alpha)$ (B) $\tan(\theta + \alpha)$

(C) $\tan(\theta - \alpha)$ (D) $-\tan(\theta + \alpha)$

123. $\text{cosec}10° - \sqrt{3}\sec 10° = ?$

(A) 0 (B) 2

(C) 3 (D) 4

124. $\tan 40° + \tan 20° + \sqrt{3}\tan 20°\tan 40° = ?$

(A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$

(C) 1 (D) 0

125. If $\sin\theta = \sin 15° + \sin 45°$, $(0° < \theta < 90°)$, then the value of θ is :

(A) 45° (B) 60°

(C) 54° (D) 75°

126. If $\sin\theta + \cos\theta = m$ and $\sin^3\theta + \cos^3\theta = n$ then

(A) $m^3 - 3m + n = 0$

(B) $n^3 - 3n + 2m = 0$

(C) $m^3 - 3m + 2n = 0$

(D) $m^3 + 3m + 2n = 0$

Answer-key

1.(C)	2. (B)	3. (B)	4.(B)	5. (B)	6.(D)	7. (C)	8. (A)	9. (B)	10.(C)
11.(A)	12.(C)	13.(D)	14.(D)	15.(B)	16.(C)	17.(A)	18.(B)	19.(D)	20.(C)
21.(A)	22.(A)	23.(C)	24.(C)	25.(C)	26.(D)	27.(C)	28.(C)	29.(C)	30.(A)
31.(A)	32.(C)	33.(C)	34.(C)	35.(C)	36.(A)	37.(C)	38.(C)	39.(C)	40.(A)
41.(B)	42.(A)	43.(A)	44.(A)	45.(A)	46.(A)	47.(B)	48.(C)	49.(D)	50.(C)
51.(A)	52.(A)	53.(C)	54.(A)	55.(D)	56.(C)	57.(D)	58.(B)	59.(B)	60.(D)
61.(B)	62. (B)	63. (A)	64.(D)	65. (A)	66.(A)	67. (B)	68. (A)	69. (A)	70.(D)
71.(A)	72. (A)	73. (B)	74.(D)	75. (B)	76.(B)	77. (C)	78. (A)	79. (B)	80 (A)
81.(B)	82.(D)	83.(B)	84.(B)	85.(B)	86.(C)	87.(A)	88.(C)	89.(B)	90.(A)
91.(C)	92.(A)	93.(C)	94.(B)	95.(A)	96.(C)	97.(B)	98.(D)	99.(B)	100.(A)
101.(A)	102.(C)	103.(C)	104.(B)	105.(A)	106.(D)	107.(A)	108.(C)	109.(C)	110.(B)
111.(A)	112.(D)	113.(D)	114.(B)	115.(C)	116.(B)	117.(A)	118.(C)	119.(A)	120.(B)
121.(A)	122.(C)	123.(D)	124.(A)	125.(D)	126.(C)				

Solution

1. (C) $\sin^2 1° + \sin^2 2° + \ldots\ldots + \sin^2 45° + \ldots\ldots + \sin^2 88° + \sin^2 89°$

$= (\sin^2 1° + \sin^2 89°) + (\sin^2 2° + \sin^2 88°) + \ldots + (\sin^2 44° + \sin^2 46°) + \sin^2 45°$

$= 1 + 1 + 1 + \ldots\ldots \text{ 44 times } + \frac{1}{2}$

$= 44\frac{1}{2}$

2. (B) $\cos^2 5° + \cos^2 10° + \cos^2 45° + \ldots\ldots + \cos^2 80° + \cos^2 85° + \cos^2 90°$

$= (\cos^2 5° + \cos^2 85°) + (\cos^2 10° + \cos^2 80°) + \ldots\ldots (\cos^2 40° + \cos^2 50°) + \cos^2 45° + \cos^2 90°$

$= 1 + 1 + \ldots\ldots \text{ 8 times } + \frac{1}{2} + 0$

$= 8\frac{1}{2}$

3. (B) $\sec\theta + \tan\theta = 4$ ...(i)

$\sec^2\theta - \tan^2\theta = 1$

$(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

$\sec\theta - \tan\theta = \frac{1}{4}$ ...(ii)

Adding equation *(i)* and *(ii)*

$2\sec\theta = 4 + \frac{1}{4} = \frac{17}{4}$

$\cos\theta = \frac{8}{17}$

Subtracting equation *(ii)* from *(i)*

$2\tan\theta = 4 - \frac{1}{4} = \frac{15}{4}$

$\frac{\sin\theta}{\cos\theta} = \frac{15}{8}$

$\sin\theta = \frac{15}{8} \times \frac{8}{17} = \frac{15}{17}$

4. (B) $\operatorname{cosec}\theta - \cot\theta = 5$

$\operatorname{cosec}^2\theta - \cot^2\theta = 1$ ...(i)

$(\operatorname{cosec}\theta + \cot\theta)(\operatorname{cosec}\theta - \cot\theta) = 1$

$\operatorname{cosec}\theta + \cot\theta = \frac{1}{5}$ ...(ii)

Adding equation *(i)* and *(ii)*

$2\operatorname{cosec}\theta = 5 + \frac{1}{5} = \frac{26}{5}$

$\sin\theta = \frac{5}{13}$

$\cos\theta = \sqrt{1 - \sin^2\theta}$

$= \sqrt{1 - \left(\frac{5}{13}\right)^2} = \frac{12}{13}$

5. (B) $\tan 25°.\tan 55°.\tan 65°.\tan 35°$

$= \tan 25°.\tan(90° - 25°).\tan 65°.\tan(90° - 65°)$

$= \tan 25°.\cot 25°.\tan 65°.\cot 65°$

$= 1 \times 1 = 1$

6. (D) $\tan 1°.\tan 2°.\ldots\ldots\tan 88°.\tan 89°$

$= (\tan 1°.\tan 89°) \times (\tan 2°.\tan 88°) \times \ldots\ldots \times (\tan 44°.\tan 46°).\tan 45°$

$= 1 \times 1 \times \ldots\ldots \times 1 \times 1 = 1$

7. (C) $\tan\theta.\tan 2\theta = 1$

So,

$\theta + 2\theta = 90°$

$3\theta = 90° \Rightarrow 2\theta = 60°$

$\sin^2 2\theta + \tan^2 2\theta = \sin^2 60° + \tan^2 60°$

$= \frac{3}{4} + 3 = 3\frac{3}{4}$

8. (A) $\tan 2\theta.\tan 4\theta = 1$

So,

$2\theta + 4\theta = 90° \Rightarrow 3\theta = 45°$

$\sin 3\theta - \cos 3\theta = \sin 45° - \cos 45°$

$= \frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}} = 0$

9. (B) $\cot\frac{\pi}{20}\cdot\cot\frac{3\pi}{20}\cdot\cot\frac{5\pi}{20}\cdot\cot\frac{7\pi}{20}\cdot\cot\frac{9\pi}{20}$

$= \left(\cot\frac{\pi}{20}\cdot\cot\frac{9\pi}{20}\right)\left(\cot\frac{3\pi}{20}\cdot\cot\frac{7\pi}{20}\right)\cot\frac{5\pi}{20}$

$= 1 \times 1 \times 1 = 1$

10. (C) $\cos 7° \times \cos 23° \times \cos 30° \times \text{cosec } 83° \times \text{cosec } 67°$

$= \sin 83° \times \sin 67 \times \frac{\sqrt{3}}{2} \times \frac{1}{\sin 83°} \times \frac{1}{\sin 67°} = \frac{\sqrt{3}}{2}$

11. (A) $\frac{\cos(90°-\theta)\sin(270°+\theta).\cot(180°-\theta)}{\tan(90°+\theta)\sec(90°+\theta)\cos(360°-\theta)}$

$= \frac{(\sin\theta)(-\cos\theta)(-\cot\theta)}{(-\cot\theta)(-\text{cosec}\,\theta)(\cos\theta)} = \sin^2\theta$

12. (C) $(\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2$

$= 2(\sin^2\theta + \cos^2\theta) = 2$

13. (D) $\sin\theta + \cos\theta = \frac{7}{5}$

Squaring on both side

$\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = \frac{49}{25}$

$2\sin\theta\cos\theta = \frac{49}{25} - 1 = \frac{24}{25}$

$\sin\theta\cos\theta = \frac{12}{25}$

14. (D) $\sin\theta + \cos\theta = \frac{17}{13}$

Squaring both side

$\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = \frac{289}{169}$

$2\sin\theta\cos\theta = \frac{289}{169} - 1 = \frac{120}{169}$ ...(i)

$\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta = 1 - \frac{120}{169}$

$(\sin\theta - \cos\theta)^2 = \frac{49}{169} = \left(\frac{7}{13}\right)^2$

$\sin\theta - \cos\theta = \frac{7}{13}$

15. (B) $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 7$

$\frac{\cos\theta(\tan\theta + 1)}{\cos\theta(\tan\theta - 1)} = \frac{7}{1}$

Using C & D method

$\frac{\tan\theta + 1 + \tan\theta - 1}{\tan\theta + 1 - \tan\theta + 1} = \frac{7+1}{7-1}$

$\frac{2\tan\theta}{2} = \frac{8}{6}$

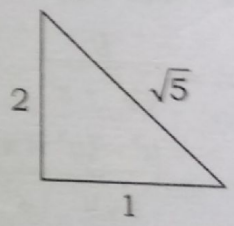
$\tan\theta = \frac{4}{3}$

16. (C) $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 3$

Using C & D method

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

$\frac{2\sin\theta}{2\cos\theta} = \frac{4}{2} \Rightarrow \tan\theta = \frac{2}{1}$



$\sin^4\theta - \cos^4\theta = \left(\frac{2}{\sqrt{5}}\right)^4 - \left(\frac{1}{\sqrt{5}}\right)^4$

$= \frac{16}{25} - \frac{1}{25} = \frac{3}{5}$

17. (A) $\frac{\tan\theta + \cot\theta}{\tan\theta - \cot\theta} = 2$

Using C & D method

$\frac{\tan\theta + \cot\theta + \tan\theta - \cot\theta}{\tan\theta + \cot\theta - \tan\theta + \cot\theta} = \frac{2+1}{2-1}$

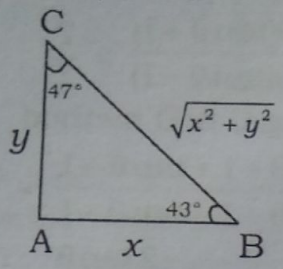
$\frac{\tan\theta}{\cot\theta} = 3 \Rightarrow \tan^2\theta = 3$

$\sin^2\theta = 3(1 - \sin^2\theta)$

$\sin^2\theta + 3\sin^2\theta = 3$

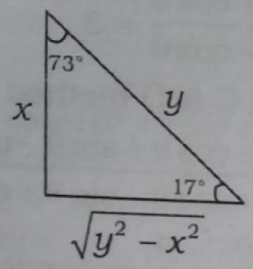
$\sin\theta = \frac{\sqrt{3}}{2}$

18. (B) $\cos 43° = \frac{x}{\sqrt{x^2+y^2}}$



$\tan 47° = \frac{x}{y}$

19. (D) $\sin 17° = \frac{x}{y}$



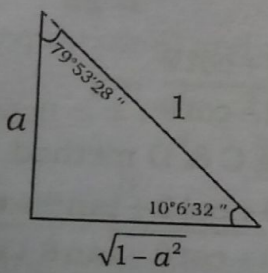
$\sec 17° - \sin 73°$

$= \frac{y}{\sqrt{y^2-x^2}} - \frac{\sqrt{y^2-x^2}}{y}$

$= \frac{y^2-(y^2-x^2)}{y\sqrt{y^2-x^2}}$

$= \frac{x^2}{y\sqrt{y^2-x^2}}$

20. (C) $\sin(10°6'32'') = a$

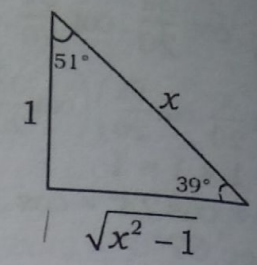


$\cos(79°53'28'') + \tan(10°6'32'')$

$= \frac{a}{1} + \frac{a}{\sqrt{1-a^2}}$

$= \frac{a\left(\sqrt{1-a^2}+1\right)}{\sqrt{1-a^2}}$

21. (A) $\operatorname{cosec} 39° = x$



$\frac{1}{\operatorname{cosec}^2 51°} + \sin^2 39° + \tan 51° - \frac{1}{\sin^2 51° \sec^2 39°}$

$= \sin^2 51° + \sin^2 39° + \tan 51° - \frac{\cos^2 39°}{\sin^2 51°}$

$= \sin^2 51° + \cos^2 51° + \tan 51° - \frac{\cos^2 39°}{\cos^2 39°}$

$= 1 + \sqrt{x^2-1} - 1 = \sqrt{x^2-1}$

22. (A) $\cot 18°$

$\left(\cot 72° \times \cos^2 22° + \frac{1}{\tan 72° \sec^2 62°}\right)$

$= \tan 72° \left(\frac{\cos^2 22°}{\tan 72°} + \frac{\cos^2 68°}{\tan 72°}\right)$

$= \cos^2 22° + \cos^2 68° = 1$

23. (C) $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} + \sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$

$= \frac{1+\cos\theta+1-\cos\theta}{\sqrt{1-\cos^2\theta}} = \frac{2}{\sin\theta}$

$= 2\operatorname{cosec}\theta$

24. (C) $2\cos\theta - \sin\theta = \frac{1}{\sqrt{2}}$

Put $\theta = 45°$

$2\cos 45° - \sin 45° = \frac{2}{\sqrt{2}} - \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$

$2\cos\theta + \sin\theta = 2\cos 45° + \sin 45°$

$= \frac{2}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \frac{3}{\sqrt{2}}$

25.(C) $\sin\theta + \frac{1}{\sin\theta} = \frac{7}{2\sqrt{3}} = \frac{\sqrt{3}}{2} + \frac{2}{\sqrt{3}}$

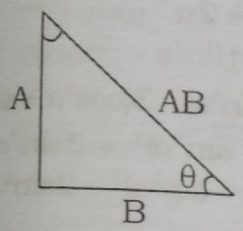
So, $\sin\theta = \frac{\sqrt{3}}{2} \Rightarrow \theta = 60°$

26.(D) $\sec\theta = A$ and $\operatorname{cosec}\theta = B$

$\cos\theta = \frac{1}{A}$ and $\sin\theta = \frac{1}{B}$

$\sin^2\theta + \cos^2\theta = \frac{1}{A^2} + \frac{1}{B^2}$

$1 = \frac{B^2 + A^2}{(AB)^2}$



$A^2 + B^2 = (AB)^2$

27.(C) $\log \tan 1° + \log \tan 2° + \log \tan 3° + \ldots\ldots + \log \tan 89°$

$= \log [\tan 1°.\tan 2°.\tan 3°.\tan 44°.\tan 45°.\cot 44°\ldots\cot 3°.\cot 2°.\cot 1°]$

$\because \tan\theta = \frac{1}{\cot\theta}$

$= \log [\tan 1°.\tan 2°.\tan 3°\ldots.\tan 89°]$

$= \log [1] = 0$

28.(C) $\cos^2\theta - \sin^2\theta = \frac{1}{3}$

$\cos^4\theta - \sin^4\theta + 1$

$= (\cos^2\theta - \sin^2\theta)(\cos^2\theta + \sin^2\theta) + 1$

$= \frac{1}{3} \times 1 + 1 = \frac{4}{3}$

29.(C) $(\sec A - \cos A)^2 + (\operatorname{cosec} A - \sin A)^2 - (\cot A - \tan A)^2$

$= \sec^2 A + \cos^2 A - 2 + \operatorname{cosec}^2 A + \sin^2 A - 2 - \cot^2 A - \tan^2 A + 2$

$= (\sec^2 A - \tan^2 A) + (\operatorname{cosec}^2 A - \cot^2 A) + (\sin^2 A + \cos^2 A) - 2 - 2 + 2$

$= 1 + 1 + 1 - 2 = 1$

30.(A) $\sin^4\theta + \cos^4\theta$

$= (\sin^2\theta)^2 + (\cos^2\theta)^2 + 2\sin^2\theta\cos^2\theta - 2\sin^2\theta\cos^2\theta$

$= (\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta$

$= 1 - 2\sin^2\theta\cos^2\theta$

31.(A) $\sin^6\theta + \cos^6\theta$

$= (\sin^2\theta + \cos^2\theta)^3 - 3\sin^2\theta\cos^2\theta (\sin^2\theta + \cos^2\theta)$

$= 1 - 3\sin^2\theta\cos^2\theta$

32.(C) $\sin^2 a + \sin^2 b = 2$

$a = b = 90°$

$\cos\left(\frac{a+b}{2}\right) = \cos\left(\frac{90° + 90°}{2}\right)$

$= \cos 90°$

$= 0$

33.(C) $\frac{\cos^2\theta}{\cot^2\theta - \cos^2\theta} = 3$

$\frac{\cos^2\theta}{\cos^2\theta\left[\frac{1}{\sin^2\theta} - 1\right]} = 3$

$\frac{\sin^2\theta}{\cos^2\theta} = 3 \Rightarrow \tan^2\theta = 3$

$\tan\theta = \sqrt{3} \Rightarrow \theta = 60°$

34.(C) $\sin\theta + \sin^2\theta = 1$

$\sin\theta = 1 - \sin^2\theta = \cos^2\theta$

$\cos^8\theta + 2\cos^6\theta + \cos^4\theta$

$= \sin^4\theta + 2\sin^3\theta + \sin^2\theta$

$= \sin^2\theta(\sin^2\theta + \sin\theta) + \sin\theta(\sin^2\theta + \sin\theta)$

$= \sin^2\theta + \sin\theta$

$= 1$

35.(C) $\sin\theta + \sin^2\theta = 1$

$\sin\theta = 1 - \sin^2\theta = \cos^2\theta$

$\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta$

$= \sin^6\theta + 3\sin^5\theta + 3\sin^4\theta + \sin^3\theta$

$= \sin^6\theta + \sin^5\theta + 2\sin^5\theta + 2\sin^4\theta + \sin^4\theta + \sin^3\theta$

$= \sin^4\theta(\sin^2\theta + \sin\theta) + 2\sin^3\theta(\sin^2\theta + \sin\theta) + \sin^2\theta(\sin^2\theta + \sin\theta)$

$= \sin^4\theta + 2\sin^3\theta + \sin^2\theta$

$= \sin^4\theta + \sin^3\theta + + \sin^3\theta + + \sin^2\theta$

$= \sin^2\theta(\sin^2\theta + \sin\theta) + \sin\theta(\sin^2\theta + \sin\theta)$

$= \sin^2\theta + \sin\theta = 1$

36.(A) $x = r\sin\theta\cos a$

$y = r\sin\theta\sin a$

$z = r\cos\theta$

$x^2 + y^2 + z^2$

$= (r\sin\theta\cos\alpha)^2 + (r\sin\theta\sin\alpha)^2 + (r\cos\theta)^2$

$= r^2\sin^2\theta[\cos^2\alpha + \sin^2\alpha] + r^2\cos^2\theta$

$= r^2[\sin^2\theta + \cos^2\theta]$

$= r^2$

37. (C) $x = 3\cos A\cos B$, $y = 3\cos A\sin B$, $z = 3\sin A$

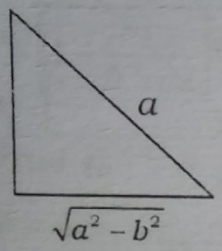
$x^2 + y^2 + z^2$

$= (3\cos A\cos B)^2 + (3\cos A\sin B)^2 + (3\sin A)^2$

$= 9\cos^2 A(\cos^2 B + \sin^2 B) + 9\sin^2 A$

$= 9(\cos^2 A + \sin^2 A) = 9$

38. (C) $\sin\theta = \frac{b}{a}$



$$\sqrt{\frac{a-b}{a+b}} + \sqrt{\frac{a+b}{a-b}} = \frac{a-b+a+b}{\sqrt{a^2-b^2}}$$

$$= 2\left(\frac{a}{\sqrt{a^2-b^2}}\right)$$

$= 2\sec\theta$

39. (C) $\sin\theta + \operatorname{cosec}\theta = 3$

$$\sin\theta + \frac{1}{\sin\theta} = 3$$

$$\frac{\sin^4\theta + 1}{\sin^2\theta} = \sin^2\theta + \frac{1}{\sin^2\theta}$$

$$= \left(\sin\theta + \frac{1}{\sin\theta}\right)^2 - 2$$

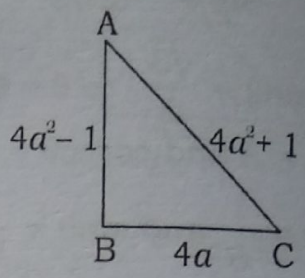
$= (3)^2 - 2 = 7$

40. (A) $\tan\theta = \frac{a}{b}$

$$\left(\frac{a\sin\theta + b\cos\theta}{a\sin\theta - b\cos\theta}\right) = \left(\frac{a\tan\theta + b}{a\tan\theta - b}\right)$$

$$= \left(\frac{a\times\frac{a}{b} + b}{a\times\frac{a}{b} - b}\right) = \frac{a^2+b^2}{a^2-b^2}$$

41. (B) $\sec\theta = a + \frac{1}{4a}$, $\cos\theta = \frac{4a}{4a^2+1}$



$$\tan\theta + \sec\theta = \frac{4a^2-1}{4a} + \frac{4a^2+1}{4a}$$

$$= \frac{4a^2-1+4a^2+1}{4a}$$

$= 2a$

42. (A) $2m_6 - 3m_4 + 1$

$= 2(\cos^6\alpha + \sin^6\alpha) - 3(\cos^4\alpha + \sin^4\alpha) + 1$

$= 2[(\cos^2\alpha + \sin^2\alpha)^3 - 3\sin^2\alpha\cos^2\alpha]$
$- 3[(\cos^2\alpha + \sin^2\alpha)^2 - 2\sin^2\alpha\cos^2\alpha]$
$+ 1$

$= 2 - 6\sin^2\alpha\cos^2\alpha - 3 + 6\sin^2\alpha\cos^2\alpha + 1$

$= 0$

43. (A) $x_n = \sin^n\theta + \cos^n\theta$

$y_n = \sin^n\theta.\cos^n\theta$

$x_4 + 2y_2 = \sin^4\theta + \cos^4\theta + 2\sin^2\theta.\cos^2\theta$

$= (\sin^2\theta + \cos^2\theta)^2$

$= 1$

44. (A)

45. (A) $$\frac{\sqrt{1+\sin\theta} + \sqrt{1-\sin\theta}}{\sqrt{1+\sin\theta} - \sqrt{1-\sin\theta}}$$

$$= \frac{\sqrt{1+\sin\theta} + \sqrt{1-\sin\theta}}{\sqrt{1+\sin\theta} - \sqrt{1-\sin\theta}} \times \frac{\sqrt{1+\sin\theta} + \sqrt{1-\sin\theta}}{\sqrt{1+\sin\theta} + \sqrt{1-\sin\theta}}$$

$$= \frac{1+\sin\theta+1-\sin\theta+2\sqrt{1-\sin^2\theta}}{1+\sin\theta-1+\sin\theta}$$

$$= \frac{2+2\cos\theta}{2\sin\theta} = \operatorname{cosec}\theta + \cot\theta$$

46. (A) $\tan\theta + \sin\theta = m$ ...(i)

$\tan\theta - \sin\theta = n$ ...(ii)

Adding equation (i) and (ii)

$(m + n) = 2\tan\theta$

Subtracting equation (ii) form (i)

$(m - n) = 2\sin\theta$

$m^2 - n^2 = 4\tan\theta.\sin\theta$

$= 4\sqrt{\tan^2\theta.\sin^2\theta}$

$= 4\sqrt{\frac{\sin^2\theta}{\cos^2\theta}(1-\cos^2\theta)}$

$= 4\sqrt{\tan^2\theta - \sin^2\theta}$

$= 4\sqrt{(\tan\theta + \sin\theta)(\tan\theta - \sin\theta)}$

$= 4\sqrt{mn}$

47. (B) $\operatorname{cosec}\theta - \sin\theta = m$

$$m = \frac{1}{\sin\theta} - \sin\theta = \frac{1-\sin^2\theta}{\sin\theta}$$

$$= \frac{\cos^2\theta}{\sin\theta}$$

$\sec\theta - \cos\theta = n$

$$n = \frac{1}{\cos\theta} - \cos\theta = \frac{1-\cos^2\theta}{\cos\theta}$$

$$= \frac{\sin^2\theta}{\cos\theta}$$

$$mn = \frac{\cos^2\theta}{\sin\theta} \times \frac{\sin^2\theta}{\cos\theta} = \sin\theta\cos\theta$$

$$m^2 + n^2 + 3 = \left(\frac{\cos^2\theta}{\sin\theta}\right)^2 + \left(\frac{\sin^2\theta}{\cos\theta}\right)^2 + 3$$

$$= \frac{\cos^6\theta + \sin^6\theta + 3\sin^2\theta\cos^2\theta}{\sin^2\theta\cos^2\theta}$$

$$= \frac{(\cos^2\theta + \sin^2\theta)^3}{\sin^2\theta\cos^2\theta} = \frac{1}{\sin^2\theta\cos^2\theta}$$

$m^2 n^2 (m^2 + n^2 + 3)$

$$= (\sin\theta\cos\theta)^2 \times \frac{1}{\sin^2\theta\cos^2\theta} = 1$$

48. (C) $\sin\theta + \operatorname{cosec}\theta = 2$

So, $\sin\theta = 1$

$$\sin^{100}\theta + \frac{1}{\sin^{100}\theta} = (1)^{100} + \frac{1}{(1)^{100}}$$

$$= 1 + 1 = 2$$

49. (D) $\tan\theta + \cot\theta = 2$

So, $\tan\theta = 1$

$$(1)^{100} + \frac{1}{(1)^{100}} = 1 + 1 = 2$$

50. (C) $\cos\theta + \sec\theta = 2$

So, $\cos\theta = 1$

$$\cos^{66}\theta + \frac{1}{\cos^{66}\theta} = (1)^{66} + \frac{1}{(1)^{66}}$$

$$= 1 + 1 = 2$$

51. (A) $\operatorname{cosec}^2\theta + \cot^2\theta = \frac{7}{12}$ ...(i)

$\operatorname{cosec}^2\theta - \cot^2\theta = \frac{7}{12}$ ...(ii)

Multiply equation (i) and (ii)

$(\operatorname{cosec}^2\theta + \cot^2\theta)(\operatorname{cosec}^2\theta - \cot^2\theta)$

$$= \frac{7}{12} \times 1$$

$$\operatorname{cosec}^4\theta - \cot^4\theta = \frac{7}{12}$$

52. (A) $\sin\theta + \cos\theta = \sqrt{2}$

Squaring on both side

$\sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = 2$

$1 + \sin 2\theta = 2$

$$\sin 2\theta = 1 = \sin\frac{\pi}{2}$$

$$2\theta = \frac{\pi}{2} \Rightarrow \theta = \frac{\pi}{4}$$

53. (C) $\frac{1+\tan 20^\circ}{1-\tan 20^\circ} = \tan\theta$

$$\tan\theta = \frac{\tan 45^\circ + \tan 20^\circ}{1 - \tan 45^\circ \tan 20^\circ}$$

$\tan\theta = \tan(45^\circ + 20^\circ)$

$\theta = 65^\circ$

54. (A) $\tan(2x + y)\tan(x - y) = 1$

i.e. $2x + y + x - y = 90^\circ$

$x = 30^\circ$

$$\sin x = \sin 30^\circ = \frac{1}{2}$$