31. Simplified value of $(\sec A - \cos A)^2 + (\text{cosec } A - \sin A)^2 - (\cot A - \tan A)^2$ is :

(A) 0 (B) $\frac{1}{2}$

(C) 1 (D) 2

32. If θ is acute and $7\sin^2\theta + 3\cos^2\theta = 4$ then the value of $\tan\theta$ is :

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

(C) 1 (D) 0

33. If θ is acute and $\tan\theta + \cot\theta = 2$ then $\tan^5\theta + \cot^{10}\theta$ is equal to :

(A) 1 (B) 2

(C) 3 (D) 4

34. If $\sin\theta - \cos\theta = \frac{7}{13}$ and $0 < \theta < 90^\circ$ then the numeric value of $\sin\theta + \cos\theta$ is equal to :

(A) $\frac{17}{13}$ (B) $\frac{13}{17}$

(C) $\frac{1}{13}$ (D) $\frac{1}{17}$

35. $\sin^2 1^\circ + \sin^2 3^\circ + \sin^2 5^\circ \ldots\ldots \sin^2 85^\circ + \sin^2 87 + \sin^2 89$ is equal to :

(A) $21\frac{1}{2}$ (B) 22

(C) $22\frac{1}{2}$ (D) $23\frac{1}{2}$

36. If $\tan(\alpha + \beta) = 1$ and $\tan(\alpha - \beta) = \frac{1}{\sqrt{3}}$ then find the value of $\tan(2\alpha + 2\beta)$:

(A) Positive Integer

(B) Negative Integer

(C) Zero

(D) Infinite

37. $\sin\theta + \text{cosec}\theta = 2$ and $0^\circ \le \theta \le 90^\circ$ then the value of $\sin^5\theta + \text{cosec}^5\theta$ is :

(A) 0 (B) 1

(C) 10 (D) 2

38. $2\cos\theta - \sin\theta = \frac{1}{\sqrt{2}}$ $(0^\circ < \theta < 90^\circ)$ then $2\sin\theta + \cos\theta$ is equal to :

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

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

39. If $a\cos\theta + b\sin\theta = c$, then $(a\sin\theta - b\cos\theta)^2$:

(A) $a^2 + b^2 + c^2$ (B) $a^2 + b^2$

(C) $a^2 + b^2 - c^2$ (D) 0

40. If A lies in the third quadrant and $3\tan A - 4 = 0$, then find the value of $5\sin 2A + 3\sin A + 4\cos A$.

(A) −1 (B) − 2

(C) 0 (D) +1

41. If $x = \sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$, then $\frac{2x}{1-x^2} = ?$

(A) $\sec\theta$ (B) $\tan\theta$

(C) $\cot\theta$ (D) $\cos\theta$

42. $\cos 40^\circ + \cos 80^\circ + \cos 160^\circ + \cos 240^\circ = ?$

(A) $-\frac{1}{2}$ (B) −1

(C) 0 (D) $\frac{1}{2}$

43. Find the value of $\cos(45^\circ - A)\cos(45^\circ - B) - \sin(45^\circ - A)\sin(45^\circ - B)$.

(A) $\cos(A + B)$ (B) $\sin(A + B)$

(C) $\sec(A + B)$ (D) $\tan(A + B)$

44. $\frac{\sin x}{\sin(x/8)} = ?$

(A) 0

(B) 1

(C) $8\cos\frac{x}{8}\cos\frac{x}{4}\cos\frac{x}{2}$

(D) $8\sin\frac{x}{8}\sin\frac{x}{4}\sin\frac{x}{2}$

45. The minimum value of $\sin\theta + \cos\theta$ is –

(A) −1 (B) 0

(C) $\sqrt{2}$ (D) $-\sqrt{2}$

46. The least value of $\sin 2\theta - \sqrt{3}\cos 2\theta$ is –

(A) – 1 (B) 0

(C) – 2 (D) $\sqrt{2}$

47. In triangle ABC, $a = 13$, $b = 14$, $c = 15$ then area of triangle and in-radius r is –

(A) 44, 4 (B) 84, 4

(C) 80, 6 (D) 60, 4

48. $\sin\alpha = \sin\beta$ and $\cos\alpha = \cos\beta$ then $\sin\left(\frac{\alpha-\beta}{\sqrt{2}}\right)$ is equal to –

(A) $\frac{3}{2}$ (B) $\frac{3}{2}$

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

49. $\sin 10° + \sin 20°. + \sin 30° \ldots\ldots\ldots \sin 360°$ is equal to –

(A) 0 (B) 1

(C) –1 (D) None of these

50. The value of $\frac{\cos 11° + \sin 11°}{\cos 11° - \sin 11°}$ is –

(A) $\tan 56°$ (B) $\sin 56°$

(C) $\cos 56°$ (D) $\cot 56°$

51. If $\sin A + \cos A = 1$, then $\sin 2A$ is equal to :

(A) 1 (B) 2

(C) 0 (D) 1/2

52. If $x = \frac{1-\cos\alpha+\sin\alpha}{1+\sin\alpha}$, then $\frac{2\sin\alpha}{1+\cos\alpha+\sin\alpha}$ is equal to –

(A) $1 - x$ (B) $1 + x$

(C) x (D) $\frac{1}{x}$

53. If $\sin\theta_1 = \cos 26^\circ$ and $\cos\theta_2 = \sin 53^\circ$ then the value of $\theta_1 + \theta_2$ is –

(A) 79° (B) 11°

(C) 101° (D) None of these

54. If $\tan\theta = \frac{1}{\sqrt{3}}$ then the value of $\tan 2\theta + \frac{1}{\tan 2\theta} = ?$

(A) 0 (B) infinite

(C) 1 (D) None of these

55. Given that $\sin 3\theta = \cos(\theta - 26^\circ)$ and 3θ is an acute angle. The value of θ is –

(A) 29° (B) 33°

(C) 42° (D) 43.5°

56. Convert 48° to radians

(A) $\frac{4}{15}\pi$ rad (B) $\frac{5}{18}\pi$ rad

(C) $\frac{6}{25}\pi$ rad (D) None of these

57. The value of $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ$ is–

(A) 0.25 (B) 0.5

(C) 1 (D) 1.25

58. In triangle ABC, angle $A = 60^\circ$, angle $B = 100^\circ$ and AB = 10cm. Find AC.

(A) $\frac{10\sin 100°}{\sin 60}$

(B) $\frac{10\sin 60°}{\sin 100°}$

(C) $\frac{10\sin 100°}{\sin 20°}$

(D) None of these

59. Given $\cos(\theta + 60^\circ) = 0.5$ and $0^\circ \le \theta \le 360^\circ$ The possible solutions of this equation in degrees are –

(A) $0^\circ, 240^\circ$ (B) $60^\circ, 120^\circ$

(C) $30^\circ, 150^\circ$ (D) $180^\circ, 210$

60. $\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = ?$

(A) $2\sin x$ (B) $2\tan x$

(C) $\sin 2x$ (D) $\tan 2x$

61. 11 radian is equal to ......

(A) 294 degrees (B) 362 degrees

62. (sec A + tan A) (1– sinA) =...........

(A) sec A (B) cosec A

(C) sin A (D) cos A

63. If cos (A + B) = 0 then sin (A – B) is equal to –

(A) cos B (B) cos 2B

(C) sin 2A (D) sin A

64. tan 10° tan 20° tan30°......tan 890° is –

(A) 0 (B) 1/2

(C) 1 (D) 2

65. If sin A + sin2A = 1 then the value of cos2A + cos 4A is .

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

(C) 2 (D) 0

66. [(secA – tanA)(secA + tanA)] + [(cosecA – cotA) (cosecA + cot A)] = ?

(A) 1 (B) 0

(C) $\frac{1}{2}$ (D) 2

67. Read the following statements :

(a) The maximum value of sin function is 1

(b) The minimum value of cos function is 1

(A) Only (a) is true

(B) Only (b) is true

(C) Both (a) and (b) are true

(D) Neither (a) nor (b) is true.

68. sin 163°cos 347° + sin73° sin 167° = ?

(A) 0 (B) $\frac{1}{2}$

(C) 1 (D) None of these

69. The equation sin x. cos x = 2 has –

(A) One solution

(B) Two solutions

(C) Infinite solutions

(D) No solution.

70. The incorrect statement is –

(A) $\sin\theta = \frac{-1}{5}$ (B) $\cos\theta = 1$

(C) $\sec\theta = \frac{1}{2}$ (D) $\tan\theta = 20$

Anskwer-key

1.(D)	2. (A)	3. (A)	4.(A)	5. (A)	6.(C)	7. (C)	8. (D)	9. (B)	10.(B)
11.(A)	12.(B)	13.(B)	14.(B)	15.(A)	16.(C)	17.(A)	18.(B)	19.(C)	20.(A)
21.(C)	22.(A)	23.(C)	24.(B)	25.(B)	26.(A)	27.(B)	28.(D)	29.(C)	30.(A)
31.(C)	32.(B)	33.(B)	34.(A)	35.(C)	36.(D)	37.(D)	38.(C)	39.(C)	40.(C)
41.(B)	42.(A)	43.(B)	44.(C)	45.(D)	46.(C)	47.(B)	48.(C)	49.(A)	50.(A)
51.(C)	52.(C)	53.(C)	54.(D)	55.(A)	56.(A)	57.(C)	58.(C)	59.(A)	60.(A)
61.(D)	62. (D)	63. (B)	64.(A)	65. (D)	66.(D)	67. (A)	68. (B)	69. (D)	70.(C)

Solutions

1. (D) $\sin^2 1010^\circ + \cos^2 1010^\circ = 1$
for every value of θ in $\sin^2\theta + \cos^2\theta$
Value of $\sin^2\theta + \cos^2\theta$ will be 1.

2. (A) $\tan^2\theta = \left(\dfrac{1}{\cot\theta}\right)^2 = \dfrac{1}{\cot^2\theta}$

3. (A) $\tan\theta.\ \text{cosec}\theta$
$= \dfrac{\sin\theta}{\cos\theta} \times \dfrac{1}{\sin\theta} = \dfrac{1}{\cos\theta} = \sec\theta$

4. (A) $\dfrac{1}{1+\sin\theta} + \dfrac{1}{1-\sin\theta}$
$= \dfrac{1-\sin\theta+1+\sin\theta}{1-\sin^2\theta}$
$= \dfrac{2}{\cos^2\theta} = 2\sec^2\theta$

5. (A) $\cos^2\theta\,(1 + \tan^2\theta)$
$= \cos^2\theta.\sec^2\theta$
$[\therefore \sec^2\theta = 1 + \tan^2\theta\ ]$
$= \cos^2\theta.\ \dfrac{1}{\cos^2\theta} = 1$

6. (C) $\tan\theta.\ \sin\theta = \dfrac{\sin\theta}{\cos\theta}\sin\theta = \dfrac{\sin^2\theta}{\cos\theta}$
$= \dfrac{1-\cos^2\theta}{\cos\theta} = \sec\theta - \cos\theta$

7. (C) $(1 + \tan A \tan B)^2 + (\tan A - \tan B)^2$
$= 1 + \tan^2 A \times \tan^2 B + 2\tan A \tan B$
$+ \tan^2 A + \tan^2 B - 2\tan A \tan B$
$= (1+\tan^2 A) + \tan^2 B\,(1 + \tan^2 A)$
$= (1+\tan^2 A)\,(1+\tan^2 B)$
$= (1+\tan^2 A)\,(1+\tan^2 B)$
$= \sec^2 A\ .\ \sec^2 B$

8. (D) $1 + \tan^2\theta = \sec^2\theta$
$1 + \tan^2\theta = \sec^2\theta$. (for all the values of θ it is true because it is a Trigonometric identity.

9. (B) Let the value of $\theta = 45^\circ$
then $P = \sin 45^\circ + \cos 45^\circ$
$= \dfrac{2}{\sqrt{2}} = \sqrt{2}$
$Q = \sec 45^\circ + \text{cosec}\,45^\circ = 2\sqrt{2}$
$2P = q\,(p^2 - 1)$
$= 2\sqrt{2}\left((\sqrt{2})^2 - 1\right) = 2\sqrt{2}$
which is equal to $2p$

10. (B) $\sqrt{\dfrac{(1-\sin x)(1+\sin x)}{(1-\cos x)(1+\cos x)}} = \sqrt{\dfrac{1-\sin^2 x}{1-\cos^2 x}}$
$= \sqrt{\dfrac{\cos^2 x}{\sin^2 x}}$
$= \dfrac{1}{\tan x}$
$= \dfrac{3}{4}$

11. (A) $\sec^2\theta + \tan^2\theta = \dfrac{7}{12}$ and
$\sec^4\theta - \tan^4\theta = (\sec^2\theta)^2 - (\tan^2\theta)^2$
$= (\sec^2\theta - \tan^2\theta)\,(\sec^2\theta + \tan^2\theta)$
$= 1 \times \dfrac{7}{12} = \dfrac{7}{12}$

12. (B) $\sin^2 60^\circ + \cos^2(3x - 9^\circ) = 1$
this is similar to $\sin^2\theta + \cos^2\theta$
$\equiv$ so $60^\circ = 3x - 9^\circ$
$3x = 69^\circ$
$x = 23^\circ$

13. (B) $\sin(x-y) = \frac{1}{2}$

$\sin(x-y) = \sin 30^\circ$

$x - y = 30^\circ$ ...(i)

$\cos(x+y) = \frac{1}{2}$

$\cos(x+y) = \cos 60^\circ$

$x + y = 60^\circ$ ...(ii)

By solving (i) and (ii)

$2x = 90$

$x = 45^\circ$ and $y = 15^\circ$

14. (B) $(\sec^2\theta - 1)(\text{cosec}^2\theta - 1)$

$= \tan^2\theta . \cot^2\theta$

$= \tan^2\theta \frac{1}{\tan^2\theta} = 1$

15. (A) $\text{cosec}\theta\sqrt{1-\cos^2\theta} = \text{cosec}\theta . \sin\theta$

$= \frac{1}{\sin\theta} \times \sin\theta$

$= 1$

16. (C) $2\cos 3\theta_1 = 1 \cong \cos 3\theta_1 = \frac{1}{2}$

$\cos 3\theta_1 = \cos 60^\circ$

$\Rightarrow 3\theta_1 = 60^\circ \Rightarrow \theta_1 = 20^\circ$

$2\sin 2\theta_2 = \sqrt{3} \cong \sin 2\theta_2 = \frac{\sqrt{3}}{2}$

$\Rightarrow \sin 2\theta_2 = \sin 60^\circ$

$2\theta_2 = 60^\circ \quad \Rightarrow \theta_2 = 30^\circ$

So θ_1 and $\theta_2 = 20^\circ$ and 30°

17. (A) $1 + 2\sec^2 A \tan^2 A - \sec^4 A - \tan^4 A$

$\cong 1 - (\sec^2 A - \tan^2 A)^2 = 1 - 1 = 0$

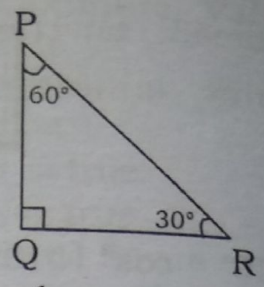
18. (B) $(\sec\theta - 1)^2 - (\tan\theta - \sin\theta)^2$

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

$= (1-\cos\theta)^2[\sec^2\theta - \tan^2\theta]$

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

19. (C)



$\tan R = \frac{1}{\sqrt{3}} \Rightarrow R = 30^\circ$

so $P = 60^\circ \Rightarrow \sin 60^\circ = \frac{\sqrt{3}}{2}$

20. (A) $\sin(180^\circ + \varphi)\sin(180 - \varphi)\text{cosec}^2\varphi$

$\cong (-\sin\varphi) . \sin\varphi . \text{cosec}^2\varphi = -1$

21. (C) $\cos 1^\circ . \cos 2^\circ ....\cos 179^\circ$

$\cong \cos 90^\circ = 0$

$\cong$ G.E value $= 0$

22. (A) $\tan\theta = 1 \cong \theta = 45^\circ$

$\frac{8\sin\theta + 5\cos\theta}{\sin^3\theta - 2\cos^3\theta + 7\cos\theta}$

$= \frac{8\sin 45^0 + 5\cos 45^0}{(\sin 45^0)^3 - 2(\cos 45^0)^3 + 7\cos 45^0}$

divide the numerator & denominator by $\cos 45^\circ$

$= \frac{8\tan 45^0 + 5}{\sin^2 45^0 . \tan 45^0 - 2\cos^2 45^0 + 7}$

$= \frac{13}{\frac{1}{2} - 1 + 7} = \frac{13}{\frac{13}{2}} = 2$

23. (C) $\frac{3\sin\theta + 2\cos\theta}{3\sin\theta - 2\cos\theta}$

Divide the numerator & denominator by $\cos\theta$ then G.E

$= \frac{3\tan\theta + 2}{3\tan\theta - 2} = \frac{4+2}{4-2}$

$= 3$

24. (B) $\cos^4\theta = 1 - \cos^2\theta = \sin^2\theta$

Dividing by $\cos^2\theta$ on both side

$\cong \quad \cos^2\theta = \tan^2\theta$ ... (i)

and $\quad \cos^4\theta = \tan^4\theta$ ... (ii)

On Addition equation (i) and (ii)

$\cos^2\theta + \cos^4\theta = \tan^2\theta + \tan^4\theta = 1$

25. (B) $\tan 4^\circ . \tan 43^\circ . \tan 47^\circ . \tan 86^\circ$

$= \tan 4^\circ . \tan 43^\circ \tan(90-43^\circ) . \tan(90-4^\circ)$

$= \tan 4^\circ . \tan 43^\circ \cot 43^\circ \cot 4^\circ$

$= 1$

26. (A) $\sin\alpha . \sec(30^\circ + \alpha) = 1$

$$\frac{\sin\alpha}{\cos(30^0 + \alpha)} = 1$$

for equal to 1 numerator & denominator should be same.

$\sin\alpha = \cos(30^\circ + \alpha)$

$\sin\alpha = \sin(90 - (30^\circ + \alpha))$

$\alpha = 30^\circ$

put in G.E. $\equiv \sin\alpha + \cos 2\alpha = 1$

27. (B) $\sin\alpha + \cos\beta = 1 + 1 = 2$

$\equiv \alpha = 90^\circ \quad \beta = 0^\circ$

$$\sin\left(\frac{2\alpha + \beta}{3}\right) = \sin 60^\circ$$

$$\cos 30^\circ = \cos\frac{\alpha}{3}$$

28. (D) $\cot 10^\circ \cot 20^\circ \cot 60^\circ \cot 70^\circ \cot 80^\circ$

$= \cot 10^\circ \cot 20^\circ \cot 60^\circ \cot(90\text{-}20^\circ) \cot(90 - 10^\circ)$

$= \cot 10^\circ \cot 20^\circ \cot 60^\circ \tan 20^\circ \tan 10^\circ$

$= \cot 60^\circ$

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

29. (C) $\cos^4\theta - \sin^4\theta = \frac{2}{3}$

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

$\equiv \cos^2\theta - \sin^2\theta = 2\cos^2\theta - 1 = \frac{2}{3}$

30. (A) In the given expression

$\sin(90 - (x + n))$

when $n = 89$ and $= x = 1$

$\sin 0^\circ = 0$

so G.E. value = 0

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

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

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

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

$= 1 + 1 + 1 - 2 = 3 - 2 = 1$

32. (B) $7\sin^2\theta + 3\cos^2\theta = 4$

$7\sin^2\theta + 3(1 - \sin^2\theta) = 4$

$\equiv 4\sin^2\theta = 1$

$\sin\theta = \frac{1}{2} \quad \equiv \theta = 30^\circ$

so $\tan\theta = \tan 30^\circ \ \frac{1}{\sqrt{3}}$

33. (B) $\tan\theta + \cot\theta = 2 = 1 + 1$

$\therefore \tan\theta = \cot\theta = 1$

only when $\theta = 45^\circ$

$\because \tan^5\theta + \cot^{10}\theta = 2$ (Always)

34. (A) $\sin\theta - \cos\theta = \frac{7}{13}$

squaring both side

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

$$1 - 2\sin\theta.\cos\theta = \frac{49}{169}$$

$$2\sin\theta.\cos\theta = \frac{120}{169}$$

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

$$= 1 + \frac{120}{169} = \frac{289}{169}$$

$$\equiv \quad \sin\theta + \cos\theta = \frac{17}{13}$$

35. (C) $\sin^2 1^\circ + \sin^2 3^\circ .....\sin^2 85^\circ + ...+ \sin^2 89^\circ$

$\equiv \sin^2 1^\circ + ...+ \cos^2 1^\circ \ (\sin^2 89^\circ = \cos^2 1^\circ)$

$[\therefore \sin(90^\circ - \theta) = \cos\theta^\circ]$

It is a series of AP

$89 = 1 + (n - 1) \times 2 \equiv n = 45$

$\sin^2 45°$

22 terms   22 terms

$\cong\ 22 + \sin^2 45° \cong\ 22\frac{1}{2}$ Ans.

36. (D) $\alpha + \beta = 45^0$

$\alpha - \beta = 30^0$

$2\alpha\ = 75^0$

and $2\beta = 15°$

$\cong$ tan $(2\alpha + 2\beta)$ = tan $90°$ = infinite

37. (D) $\sin\theta + \text{cosec}\theta = 2$

$\cong\ x + \frac{1}{x} = 2$ ($x = 1$ Satisfying)

So, $\sin^5\theta + \text{cosec}^5\theta$

$= x^5 + \frac{1}{x^5} = 1 + 1 = 2$

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

$\cong\ \theta = 45°$ Satisfying

$2\sin\theta + \cos\theta = \frac{2}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \frac{3}{\sqrt{2}}$

39. (C) Let $a\sin\theta - b\cos\theta = k$

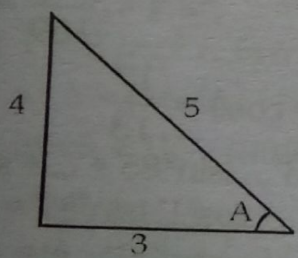
$c^2 + k^2 = a^2(\cos^2\theta + \sin^2\theta)$
$+ b^2(\sin^2\theta + \cos^2\theta)$

$\cong\ k^2 = a^2 + b^2 - c^2$

40. (C) $\tan A = \frac{4}{3}$

as(sinA, cosA in 3rd quadrant)

$\cong\ \sin A = -\frac{4}{5} \cong \cos A = -\frac{3}{5}$



$\cong \sin 2A = \frac{24}{25}$

$\because$ ($\sin 2A = 2\sin A.\cos A$)

$$\Rightarrow 5\left(\frac{24}{25}\right) + 3\left(\frac{-4}{5}\right) + 4\left(\frac{-3}{5}\right) = 0$$

41. (B) $x = \sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \sqrt{\frac{2\sin^2\frac{\theta}{2}}{2\cos^2\frac{\theta}{2}}} = \tan\frac{\theta}{2}$

[$\cos 2\theta = 2\cos^2\theta - 1$
$1 + \cos 2\theta = 2\cos^2\theta$

So $\frac{2x}{1-x^2} = \frac{2\tan\frac{\theta}{2}}{1-\tan^2\frac{\theta}{2}} = \tan\theta$

42. (A) $\cos 40° + \cos 80° + \cos 160° + \cos 240°$

$2\cos\frac{40+80}{2}\cos\frac{40-80}{2} - \cos 20° - \frac{1}{2}$

$= 2\cos 60°\cos 20° + \cos(180 - 20°) - \frac{1}{2}$

$= 2 \times \frac{1}{2}\cos 20° - \cos 20° - \frac{1}{2}$

$= \cos 20° - \cos 20° - \frac{1}{2} = -\frac{1}{2}$

43. (B) $\cos[45° - A + (45° - B)]$

[$\because \cos(x + y) = \cos x \times \cos y - \sin x \times \sin y$]

$\cong\ \cos[90 - (A + B)] = \sin(A + B)$

[$\cos(90° - \theta) = \sin\theta$]

44. (C) $\sin x = 2\sin\frac{x}{2}\cos\frac{x}{2}$

$= 4\sin\frac{x}{4}\cos\frac{x}{4}\cos\frac{x}{2}$

$\cong\ 8\sin\frac{x}{8}\cos\frac{x}{8}\cos\frac{x}{4}\cos\frac{x}{2}$

($\because \sin 2x = 2\sin x \times \cos x$)

$\frac{\sin x}{\sin\frac{x}{8}} = 8\cos\frac{x}{8}\cos\frac{x}{4}\cos\frac{x}{2}$

45. (D) Minimum Value $= -\sqrt{1+1} = -\sqrt{2}$

($\because a\sin\theta + b\cos\theta$)

Max^m/min^m value $= \pm\sqrt{a^2 + b^2}$

46. (C) Least value = $-\sqrt{(1)^2+(-\sqrt{3})^2} = -2$

47. (B) $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$

$$s = \frac{13+14+15}{2} = 21$$

$$= \sqrt{21\times8\times7\times6} = 84$$

$$r = \frac{\Delta}{S} = \frac{84}{21} = 4$$

$\cong (\Delta, r) = (84, 4)$

48. (C) $\sin\alpha = \sin\beta$ and $\cos\alpha = \cos\beta$

By hits trial method $\alpha = \beta = 45°$

$$\text{Sin}\left(\frac{\alpha-\beta}{\sqrt{2}}\right) = 0$$

or

$\cong \sin\alpha - \sin\beta = \cos\alpha - \cos\beta = 0$

$$2\cos\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$$

$$= -2\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$$

$= 0$

$$\cong \left(\frac{\alpha-\beta}{2}\right) = 0 \text{ so } \left(\frac{\alpha-\beta}{\sqrt{2}}\right) = 0$$

49. (A) Here given that

$= \sin10° + \sin20° + \sin30° + ... + \sin360°$

$= \sin10° + \sin20° + \sin30° + ... + \sin90° + \sin100° + \sin110° + ... + \sin180° + \sin190° + \sin200° + ... + \sin270° + \sin280° + ... + \sin360°$

$= \sin10° + \sin20° + ...+ \sin90° + \sin(90° + 10°) + \sin(90° + 20°) + ... + \sin180° + \sin(180° + 10°) + ... + \sin270° + \sin(270° + 10°) + ... + \sin360°$

$= \cancel{\sin10°} + \cancel{\sin20°} + ... + \cancel{1} + \cancel{\cos10°} + \cancel{\cos20°} + ... \cancel{-\sin10°}\ \cancel{-\sin20°} .... - \cancel{1}\ \cancel{-\cos10°}\ \cancel{-\cos20°}$

$= 0.$

50. (A) Given $= \dfrac{\cos11° + \sin11°}{\cos11° - \sin11°}$

$$\cong \frac{\dfrac{\cos11° + \sin11°}{\cos11°}}{\dfrac{\cos11° - \sin11°}{\cos11°}}$$

$$= \frac{1+\tan11°}{1-\tan11°}$$

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

$(\because \tan 45°=1)$

$\cong \tan(45 + 11) = \tan 56°$

51. (C) Given $\sin A + \cos A = 1$
Squaring both the sides
we obtain $= 1 + \sin 2A = 1$
$\sin 2A = 0$

52. (C) Let the value of $\alpha = 45°$

$$\text{given value } x = \frac{1-\frac{1}{\sqrt{2}}+\frac{1}{\sqrt{2}}}{1+\frac{1}{\sqrt{2}}}$$

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

Now check the value of $\dfrac{2\sin\alpha}{1+\cos\alpha+\sin\alpha}$

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

$$= \frac{\sqrt{2}}{1+\sqrt{2}} = \text{which is equal to } x.$$

53. (C) $\sin\theta_1 = \sin(90-26°) \cong \theta_1 = 64°$

$\cong \cos\theta_2 = \cos(90-53°) \cong \theta_2 = 37°$

$\theta_1 + \theta_2 = 101°$

54. (D) $\tan\theta = \dfrac{1}{\sqrt{3}} \cong \theta = 30°$

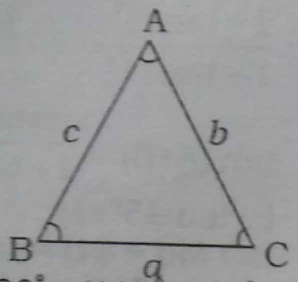
$$\tan60° + \frac{1}{\tan60°} = \left(\sqrt{3}+\frac{1}{\sqrt{3}}\right) = \frac{4\sqrt{3}}{3}$$

55. (A) $\sin 3\theta = \sin\{90° - (\theta - 26°)\}$
$3\theta = 90° - \theta + 26°$
$\equiv \quad 4\theta = 116° \equiv \theta = 29°$

56. (A) $180° = \pi \text{ rad} \Rightarrow 48° = \frac{4\pi}{15}$ rad.

57. (C) $\tan 48° \tan 23° \tan 42° \tan 67°$
$= \tan 48° \tan 23° \cot 48° \cot 23°$
$= 1$

58. (C)



$c = \{180° - (100° + 60°)\} = 20°$
$\equiv$ By the formula
$\equiv \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
$\equiv \quad c = 10 \text{ AC} = b$
$\equiv \quad \frac{AC}{\sin 100°} = \frac{10}{\sin 20°}$
$\equiv \quad AC = \frac{10\sin 100}{\sin 20°}$

59. (A) $\cos(\theta + 60°) = \frac{1}{2}$
$\theta + 60° = 60° \quad \Rightarrow \theta = 0°$
So first solution will be 0°
Second solution will be 240°

60. (A) $\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = \frac{\sin 3x - \sin x}{\cos 2x}$
Let $x = 30°$
$\equiv \quad \sin x = \frac{1}{2}, \ \sin 3x = 1, \cos 2x = \frac{1}{2}$
$\equiv \frac{1 - \frac{1}{2}}{\frac{1}{2}} = 1 = 2 \times \frac{1}{2} = 2 \sin 30°$
$= 2 \sin x$

61. (D) $\frac{22}{7} \times x = 11 \qquad x = \frac{7}{2}\pi \text{ rad}$
$\pi \text{ rad} = 180°$
$\frac{7}{2}\pi \text{ rad} = 630° = 630$ degrees

62. (D) $(\sec A + \tan A)(1 - \sin A)$
$\equiv \left(\frac{1}{\cos A} + \frac{\sin A}{\cos A}\right)(1 - \sin A)$
$\equiv \frac{1 - \sin^2 A}{\cos A} = \frac{\cos^2 A}{\cos A} = \cos A$

63. (B) $\cos(A + B) = 0 = \cos 90°$
$\equiv \ A + B = 90° \equiv A = 90 - B°$
so $\sin(90 - B - B) = \sin(90 - 2B)$
$\sin(A - B) = \cos 2B$

64. (A) $\tan 10° \tan 20° \tan 30° \ldots\ldots\ldots \tan 890°$
$\equiv \ \tan 90° =$ infinite and $\tan 180 = 0°$
so value of G.E. = infinite $\times 0 = 0$

65. (D) $\sin A + \sin 2A = 1$

$A = \frac{\pi}{2}$ Satisfying the following equation
$\equiv \ \cos\pi + \cos 2\pi \Rightarrow -1 + 1 = 0$

66. (D) $(\sec^2 A - \tan^2 A) + (\operatorname{cosec}^2 A - \cot^2 A)$
$\equiv \ 1 + 1 = 2$

67. (A) Range of sin function is $[-1,1]$
Range of cos function is $[-1,1]$
only statement (a) is true.

68. (B) $\sin 163° \cos 347° + \sin 73° \sin 167°$
$= \sin(180° - 17°)\cos(360° - 13°)$
$+ \sin(90° - 17°)\sin(180° - 13°)$
$= \sin 17° \cos 13° + \cos 17° \sin 13°$
$= \sin(17° + 13°) = \sin 30°$
$= \frac{1}{2}$

69.(D) $\sin x . \cos x = 2$
$\equiv \ 2\sin x \times \cos x = 4$
$\equiv \ \sin 2x = 4$ (not possible)
For same value of angle
$\sin x . \cos x$ never produce their product = 2.
So, no solutions. $(\sin \in (-1,1))$

70. (C) Value of sec function varies from $(-\infty, -1] \cup [1, \infty)$

so $\sec\theta = \frac{1}{2}$ not possible.

Exercise

1. $\sin^2 1° + \sin^2 2° + \sin^2 3° + \sin^2 4° + \ldots\ldots + \sin^2 88° + \sin^2 89°$ is equal to :

(A) $22\frac{1}{2}$ (B) $22\sqrt{2}$

(C) $44\frac{1}{2}$ (D) $44\sqrt{2}$

2. $\cos^2 5° + \cos^2 10° + \cos^2 15° + \ldots\ldots + \cos^2 90° = ?$

(A) $7\frac{1}{2}$ (B) $8\frac{1}{2}$

(C) 9 (D) $9\frac{1}{2}$

3. If $\sec\theta + \tan\theta = 4$ then $\sin\theta$ is-

(A) $\frac{17}{15}$ (B) $\frac{15}{17}$

(C) $\frac{15}{8}$ (D) $\frac{8}{15}$

4. If $\text{cosec}\theta - \cot\theta = 5$ then $\cos\theta$ is -

(A) $\frac{13}{12}$ (B) $\frac{12}{13}$

(C) $\frac{5}{12}$ (D) $\frac{12}{5}$

5. $\tan 25° \tan 55° \tan 65° \tan 35° = ?$

(A) 0 (B) 1

(C) $\tan 25°$ (D) 2

6. $\tan 1° \tan 2° \tan 3° \tan 4° \ldots\ldots\ldots \tan 88° \tan 89° = ?$

(A) 0 (B) $\sqrt{3}$

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

7. If $\tan\theta.\tan 2\theta = 1$ then the value of $\sin^2 2\theta + \tan^2 2\theta$ is -

(A) $\frac{3}{4}$ (B) $\frac{10}{3}$

(C) $3\frac{3}{4}$ (D) 3

8. If $\tan 2\theta.\tan 4\theta = 1$ then the value of $\sin 3\theta - \cos 3\theta$ is –

(A) 0 (B) 1

(C) $\frac{1}{\sqrt{2}}$ (D) $\frac{1}{2}$

9. If $\cot\frac{\pi}{20} \cot\frac{3\pi}{20} \cot\frac{5\pi}{20} \cot\frac{7\pi}{20} \cot\frac{9\pi}{20} = ?$

(A) –1 (B) 1

(C) $\sqrt{3}$ (D) 0

10. $\cos 7° \cos 23° \cos 30° \text{cosec } 83° \text{cosec } 67° = ?$

(A) 0 (B) 1

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

11. Find the value of

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

(A) $\sin^2\theta$ (B) $\cos^2\theta$

(C) $\cot^2$ (D) $\tan^2\theta$

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

(A) 0 (B) 1

(C) 2 (D) $4 \sin\theta.\cos\theta$

13. If $\sin\theta + \cos\theta = \frac{7}{5}$, then the value of $\sin\theta.\cos\theta$ is -

(A) $\frac{4}{5}$ (B) $\frac{7}{8}$

(C) $\frac{13}{12}$ (D) $\frac{12}{25}$

14. If $\sin\theta + \cos\theta = \frac{17}{13}$, then the value of $\sin\theta - \cos\theta$ is -

(A) $\frac{5}{17}$ (B) $\frac{3}{19}$

(C) $\frac{7}{10}$ (D) $\frac{7}{13}$

15. If $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 7$, then the value of $\tan\theta$ is

(A) $\frac{2}{3}$ (B) $\frac{4}{3}$

(C) $\frac{1}{3}$ (D) $\frac{5}{3}$

16. If $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} = 3$, then the value of $\sin^4\theta - \cos^4\theta$ is -

(A) $\frac{1}{5}$ (B) $\frac{2}{5}$

(C) $\frac{3}{5}$ (D) $\frac{4}{5}$

17. If $\frac{\tan\theta + \cot\theta}{\tan\theta - \cot\theta} = 2\ (0 \le \theta \le 90^\circ)$, then the value of $\sin\theta$ is -

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

(C) $\frac{1}{2}$ (D) 1

18. If $\cos 43^\circ = \frac{x}{\sqrt{x^2+y^2}}$, then the value of $\tan 47^\circ$ is -

(A) $\frac{y}{x}$ (B) $\frac{x}{y}$

(C) $\frac{x}{\sqrt{x^2+y^2}}$ (D) x

19. If $\sin 17^\circ = \frac{x}{y}$, then the value of $\sec 17^\circ - \sin 73^\circ$ is -

(A) $\frac{y^2-x^2}{xy}$ (B) $\frac{x^2}{\sqrt{y^2-x^2}}$

(C) $\frac{x^2}{\sqrt{y^2+x^2}}$ (D) $\frac{x^2}{y\sqrt{y^2-x^2}}$

20. If $\sin(10^\circ\ 6'32'') = a$ then the value of $\cos(79^\circ\ 53'\ 28'') + \tan(10^\circ\ 6'\ 32'')$ is -

(A) $\frac{\sqrt{1-a^2}+a}{\sqrt{1-a^2}}$ (B) $\frac{a\sqrt{1-a^2}+1}{\sqrt{1-a^2}}$

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

21. If cosec $39^\circ = x$, then the value of $\frac{1}{\operatorname{cosec}^2 51^\circ} + \sin^2 39^\circ + \tan 51^\circ - \frac{1}{\sin^2 51^\circ \sec^2 39^\circ}$ is -

(A) $\sqrt{x^2-1}$ (B) $\sqrt{1-x^2}$

(C) x^2-1 (D) $1-x^2$

22. If $\cot 18^\circ \left(\cot 72^\circ \cos^2 22^\circ + \frac{1}{\tan 72^\circ \sec^2 68}\right) = ?$

(A) 1 (B) $\sqrt{2}$

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

23. $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} + \sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = ?$

(A) 2 sec θ (B) sec θ

(C) 2 cosec θ (D) cos θ

24. If $2\cos\theta - \sin\theta = \frac{1}{\sqrt{2}}\ (0^\circ < \theta < 90^\circ)$, then the value of $2\cos\theta + \sin\theta$ is

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

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

25. If $\sin\theta + \frac{1}{\sin\theta} = \frac{7}{2\sqrt{3}}$, then θ is –

(A) 30° (B) 45°

(C) 60° (D) 90°

26. If sec θ= A and cosec θ =B then

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

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

(C) $A^2 - B^2 = A^2B^2$

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

27. $\log \tan 1^\circ + \log \tan 2^\circ + \log \tan 3^\circ + \ldots\ldots + \log \tan 89^\circ = ?$
(A) 1
(B) 2
(C) 0
(D) −1

28. If $\cos^2\theta - \sin^2\theta = \frac{1}{3}$ then the value of $\cos^4\theta - \sin^4\theta + 1$ is
(A) 1
(B) $\frac{1}{3}$
(C) $\frac{4}{3}$
(D) $\frac{5}{3}$

29. $(\sec A - \cos A)^2 + (\mathrm{cosec} A - \sin A)^2 - (\cot A - \tan A)^2 = ?$
(A) 0
(B) $\frac{1}{2}$
(C) 1
(D) 2

30. $\sin^4\theta + \cos^4\theta$ is equal to :
(A) $1 - 2\sin^2\theta\cos^2\theta$
(B) $1 + 2\sin^2\theta\cos^2\theta$
(C) $2\sin^2\theta\cos^2\theta - 1$
(D) $2\sin^2\theta\cos^2\theta - 3$

31. $\sin^6\theta + \cos^6\theta$ is equal to :
(A) $1 - 3\sin^2\theta\cos^2\theta$
(B) $3\sin^2\theta\cos^2\theta - 1$
(C) 1
(D) −1

32. If $\sin^2\alpha + \sin^2\beta = 2$, $(0° \le a, b \le 90°)$ then the value of $\cos\left(\frac{a+b}{2}\right)$ is:
(A) 1
(B) − 1
(C) 0
(D) 2

33. If $\frac{\cos^2\theta}{\cot^2\theta - \cos^2\theta} = 3$, $(0° < \theta < 90°)$ then θ is -
(A) 30°
(B) 45°
(C) 60°
(D) 90°

34. If $\sin\theta + \sin^2\theta = 1$ then find the value of $\cos^8\theta + 2\cos^6\theta + \cos^4\theta$.
(A) 0
(B) −1
(C) 1
(D) 2

35. If $\sin\theta + \sin^2\theta = 1$ then $\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta$ is equal to :
(A) 0
(B) −1
(C) 1
(D) 2

36. If $x = r\sin\theta\cos\alpha$, $y = r\sin\theta\sin\alpha$ and $z = r\cos\theta$ then –
(A) $x^2 + y^2 + z^2 = r^2$
(B) $x^2 + y^2 + r^2 = z^2$
(C) $x^2 + y^2 - z^2 = r^2$
(D) $x^2 - y^2 + z^2 = r^2$

37. If $x = 3\cos A\cos B$, $y = 3\cos A\sin B$ and $z = 3\sin A$ then the value of $x^2 + y^2 + z^2$ is:
(A) 3
(B) 6
(C) 9
(D) 12

38. If $\sin\theta = \frac{b}{a}$ then the value of $\sqrt{\frac{a-b}{a+b}} + \sqrt{\frac{a+b}{a-b}}$ is –
(A) 0
(B) 1
(C) $2\sec\theta$
(D) $2\ \mathrm{cosec}\,\theta$

39. If $\sin\theta + \mathrm{cosec}\,\theta = 3$, then the value of $\frac{\sin^4\theta + 1}{\sin^2\theta}$ is :
(A) 1
(B) 0
(C) 7
(D) 9

40. If $\tan\theta = \frac{a}{b}$ then the value of $\frac{a\sin\theta + b\cos\theta}{a\sin\theta - b\cos\theta}$ is
(A) $\frac{a^2+b^2}{a^2-b^2}$
(B) $\frac{a^2-b^2}{a^2+b^2}$
(C) $\frac{a}{\sqrt{a^2+b^2}}$
(D) $\frac{b}{\sqrt{a^2+b^2}}$

41. If $\sec\theta = a + \frac{1}{4a}$ then the value of $\tan\theta + \sec\theta$ is :
(A) a
(B) $2a$
(C) $3a$
(D) $4a$