

28. The value of $\frac{\sec^2 \theta (2 + \tan^2 \theta + \cot^2 \theta) \div (\sin^2 \theta - \tan^2 \theta)}{(\operatorname{cosec}^2 \theta + \sec^2 \theta)(1 + \cot^2 \theta)^2}$ is:

$\frac{\sec^2 \theta (2 + \tan^2 \theta + \cot^2 \theta) \div (\sin^2 \theta - \tan^2 \theta)}{(\operatorname{cosec}^2 \theta + \sec^2 \theta)(1 + \cot^2 \theta)^2}$ का मान ज्ञात कीजिए।

[A] -1

[C] -2

[B] 1

[D] 2

but $\theta = 45^\circ$

$$\left(\frac{1}{2} - 1\right)$$

$$\frac{2 \times 4}{\frac{1}{2} \times 4 \times 4} = -1$$

29. Simplify the given expression.

दिए गए व्यंजक का सरलीकरण कीजिए।

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

SSC CGL 2023 PRE

[A] 3 $= \frac{2}{1}$

[C] 2

[B] 1

[D] 4

put $\theta = 0^\circ$

30. What is simplified value of $1 + \tan A \cdot \tan\left(\frac{A}{2}\right)$?

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

$1 + \tan A \cdot \tan\left(\frac{A}{2}\right)$ का सरलीकृत मान क्या है?

[A] ~~$\cos A$~~

[B] ~~$\sin A$~~

[C] $\sec A$ ②

[D] ~~$\cot A$~~

put $A = 60^\circ$

31. Solve: $\cos \theta \left[\cot^2 \frac{\theta}{2} - \tan^2 \frac{\theta}{2} \right] - 4 \operatorname{cosec}^2 \theta$

[A] -2

[B] -1

$= -4 \times 1$

[C] -4 ✓

[D] 1

put $\theta = 90^\circ$

32. The expression $\sqrt{\sin^4 x + 4\cos^2 x} - \sqrt{\cos^4 x + 4\sin^2 x}$ is equal to:

$\sqrt{\sin^4 x + 4\cos^2 x} - \sqrt{\cos^4 x + 4\sin^2 x}$ का मान ज्ञात करें?

[A] ~~$\sin 2x$~~

[B] ~~1~~

☒ [C] $\cos 2x = \cos 180^\circ = -1$

[D] ~~$-\cos 2x$~~

put $x=0^\circ$

$$2-1=1$$

$$\left. \begin{array}{l} \sin 180^\circ = 0 \\ \cos 180^\circ = -1 \end{array} \right\}$$

put $x=90^\circ$

$$1-2=-1$$

33. What is $\left(\frac{\cos\theta - \sin\theta + 1}{\cos\theta + \sin\theta - 1}\right) (\cot\theta - \operatorname{cosec}\theta)$ equal to?

$\left(\frac{\cos\theta - \sin\theta + 1}{\cos\theta + \sin\theta - 1}\right) (\cot\theta - \operatorname{cosec}\theta)$ किसके बराबर है?

(UPSC CDS-2 2024)

[A] -1 ✓

[B] 0

[C] 1

[D] 2

$\frac{2}{\sqrt{2}}$

but $\theta = 45^\circ$

$$\frac{1}{(\sqrt{2}-1)} \times (1-\sqrt{2}) = -1$$

34. What is $(1 + \tan\alpha \tan\beta)^2 + (\tan\alpha - \tan\beta)^2$ equal to?

$(1 + \tan\alpha \tan\beta)^2 + (\tan\alpha - \tan\beta)^2$ किसके बराबर है?

(UPSC CDS-2 2024)

[A] ~~$\tan^2\alpha \tan^2\beta$~~

[B] $\sec^2\alpha \sec^2\beta$

[C] ~~$\tan^2\alpha \cot^2\beta$~~

[D] ~~$\sec^2\alpha \tan^2\beta$~~

put $\alpha = \beta = 0^\circ$

①

35. If $A + B + C = 90^\circ$, then $\sin \frac{A}{2} \cdot \sin \left(\frac{180-B-C}{2} \right) + \cos \frac{A}{2} \cdot \sin \frac{B+C}{2} = ?$

यदि $A + B + C = 90^\circ$, तो $\sin \frac{A}{2} \cdot \sin \left(\frac{180-B-C}{2} \right) + \cos \frac{A}{2} \cdot \sin \frac{B+C}{2} = ?$

(SSC CGL MAINS 2017)

[A] $\frac{1}{2}$

[C] 0

[B] $\frac{1}{\sqrt{2}}$

[D] $\frac{3}{\sqrt{2}}$

36. What is $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1}$ equal to?

$\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1}$ किसके बराबर है?

[A] $\frac{1 + \sin A}{\cos A}$ ✗

[B] $\sin A$ ✗

[C] $\tan \frac{A}{2}$ ✗

✓ [D] $\cot \frac{A}{2} = \cot 30^\circ = \sqrt{3}$

Let $A = 60^\circ$

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

(V.V.V.V imp)

37. $\frac{\sin x - \cos x + 1}{\sin x + \cos x - 1}$ is equal to?
किसके बराबर है?

[A] $\frac{\sin x - 1}{\cos x}$ ✗

[C] $\frac{\sin x - 1}{\cos x + 1}$ ✗

[B] $\frac{\sin x + 1}{\cos x}$ ✓
[D] $\frac{\sin x + 1}{\cos x + 1}$ ✗

but $x = 45^\circ$

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

38. The value of $\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \frac{\tan^2\theta(\operatorname{cosec}^2\theta - 1)}{\sec\theta - \tan\theta}$ is:

$\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \frac{\tan^2\theta(\operatorname{cosec}^2\theta - 1)}{\sec\theta - \tan\theta}$ का मान है:

[A] 1

[C] 0

[B] $\frac{1}{2}$

[D] -1

(G L
MAINS
2020)

Let $\theta = 45^\circ$

$$\frac{\sqrt{2}-1}{\sqrt{2}-1} \times \frac{1 \times 1}{\sqrt{2}-1}$$

(1)

38. The value of $\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \frac{\tan^2\theta(\operatorname{cosec}^2\theta - 1)}{\sec\theta - \tan\theta}$ is:

$\frac{\sin\theta + \cos\theta - 1}{\sin\theta - \cos\theta + 1} \times \frac{\tan^2\theta(\operatorname{cosec}^2\theta - 1)}{\sec\theta - \tan\theta}$ का मान है:

[A] 1

[C] 0

$$\sec\theta + \tan\theta = x$$

$$\sec\theta - \tan\theta = \frac{1}{x}$$

[B] $\frac{1}{2}$

[D] -1

(GL
MAINS
2020)

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

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

$$= 1$$

$$= \frac{\tan\theta - \sec\theta + 1}{\tan\theta + \sec\theta - 1} = \frac{-\frac{1}{x} + 1}{x - 1} = \frac{1}{x} = \sec\theta - \tan\theta$$

39. If $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = p\sec\theta + q\tan\theta$, where $0 < \theta < \frac{\pi}{2}$, then what is the value of $p+q$?

जहां $0 < \theta < \frac{\pi}{2}$ है, तो $p+q$ का मान क्या

यदि $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = p\sec\theta + q\tan\theta$,
 (CDS-1 2024)

[A] 0

[B] 1

[C] 2

[D] 4

अ माना

$$\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1}$$

$$= \frac{x-1}{-\frac{1}{x}+1} = \frac{x-1}{\frac{-1+x}{x}} = x = \sec\theta + \tan\theta$$

40. $\frac{\sin \theta}{\cot \theta + \operatorname{cosec} \theta} - \frac{\sin \theta}{\cot \theta - \operatorname{cosec} \theta} = ?$

[A] 1

[B] 2

[C] 3

[D] 0

$$\operatorname{cosec} \theta - \cot \theta = 1$$

$$= \frac{\cancel{\sin \theta} \times \cancel{-2 \operatorname{cosec} \theta}}{-1}$$

$$= 2$$

41.

$$\frac{(\operatorname{cosec} \theta - \sec \theta)(\cot \theta - \tan \theta)}{(\operatorname{cosec} \theta + \sec \theta)(\sec \theta \cdot \operatorname{cosec} \theta - 2)} = ?$$

[A] 2

[C] 3

[B] 1

[D] -1

put $\theta = 60^\circ$

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

$$\frac{\left(\frac{2}{\sqrt{3}} - 2\right)}{\left(\frac{2}{\sqrt{3}} + 2\right)} \times \frac{-2}{\sqrt{3}}$$

$$\frac{1-\sqrt{3}}{1+\sqrt{3}}$$

$$\frac{-1}{2-\sqrt{3}} = \left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right) \times (2+\sqrt{3}) = 1$$

$$\begin{aligned} \frac{\sqrt{3}-1}{\sqrt{3}+1} &= \frac{(\sqrt{3}-1)^2}{2} \\ &= \frac{4-2\sqrt{3}}{2} \\ &= 2-\sqrt{3} \end{aligned}$$

42. If $p = \frac{1}{\operatorname{cosec}\theta + \cot\theta}$ & $q = \operatorname{cosec}\theta$ then what is $p^2 - 2pq$ equal to?

यदि $p = \frac{1}{\operatorname{cosec}\theta + \cot\theta}$ & $q = \operatorname{cosec}\theta$ है, तो $p^2 - 2pq$ किसके बराबर है?

(UPSC CDS-1 2025)

$$1 - 2 = (-1)$$

[A] -1

[B] 0

[C] 2

[D] 1

$$p = \operatorname{cosec}\theta - \cot\theta = 1$$

$$q = \operatorname{cosec}\theta = 1$$

$$\text{but } \theta = 90^\circ$$

43. $\frac{(2\sin A)(1+\sin A)}{1+\sin A+\cos A}$ is equal to:

$\frac{(2\sin A)(1+\sin A)}{1+\sin A+\cos A}$ बराबर है:

[A] ~~$1 - \sin A \cos A$~~

[C] ~~$1 + \cos A - \sin A$~~

[B] $1 + \sin A - \cos A$

[D] ~~$1 + \sin A \cos A$~~

put $A = 90^\circ$

2

44. $\cos^2\theta + \cos^2(\alpha+\theta) - 2\cos\alpha.\cos\theta\cos(\theta+\alpha) = ?$

[A] $\sin^2\alpha$

[B] $\cos^2\alpha$

[C] $\tan^2\alpha$

[D] $\sec^2\alpha$

put $\theta = 0^\circ$

$$\begin{aligned} & 1 + \cos^2\alpha - 2\cos\alpha \\ &= 1 - \cos^2\alpha = \sin^2\alpha \end{aligned}$$

45. $\cos^2(A - \cancel{B}) + \cos^2 \cancel{B} - 2\cos(\cancel{A - B}). \cos A. \cos B = ?$

[A] $\cos^2 A$

[C] $\tan^2 A$

[B] $\sin^2 A$

[D] $\cot^2 A$

Let $B = 0^\circ$

$$\begin{aligned} \cos^2 A + 1 - 2\cos^2 A \\ = 1 - \cos^2 A \end{aligned}$$

46. If $0^\circ < \theta < 90^\circ$, then $\left(\frac{5\cos\theta - 4}{3 - 5\sin\theta} - \frac{3 + 5\sin\theta}{4 + 5\cos\theta} \right)$ is equal to:

यदि $0^\circ < \theta < 90^\circ$, तो $\left(\frac{5\cos\theta - 4}{3 - 5\sin\theta} - \frac{3 + 5\sin\theta}{4 + 5\cos\theta} \right)$ किसके बराबर है?

[A] 0 ✓

[B] 1

[C] $\frac{1}{2}$

[D] $\frac{1}{4}$

$$\text{put } \theta = 0^\circ$$

$$\frac{1}{3} - \frac{3}{4} \\ = 0$$

47. Simplify $\frac{1+\sin t}{4-4\sin t} - \frac{1-\sin t}{4+4\sin t}$?

$\frac{1+\sin t}{4-4\sin t} - \frac{1-\sin t}{4+4\sin t}$ को सरल कीजिए?

[A] ~~4tan t. sin t~~

[C] ~~Tan t - sin t~~

[B] Tan t. sec t

[D] ~~Tan t + sin t~~

$$\frac{1}{4} \left[\frac{1+S}{1-S} - \frac{1-S}{1+S} \right]$$

$$= \frac{1}{4} \times \left[\frac{(1+S)^2 - (1-S)^2}{(1-S)(1+S)} \right]$$

$$= \frac{1}{4} \times \frac{4S}{1-S^2} = \frac{S}{1-S^2} \times \frac{1}{1} = \tan t \cdot \sec t$$

$$(a+b)^2 - (a-b)^2 = 4ab$$

48. $\frac{\sin\theta.\tan\theta}{1-\cos\theta} + (\tan^2\theta - \sec^2\theta)$

[A] $\sin\theta.\cos\theta$

[C] $\tan\theta$

[B] $\sec\theta$

[D] $\operatorname{cosec}\theta$

$$\begin{aligned} & \frac{\cancel{\sec\theta}}{\cancel{c(1-\cos\theta)}} - 1 \\ & \frac{1+\cos\theta}{c} - 1 \\ & = \sec\theta - 1 \end{aligned}$$

49.

$$1 - \frac{\sin^2 y}{1 + \cos y} + \frac{1 + \cos y}{\sin y} - \frac{\sin y}{1 - \cos y} = ?$$

[A] 0

[C] $\sin y$

[B] 1

[D] $\cos y$

$$1 - (1 - \cos y) = \cos y$$

$$\frac{1 + \cos y}{\sin y} \rightarrow \frac{\sin y}{1 - \cos y}$$

50. $\left(\frac{2\sqrt{2} + \cancel{3\sin A}}{1 - 3\cos A}\right)^5 + \left(\frac{1 + 3\cos A}{2\sqrt{2} - \cancel{3\sin A}}\right)^5 = ?$

[A] $(2\sqrt{2})^5$

[B] 243

[C] 0 ✓

[D] 1

Let $A = 0^\circ$

$(-1)^5 = -1$

$\left(\frac{\cancel{2\sqrt{2}}}{-1}\right)^5 + \left(\frac{\cancel{4}}{2\sqrt{2}}\right)^5$
 ~~$(-\sqrt{2})^5 + (\sqrt{2})^5 = 0$~~

51. $\frac{\sin \theta}{\sec \theta + \tan \theta - 1} + \frac{\cos \theta}{\operatorname{cosec} \theta + \cot \theta - 1} = ?$

[A] 0

[B] 1

[C] -1

[D] 2

$$\frac{\sin \theta}{\sec \theta + \tan \theta - 1} + \frac{\cos \theta}{\operatorname{cosec} \theta + \cot \theta - 1} = ?$$

$\cos \theta$

=?

[A] 0

O

~~[B]~~ 1

1

$[c]^{-1}$

-1

[D] 2

2

but $\theta = 45^\circ$

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

$$= 1$$

52. The value of $\frac{\sin A}{\cot A + \operatorname{cosec} A} - \frac{\sin A}{\cot A - \operatorname{cosec} A} - 1$ is:

$\frac{\sin A}{\cancel{\cot A + \operatorname{cosec} A}} - \frac{\sin A}{\cancel{\cot A - \operatorname{cosec} A}} - 1$ का मान ज्ञात करें।

[A] $\frac{1}{2}$

[B] 3

[C] 1 ✓

[D] 2

put $A = 90^\circ$

$$1 + 1 - 1 = 1$$

53. $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} - \frac{2}{\sin 2A} = ?$

[A] -1

[C] 0

$$\frac{-1}{2} - \frac{1}{2} - \frac{2}{(-1)} = -1 + 2 = 1$$

✓ [B] 1

[D] 2

Trick $\Rightarrow$

$1 - \cot A / \tan A$

Let $A' = 135^\circ$

$\tan 135^\circ = \cot 135^\circ = -1$

$\sin 270^\circ = -1$

54. **Simplify** $\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}$ को हल करें:

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

[A] $\cos\frac{\theta}{2}$ ✗

[C] $\cot\frac{\theta}{2}$ ✗

[B] $\sin\frac{\theta}{2}$ ✗

[D] $\tan\frac{\theta}{2} = \tan 30^\circ$ ✓

put $\theta = 60^\circ$

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