Trigonometry Questions for CDSE, CGL Tier 2, CGL Tier 1 and SSC 10+2 Exams

TRIGONOMETRY QUIZ 12

Directions: Read the following questions carefully and choose the right answer.

(1). If $\frac{2\sin\theta-\cos\theta}{\cos\theta+\sin\theta}$ = 1, then the value of cot θ is

A. 1/2 B. 1/3 C. 3 D. 2

(2). If cot $\left(\frac{\pi}{2}-\theta\right)$ = √3, then the value of cos θ is

A. 0 B. 1/√2 C. ½ D. 1

(3). If tan4θ + tan2θ = 1, then the value of cos4θ + cos2θ is

A. 8 B. 10 C. 1 D. 2

(4). The value of sin (45° + θ) – cos (45° – θ) is

A. 1 B. 0 C. 2 cos θ D. 2 sin θ

(5). If cot A + cosec A = and A is an acute angle, then the value of cos A is

A. 4/5 B. 1 C. 1/2 D. 1/√3

(6). If tan (x + y) tan (x – y) = 1, then the value of tan x is

A. √3 B. 1 C. 1/2 D. 1/√3

(7). Minimum value of 12 cos2 α + 3 sec2 α is

A. 14 B. 10 C. 11 D. 12

(8). $1 - \frac{\sin^2 A}{1 + cosA} + \frac{1 + cosA}{sinA} - \frac{sinA}{1 - cosA} = ?$

A. cos A B. 0 C. 1 D. sin A

(9). If tan θ – cot θ = a and cos θ – sinθ = b, then the value of (a2 + 4) (b2 – 1) is

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

(10). If sec θ + tan θ = √3, then the positive value of sin θ is

A. 0 B. ½ C. 3/2 D. 1

Correct answers:

1	2	3	4	5	6	7	8	9	10
A	C	C	B	A	B	D	A	A	B

Explanations:

1.

Dividing numerator and denominator by sin θ

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

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

$$\Rightarrow 2 - \cot\theta = 1 + \cot\theta$$

$$\Rightarrow \cot\theta = 1/2$$

Hence, option A is correct.

2.

$$\cot\left(\frac{\Pi}{2} - \theta\right) = \sqrt{3}$$

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

$$[\because \cot\left(\frac{\Pi}{2} - \theta\right) = \tan\theta]$$

$$\therefore \theta = 60°$$

Hence, $\cos 60° = 1/2$.

Hence, option C is correct.

3.

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

$\tan^2\theta (\tan^2\theta + 1)$

$\Rightarrow \tan^2\theta . \sec^2\theta = 1$ {$\because \sec^2\theta = 1 + \tan^2\theta$}

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

$\Rightarrow 1 - \cos^2\theta = \cos^4\theta$ {$\because \sin^2\theta = 1 - \cos^2\theta$}

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

Hence, option C is correct.

4.

$\sin(45° + \theta) - \cos(45° - \theta)$

$= \sin\{90° - (45° - \theta)\} - \cos(45° - \theta)$

$= \cos(45° - \theta) - \cos(45° - \theta)$

{$\because \sin(90 - A) = \cos A$ }

$= 0$

Hence, option B is correct.

5.

Here, cot A + cosec A = 3

$\Rightarrow \frac{\cos A}{\sin A} + \frac{1}{\sin A} = 3$

$\Rightarrow \cos A + 1 = 3\sin A$

Squaring both sides.

$\Rightarrow (\cos A + 1)^2 = 9\sin^2 A$

$\Rightarrow \cos^2 A + 2\cos A + 1 = 9 (1 - \cos^2 A)$

$\Rightarrow 10 \cos^2 A + 2 \cos A - 8 = 0$

$\Rightarrow 5 \cos^2 A + \cos A - 4 = 0$

$\Rightarrow (5 \cos A - 4)(\cos A + 1) = 0$

(∵ A is an acute angle)

$\therefore \cos A = \frac{4}{5}$

Hence, option A is correct.

6.

Here, tan (x + y) tan (x – y) = 1

$\Rightarrow \tan (x + y) = \frac{1}{\tan (x - y)}$

$\Rightarrow \tan (x + y)$

$= \cot(x - y) = \tan\left(\frac{\Pi}{2} - x + y\right)$

{ $\because \tan(90° - \theta) = \cot\theta$ }

$\therefore x + y = \Pi/2 - x + y \Rightarrow x = \pi/4$

$\therefore \tan x = \tan\frac{\Pi}{4} = 1$

Hence, option B is correct.

7.

Let $A = 12\cos^2\alpha + 3\sec^2\alpha$

$\Rightarrow A = 3(4\cos^2\alpha + \sec^2\alpha)$

$\Rightarrow A = 3[(2\cos\alpha - \sec\alpha)^2 + 4]$

$\Rightarrow A = 3(2\cos\alpha - \sec\alpha)^2 + 12$

For minimum value of A, $2008\alpha - \sec\alpha = 0$

$2\cos\alpha = \sec\alpha$

Hence, the minimum value of the expression = 12.

Hence, option D is correct.

8.

$$1 - \frac{\sin^2 A}{1 + \cos A} + \frac{1 + \cos A}{\sin A} - \frac{\sin A}{1 - \cos A}$$

$$= 1 - \frac{1 - \cos^2 A}{1 + \cos A} + \frac{1 - \cos^2 A - \sin^2 A}{\sin A(1 - \cos A)}$$

$= \frac{\cos A\,(1 + \cos A)}{1 + \cos A}$

$= \cos A$

Hence, option A is correct.

9.

Here, $\tan\theta - \cot\theta = a$

$\Rightarrow \tan^2\theta + \cot^2\theta - 2\tan\theta\cot\theta = a^2$

$\Rightarrow \frac{\sin^2\theta}{\cos^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} = a^2 + 2$

$\Rightarrow \sin^4\theta + \cos^4\theta = (a^2 + 2)\sin^2\theta\cos^2\theta$

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

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

.... *(i)*

Similarly,

$\cos\theta - \sin\theta = b$

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

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

$\Rightarrow (b - 1)^2 = 4\sin^2\theta\cos^2\theta$

....*(ii)*

Solving (i) and (ii), we get

$(a + 4)^2 (b – 1)^2 = 4$

Hence, option A is correct.

10.

$\sec \theta + \tan \theta = \sqrt{3}$

....*(i)*

$\Rightarrow \sec\theta – \tan \theta = 1/\sqrt{3}$

$\{\because \sec^2 \theta = \tan^2 \theta = 1\}$

....*(i)*

By adding (i) and (ii), we get

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

$\Rightarrow \theta = 30°$

$\therefore \sin \theta = \sin 30° = 1/2$

Hence, option B is correct.