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

TRIGONOMETRY QUIZ 5

Direction: Study the following questions carefully and choose the right answer:

(1). What is cosec (75° + Θ) – sec (15° – Θ) – tan (55° + Θ) + cot (35° – Θ) equal to?

A. –1 B. 0

C. 1 D. 3/2

(2). If $\sin\Theta . \cos\Theta = \frac{1}{2}$, then what is $\sin^6\Theta + \cos^6\Theta$ equal to?

A. 1 B. 2

C. 3 D. 1/4

(3). If 2 cot Θ = 3, then, what is $\frac{2\cos\Theta - \sin\Theta}{2\cos\Theta + \sin\Theta}$ equal to?

A. 2/3 B. 1/3

C. 1/2 D. 3/4

(4). In circular measure, the value of the angle 11° 15' is

A. $\pi^c / 5$ B. $\pi^c / 8$

C. $\pi^c / 4$ D. $\pi^c / 12$

(5). If 29 tanΘ = 31 then the value of $\frac{1 + 2\sin\Theta\cos\Theta}{1 - 2\sin\Theta\cos\Theta}$ is equal to

A. 810 B. 900

C. 540 D. 490

(6). If $2\sin\Theta + \cos\Theta = \frac{7}{3}$ then the value of $(\tan^2\Theta - \sec^2\Theta)$ is

A. 0 B. –1

C. 3/7 D. 7/3

(7). In a triangle ABC, ∠ABC = 75° and ∠ACB = $\frac{\pi^c}{4}$ The circular measure of ∠BAC is

A. $\frac{5\pi}{12}$ radian B. $\frac{\pi}{3}$ radian

C. $\frac{\pi}{6}$ radian D. $\frac{\pi}{2}$ radian

(8). The value of x which satisfies the equation

$2\,\text{cosec}^2 30° + x \sin^2 60° - \frac{3}{4}\tan^2 30° = 10$ is

A. 2 B. 3

C. 0 D. 1

(9). If $7 \sin \alpha = 24 \cos \alpha$; $0 < \alpha < \frac{\pi}{2}$ then the value of $14 \tan \alpha - 75 \cos \alpha - 7 \sec \alpha$ is equal to

A. 3 B. 4

C. 1 D. 2

(10). If Θ is an acute angle and $\tan \Theta + \cot \Theta = 2$, then the value of $\tan^5 \Theta + \cot^5 \Theta$ is

A. 1 B. 2

C. 3 D. 4

Correct answers:

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

Explanations:

1.

$\text{cosec}\,(75° + \Theta) - \sec(15° - \Theta) - \tan(55° + \Theta) + \cot(35° - \Theta)$

$= \text{cosec}\,(75° + \Theta) - \sec[90° - (75° - \Theta)] - \tan(55° + \Theta) + \tan[90 - (55° - \Theta)]$

$= \text{cosec}\,(75° + \Theta) - \text{cosec}\,(75° + \Theta) - \tan(55° + \Theta) + \tan(55° + \Theta) = 0.$

Hence, option B is correct.

2.

$\sin^6\Theta + \cos^6\Theta = (\sin^2\Theta)^3 + (\cos^2\Theta)^3$

$= (\sin^2\Theta + \cos^2\Theta)(\sin^4\Theta + \cos^4\Theta - \sin^2\Theta\cos^2\Theta)$

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

$= 1 - 3 \times \frac{1}{4} = \frac{1}{4}.$

Hence, option D is correct

3.

$2\cot\Theta = 3 \Rightarrow \cot\Theta = \frac{3}{2}$

$= \frac{2\cos\Theta - \sin\Theta}{2\cos\Theta + \sin\Theta}$

[∵ Dividing by sin Θ in numerator & denominator]

$$= \frac{2.\frac{\cos\Theta}{\sin\Theta} - 1}{2.\frac{\cos\Theta}{\sin\Theta} + 1} = \frac{2 \times \frac{3}{2} - 1}{2 \times \frac{3}{2} + 1}$$

$$[\because \frac{\cos\Theta}{\sin\Theta} = \cot\Theta = \frac{3}{2}]$$

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

Hence, option C is correct.

4.

$11° 15'$

$$= 11° + \frac{15°}{60}$$

$$= 11° + \frac{1}{4} = \frac{45°}{4}$$

$[\because 180° = \pi^c]$

$$\therefore \quad \frac{45°}{4} = \frac{\pi}{180} \times \frac{45}{4} = \frac{\pi^c}{16}$$

Hence, option A is correct.

5.

$$29 \tan\Theta = 31 \Rightarrow \tan\Theta = \frac{31}{29}$$

$$\text{Expression} = \frac{1 + 2\sin\Theta.\cos\Theta}{1 - 2\sin\Theta.\cos\Theta}$$

$$= \frac{\sin^2\Theta + \cos^2\Theta + 2\sin\Theta.\cos\Theta}{\sin^2\Theta + \cos^2\Theta - 2\sin\Theta.\cos\Theta}$$

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

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

$$= \left(\frac{\frac{31}{29} + 1}{\frac{31}{29} - 1}\right)^2 = \left(\frac{\frac{31 + 29}{29}}{\frac{31 - 29}{29}}\right)^2$$

$$= \left(\frac{60}{2}\right)^2 = (30)^2 = 900.$$

Hence, option B is correct.

6.

We know that,

$(1 + \tan^2\Theta) = \sec^2\Theta$

$\therefore \quad \tan^2\Theta - \sec^2\Theta = \tan^2\Theta - (1 + \tan^2\Theta) = -1$

Hence, option B is correct.

7.

$\angle ABC = 75°$

[$\because$ $180° = \pi$ radian or π^c]

$75° = \frac{\pi}{180} \times 75 = \frac{5\pi}{12}$ radian

$\therefore \quad \angle BAC = \pi - \frac{\pi}{4} - \frac{5\pi}{12}$

$= \frac{12\pi - 3\pi - 5\pi}{12} = \frac{4\pi}{12}$

$= \frac{\pi}{3}$ radian

Hence, option B is correct.

8.

$2\,\text{cosec}^2 30° + x \sin^2 60° - \frac{3}{4}\tan^2 30° = 10$

$\Rightarrow \quad 2 \times (2)^2 + x \times \left(\frac{3}{2}\right)^2 - \frac{3}{4} \times \left(\frac{1}{3}\right)^2 = 10$

$\Rightarrow \frac{3x}{4} = 10 + \frac{1}{4} - 8$

$\Rightarrow \frac{3x}{4} = \frac{9}{4} \Rightarrow 3x = 9 \Rightarrow x = 3.$

Hence, option B is correct.

9.

$7 \sin\alpha = 24 \cos\alpha$

$\Rightarrow \frac{\sin\alpha}{\cos\alpha} = \frac{24}{7} \Rightarrow \tan\alpha = \frac{24}{7}$

$\therefore \quad \sec\alpha = \quad 1 + \tan^2\alpha = \quad 1 + \left(\frac{24}{7}\right)^2$

$= \quad 1 + \frac{576}{49} = \quad \frac{49 + 576}{49}$

$= \quad \frac{625}{49} = \frac{25}{7}$

$\therefore \quad \cos\alpha = \frac{1}{\sec\alpha} = \frac{7}{25}$

$\therefore \quad 14\tan\alpha - 75\cos\alpha - 7\sec\alpha$

$= 14 \times \frac{24}{7} - 75 \times \frac{7}{25} - 7 \times \frac{25}{7}$

$= \quad 48 - 21 - 25 = 2.$

Hence, option D is correct.

10.

$\tan\Theta + \cot\Theta = 2$

$\Rightarrow \quad \tan\Theta + \frac{1}{\tan\Theta} = 2$

$\Rightarrow \quad \frac{\tan^2\Theta + 1}{\tan\Theta} = 2$

$\Rightarrow \quad \tan^2\Theta + 1 = 2\tan\Theta$

$\Rightarrow \quad \tan^2\Theta - 2\tan\Theta + 1 = 0$

$\Rightarrow \quad (\tan\Theta - 1)^2 = 0$

$\Rightarrow \quad \tan\Theta - 1 = 0 \quad \Rightarrow \quad \tan\Theta = 1$

$\therefore \quad \cot\Theta = \frac{1}{\tan\Theta} = 1$

$\therefore \tan^5\Theta + \cot^5\Theta = 1 + 1 = 2.$

Hence, option B is correct.