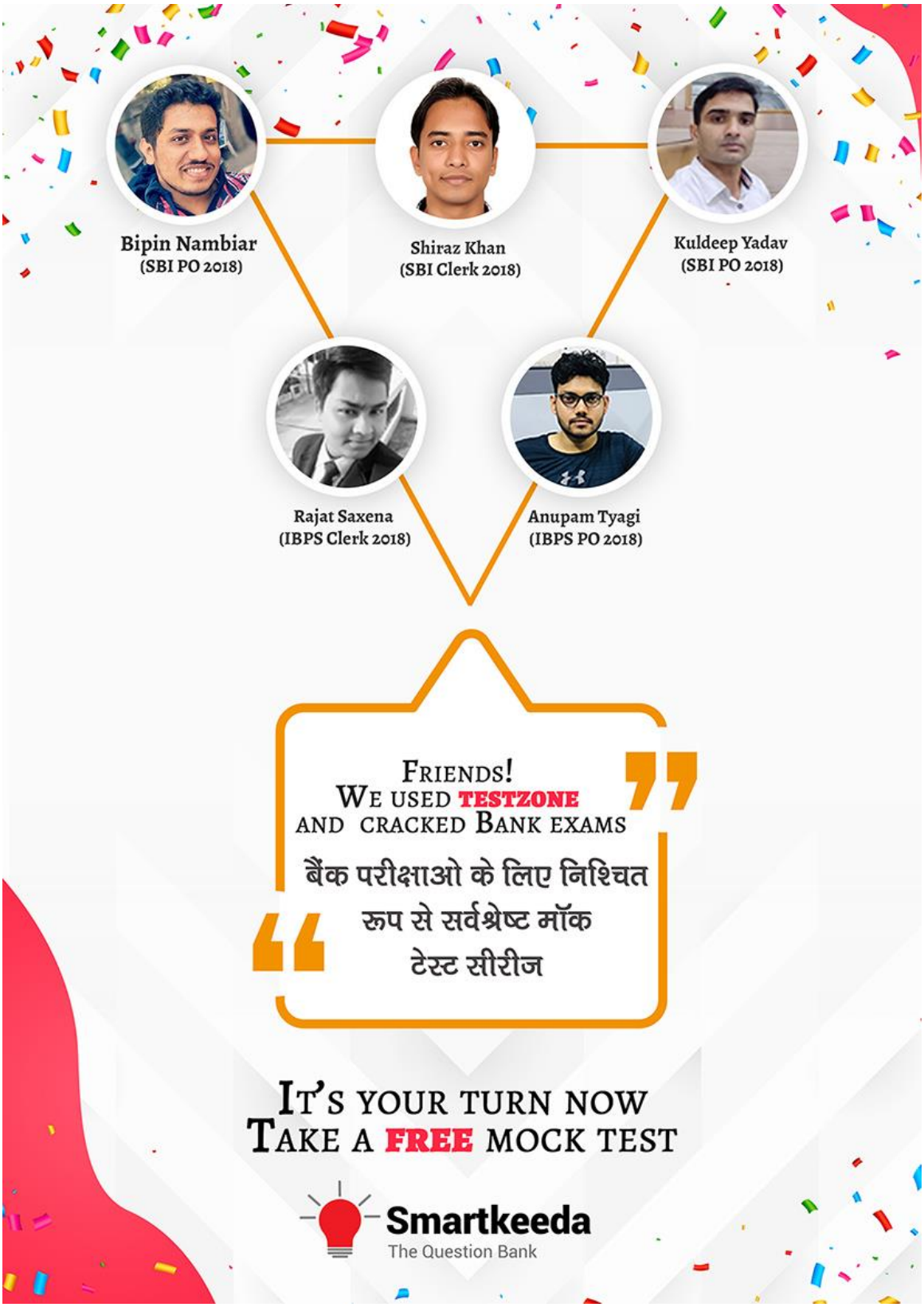
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The Question Bank

Trigonometry Questions for SSC 10 + 2 and CGL Tier-I

Trigonometry Quiz 5

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

1. $\boldsymbol{Find\ the\ value\ of\ \sin^2 10 + \sin^2 20 + \sin^2 30 + \ldots\ldots + \sin^2 80}$.

A. 2

B. 3

C. 1

D. 4

2. $\boldsymbol{Find\ the\ value\ of\ \frac{16}{\sqrt{3}}(Cos50°Cos10°Cos110°Cos60°)}$

A. 1

B. 2

C. – 1

D. – 2

3. $\boldsymbol{\cos^2\theta\left(\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}+\sqrt{\frac{1-\sin\theta}{1+\sin\theta}}\right)}$

$A.\cos\theta$

$B.\frac{\cos\theta}{2}$

$C.2\cos\theta$

$D.\sqrt{2}\cos\theta$

4. $\boldsymbol{If\ \sin 21° = \frac{x}{y},\ then\ \sec 21° - \sin 69°\ is\ equal\ to}$

$A.\frac{x^2}{y\sqrt{y^2-x^2}}$

$B.\ \frac{x^2}{y\sqrt{y^2-x^2}}$

$A.\frac{x^2}{y\sqrt{y^2-x^2}}$

$C.\frac{y}{x\sqrt{x^2-y^2}}$

5. $\boldsymbol{\left(\frac{sin\ 35°}{cos\ 55°}\right)^2+\left(\frac{cos\ 55°}{sin\ 35°}\right)^2-2\ cos\ 30°}$

A. 0

B. $1-\sqrt{3}$

C. $2-\sqrt{3}$

D. 3

6. $If\ sin\alpha + (sin\alpha)^2 = 1, then\ the\ value\ of$

$(cos\alpha)^{12} + 3(cos\alpha)^{10} + 3(cos\alpha)^8 + (cos\alpha)^6 - 1\ is$

A. 0

B. 1

C. – 1

D. 2

7. $If\ cos^4A - sin^4A = p, then\ find\ the\ value\ of\ p.$

A. 2 cos2 A – 1

B. 2 cos2 A + 1

C. cos2 A – 1

D. cos2 A + 1

8. $The\ minimum\ value\ of\ 16\ tan^2\theta + 25\ cot^2\theta\ is$

A. 5

B. 4

C. 30

D. 40

9. $If\ 7\ sin^2\theta + 3\ cos^2\theta = 4, (0° < \theta < 90°), then\ value\ of\ \theta\ is$

A. π/2

B. π/3

C. π/6

D. π/4

10. $If\ 2\ sin\ \theta + cos\ \theta = \frac{7}{3}, then\ the\ value\ of\ tan^2\theta - sec^2\theta\ is$

A. 0

B. – 1

C. 2

D. – 2

Correct answer:

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

Explanation:

1. We can rewrite above equation as

$\sin^2 10 + \sin^2 80 + \sin^2 20 + \sin^2 70 + \sin^2 30 + \sin^2 60 + \sin^2 40 + \sin^2 50$ ..... equation (A)

We know that $\sin^2 x + \sin^2 (90 - x) = 1$

Therefore equation A becomes

$1 + 1 + 1 + 1 = 4$

Hence, option D is correct.

2. We have $\cos x \cos (60 - x) \cos (60 + x)$

$= \cos x (\cos x \cos 60 + \text{Sin } x \text{ Sin } 60°) (\cos x \cos 60° - \text{Sin } x \text{ Sin } 60°)$

$= \cos x (\cos^2 x \cos^2 60° - \text{Sin}^2 x \text{ Sin}^2 60°)$

$= \cos x \left(\frac{1}{4} \cos^2 - \frac{3}{4} \sin^2 x\right)$

$= \frac{1}{4} \{ \cos^3 x - 3 \cos x (1 - \cos^2 x) \}$

$= \frac{1}{4} (4 \cos^3 x - 3 \cos x)$

$= \frac{1}{4}\cos 3x$

Thus,

$\cos x° \cos(60 - x)° \cos(60 + x) = \frac{1}{4}\cos(3x)$

Therefore,

$\cos 50° \cos 10° \cos 110° = \frac{1}{4}\cos 150°$

$= \frac{1}{4}(-\sqrt{3}/2) = -\frac{\sqrt{3}}{8}$ **... eq A**

Also $\cos 60° = \frac{1}{2}$ **... eqB**

Put values of eq.A and Eq.B in

$\frac{16}{\sqrt{3}}(\cos 50° \cos 10 \cos 110° \cos 60°)$, we get

$= \frac{16}{\sqrt{3}} \times (-\frac{\sqrt{3}}{8}) \times \frac{1}{2}$

$= -1$

Option C is hence the correct answer.

3. $\cos^2\theta\left(\sqrt{\frac{(1+\sin\theta)(1+\sin\theta)}{(1-\sin\theta)(1+\sin\theta)}} + \sqrt{\frac{(1-\sin\theta)(1-\sin\theta)}{(1+\sin\theta)(1-\sin\theta)}}\right)$

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

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

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

Hence, option C is correct.

4. $\text{Sin } 21° = \frac{x}{y}$

$\cos 21° = \sqrt{1 - (\sin 21°)^2}$

$\Rightarrow \sqrt{1 - \frac{x^2}{y^2}} = \frac{\sqrt{y^2 - x^2}}{7}$

$\Rightarrow \sec 21° = \frac{y}{\sqrt{y^2 - x^2}}$

According to the question,

$\Rightarrow \sec 21° - \sin 69°$

$\Rightarrow \sec 21° - \sin (90 - 21°)$

$\Rightarrow \sec 21° - \cos 21°$

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

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

Hence, option A is correct.

5. $\left(\frac{\sin 35°}{\cos 55°}\right)^2 + \left(\frac{\cos 55°}{\sin 35°}\right)^2 - 2 \cos 30°$

$\Rightarrow \left(\frac{\sin (90 - 35°)}{\cos 55°}\right)^2 + \left(\frac{\cos (90 - 55°)}{\sin 35°}\right)^2 - 2 \cos 30°$

$\Rightarrow \left(\frac{\cos 55°}{\cos 55°}\right)^2 + \left(\frac{\sin 35°}{\sin 35°}\right)^2 - 2 \cos 30°$

$\Rightarrow 1 + 1 - 2 \times \frac{\sqrt{3}}{2}$

$\Rightarrow 2 - \sqrt{3}$

Hence, option C is correct.

6. $\sin \alpha + (\sin \alpha)^2 = 1$

$\Rightarrow \sin \alpha = 1 - (\sin \alpha)^2$

$\Rightarrow \sin \alpha = (\cos \alpha)^2$

According to the question,

we have $(\cos \alpha)^{12} + 3(\cos \alpha)^{10} + 3(\cos\alpha)^8 + (\cos \alpha)^6 - 1$

$\Rightarrow ((\cos \alpha)^4 + (\cos \alpha)^2)^3 - 1$

$\Rightarrow ((\sin \alpha)^2 + (\cos \alpha)^2)^3 - 1 = 1 - 1 = 0$

Hence, option A is correct.

7. we know, $a^2 - b^2 = (a + b)(a - b)$

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

$\Rightarrow \{\cos^2 A - (1 - \cos^2 A)\}$ [using, $\sin^2 A + \cos^2 A = 1$]

$\Rightarrow 2\cos^2 A - 1$

Hence, option A is correct.

8. Comparing $16\tan^2 \theta + 25\cot^2 \theta$ with $a\tan^2 \theta + b\cot^2 \theta$, we get

$a = 16$

and, $b = 25$

We know that the minimum value of such equation = $2\sqrt{ab}$

Thus the minimum value = $2\sqrt{(16 \times 25)}$

$\Rightarrow 2 \times 4 \times 5 = 40$

Hence, option D is correct.

9. $7 \sin^2\theta + 3 \cos^2\theta = 4$

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

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

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

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

$\theta = \frac{\pi}{6}$

Hence, option C is correct.

10. This question is a tricky one. Those who'd start solving it keeping the given equation in mind would just waste their precious time.

Kindly go through the explanation given below:

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

We know that

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

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

$\Rightarrow \sec^2\theta = 1 + \tan^2\theta$

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

Hence, option B is correct.