

JEE MAIN TRIGONOMETRIC FUNCTIONS — SUM AND DIFFERENCE FORMULAE — PYQS

Max. Marks: 24

Questions: 6

Section A (MCQ) — 5 questions

Q.1 Let $\tan A, \tan B$, where $A, B \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, be the roots of the quadratic equation $x^2 - 2x - 5 = 0$. Then $20\sin^2\left(\frac{A+B}{2}\right)$ is equal to :

[JEE Main 2026 (Online) 5th April Morning Shift]

- (1) $10 + \sqrt{10}$ (2) $10 - 2\sqrt{10}$
(3) $10 - 3\sqrt{10}$ (4) $10 - \sqrt{10}$

Scan or tap for the full solution



Q.2 Let $\frac{\pi}{2} < \theta < \pi$ and $\cot \theta = -\frac{1}{2\sqrt{2}}$. Then the value of $\sin\left(\frac{15\theta}{2}\right)(\cos 8\theta + \sin 8\theta) + \cos\left(\frac{15\theta}{2}\right)(\cos 8\theta - \sin 8\theta)$ is equal to :

[JEE Main 2026 (Online) 23rd January Evening Shift]

- (1) $\frac{\sqrt{2}-1}{\sqrt{3}}$ (2) $\frac{\sqrt{2}}{\sqrt{3}}$
(3) $\frac{1-\sqrt{2}}{\sqrt{3}}$ (4) $-\frac{\sqrt{2}}{\sqrt{3}}$

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Q.3 The value of $\operatorname{cosec} 10^\circ - \sqrt{3}\sec 10^\circ$ is equal to :

[JEE Main 2026 (Online) 21st January Morning Shift]

- (1) 2 (2) 6 (3) 8 (4) 4

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Q.4 If for $\theta \in \left[-\frac{\pi}{3}, 0\right]$, the points

$(x, y) = \left(3\tan\left(\theta + \frac{\pi}{3}\right), 2\tan\left(\theta + \frac{\pi}{6}\right)\right)$ lie on $xy + \alpha x + \beta y + \gamma = 0$, then $\alpha^2 + \beta^2 + \gamma^2$ is equal to :

[JEE Main 2025 (Online) 7th April Morning Shift]

- (1) 75 (2) 96 (3) 80 (4) 72

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Q.5 If $\sum_{r=1}^{13} \left\{ \frac{1}{\sin\left(\frac{\pi}{4} + (r-1)\frac{\pi}{6}\right)\sin\left(\frac{\pi}{4} + \frac{r\pi}{6}\right)} \right\} = a\sqrt{3} + b$, $a, b \in \mathbb{Z}$, then $a^2 + b^2$ is equal to :

[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) 10 (2) 4 (3) 8 (4) 2

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Section B (Numerical) — 1 question

Q.6 Let $\cos(\alpha + \beta) = -\frac{1}{10}$ and $\sin(\alpha - \beta) = \frac{3}{8}$, where $0 < \alpha < \frac{\pi}{3}$ and $0 < \beta < \frac{\pi}{4}$. If

$\tan 2\alpha = \frac{3(1-r\sqrt{5})}{\sqrt{11}(s+\sqrt{5})}$, $r, s \in \mathbb{N}$, then $r + s$ is equal to _____.

[JEE Main 2026 (Online) 22nd January Evening Shift]

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ANSWER KEY

Section A (MCQ) — 5 questions

Ques.	1	2	3	4	5						
Ans.	3	3	4	1	3						

Section B (Numerical) — 1 question

Ques.	6										
Ans.	20										