

MATHEMATICS

TARGET : JEE-2024

Maximum Time : 50 Min.

DPP No. : 05

Comprehension # 1 (Q. No. 1 to 2)

$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$\tan(A + B + C) = \frac{\tan A + \tan B + \tan C - \tan A \tan B \tan C}{1 - (\tan A \tan B + \tan B \tan C + \tan C \tan A)}$$

By the use of standard formulae above, answer the following question.

1. If $\tan A$ and $\tan B$ are roots of $x^2 - px + q = 0$ ($p^2 > 4q$) then

(A) $\tan(A + B) = \frac{p}{1 - q}$

(B) $\tan(A + B) = \frac{p}{1 + q}$

(C) $\tan(A - B) = \frac{\sqrt{p^2 - 4q}}{1 + q}$

(D) $\tan(A - B) = \frac{\sqrt{p^2 - 4q}}{1 + q}$

2. The value of $\tan 3A - \tan 2A - \tan A$ is equal to

(A) $\tan 3A \tan 2A \tan A$

(B) $-\tan 3A \tan 2A \tan A$

(C) $\tan A \tan 2A - \tan 2A \tan 3A - \tan 3A \tan A$

(D) None of these

Comprehension-2 (Q. No. 3 to 5)

$$\sin 2A = \frac{2 \tan A}{1 + \tan^2 A}$$

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

$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

By the use of standard formulae above, answer the following question.

3. If $\cos x + \sin x = \frac{7}{5}$ then product of all possible values of $\cot \frac{x}{2}$ is equal to

(A) 2

(B) 4

(C) 6

(D) 8

4. If $2\cos x + \sin x = 1$, then the sum of all possible value of $7\cos x + 6\sin x$ is equal to

(A) 2

(B) 4

(C) 6

(D) 8

5. The value of $\left(\tan \frac{\pi}{16} + \tan \frac{3\pi}{16} + \tan \frac{5\pi}{16} + \tan \frac{7\pi}{16}\right)^2$ is equal to
 (A) $32 + 16\sqrt{2}$ (B) $16 + 16\sqrt{2}$ (C) $32 + 32\sqrt{2}$ (D) $32\sqrt{2} - 16$
6. Number of integral solutions of the equation $\log_{x-3} \left(\log_{2x^2-2x+3} (x^2 + 2x) \right) = 0$
 (A) 4 (B) 2 (C) 1 (D) 0
7. Solve $\frac{|x-3|}{x^2-5x+6} \geq 2$
8. Solve the following—
 (a) $\log_2 x \leq \frac{2}{\log_2 x - 1}$ (b) $\log_{0.5} \sqrt{\frac{x-4}{x+3}} < \log_{0.5} 2$
9. The sum of $\left[\frac{1}{2}\right] + \left[\frac{1}{2} + \frac{1}{2000}\right] + \left[\frac{1}{2} + \frac{2}{2000}\right] + \left[\frac{1}{2} + \frac{3}{2000}\right] + \dots + \left[\frac{1}{2} + \frac{1999}{2000}\right]$
 where $[.]$ denotes the greatest integer function, is equal to :
 (A) 1000 (B) 999 (C) 1001 (D) 1002
10. Let $N = (2+1)(2^2+1)(2^4+1)\dots(2^{32}+1) + 1$ and $N = 2^\lambda$ then the value of λ is
 (A) 63 (B) 64 (C) 65 (D) 66

ANSWER KEY OF DPP NO. : 05

1. (AC) 2. (A) 3. (C) 4. (D) 5. (A) 6. (D)
 7. $x \in \left[\frac{3}{2}, 2\right)$ 8. (a) $(0, 1/2] \cup (2, 4]$ (b) $(-16/3, -3)$ 9. (A) 10. (B)