

Topics : Inverse Trigonometric Function, Set & Relation, Fundamentals of Mathematics, Matrices & Determinants, Quadratic Equation, Trigonometric Ratio

Type of Questions

Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	M.M., Min. [9, 9]
Single choice Objective (no negative marking) Q. 4, 5, 6, 7	(3 marks, 3 min.)	[12, 12]
Multiple choice objective (no negative marking) Q.8	(5 marks, 4 min.)	[5, 4]

COMPREHENSION (FOR Q.NO. 1 TO 3) :

A polynomial $P(x)$ of third degree vanish when $x = 1$ & $x = -2$. This polynomial have the values 4 & 28 when $x = -1$ and $x = 2$ respectively.

1. One of the factor of $P(x)$ is
(A) $x + 1$ (B) $x - 2$ (C) $3x + 1$ (D) none of these

2. If the polynomial $P(x)$ is divided by $(x + 3)$, then remainder is
(A) -32 (B) 100 (C) 32 (D) 0

3. If $i = \sqrt{-1}$, then $P(i)$ is
(A) rational (B) purely imaginary (C) imaginary (D) irrational

4. If $n(A) = 110$, $n(B) = 300$, $n(A - B) = 50$, then $n(A \cup B)$ equals
(1) 350 (B) 410 (C) 160 (D) 460

5. The sum of

$$\cot^{-1}\left(\frac{7}{4}\right) + \cot^{-1}\left(\frac{19}{4}\right) + \cot^{-1}\left(\frac{39}{4}\right) + \cot^{-1}\left(\frac{67}{4}\right) \dots \dots \infty \text{ is equal to}$$

- (A) $\tan^{-1} 4$ (B) $\tan^{-1} 3$ (C) $\tan^{-1} 2$ (D) None of these

6. If $A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$, then $A^T A^{-1} =$

(A) $\begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$

(B) $\begin{bmatrix} -\cos 2x & \sin 2x \\ -\sin 2x & \cos 2x \end{bmatrix}$

(C) $\begin{bmatrix} \sin 2x & \cos 2x \\ \cos 2x & \sin 2x \end{bmatrix}$

- (D) None of these

7. Let $\cos(\alpha + \beta) = \frac{4}{5}$ and $\sin(\alpha - \beta) = \frac{5}{13}$, where $0 \leq \alpha, \beta \leq \frac{\pi}{4}$. Then $\tan 2\alpha =$

(A) $\frac{56}{33}$

(B) $\frac{19}{12}$

(C) $\frac{20}{7}$

(D) $\frac{25}{16}$

8. If the cubic polynomials $x^3 + ax^2 + 11x + 6$ and $x^3 + bx^2 + 14x + 8$ may have a common factor of the form $x^2 + px + q$, then

(A) $a + p = b + q$

(B) $ap < bq$

(C) pq divides ab

(D) $p + q$ divides $a + b$.

Answers Key

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|--------|--------|--------|--------|
| 1. (C) | 2. (A) | 3. (C) | 4. (1) |
| 5. (C) | 6. (A) | 7. (A) | 8. (A) |