

Topics : Fundamentals of Mathematics, Quadratic Equation

Type of Questions

M.M., Min.

Comprehension (no negative marking) Q.1 to 3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4,5	(3 marks, 3 min.)	[6, 6]
Multiple choice objective (no negative marking) Q.6	(5 marks, 4 min.)	[5, 4]
Subjective Questions (no negative marking) Q.7,8	(4 marks, 5 min.)	[8, 10]

COMPREHENSION (For Q.1 to 3)

Consider the equation $||x - 1| - 2| = \lambda$

- If the given equation has two solutions, then λ belongs to
(A) $(2, \infty) \cup \{0\}$ (B) $(2, \infty)$ (C) $(0, 2)$ (D) none of these
- If the given equation has three solutions, then λ belongs to
(A) $(0, 2)$ (B) $\{2\}$ (C) $(0, \infty)$ (D) $(-\infty, 0)$
- Number of integral values of λ so that the given equation has four solutions, is
(A) 0 (B) 1 (C) 2 (D) 3
- If α, β, γ are the roots of the equation $x^3 - px^2 + qx - r = 0$, then the value of $\sum \frac{\alpha\beta}{\gamma}$ is equal to
(A) $pq + 3r$ (B) $pq + r$ (C) $pq - 3r$ (D) $\frac{q^2 - 2pr}{r}$
- S_1 : For $ax^2 + bx + c = 0$ ($a \neq 0$) if $a + b + c = 0$, then the roots are 1 and c/a

S_2 : If $f(x) = ax^2 + bx + c$ ($a \neq 0$) has finite minimum value and both roots are of opposite sign, then $f(0) < 0$

S_3 : If α is repeated root of $ax^2 + bx + c = 0$, $a \neq 0$, then $ax^2 + bx + c = (x - \alpha)^2$

S_4 : For $ax^2 + bx + c = 0$ ($a \neq 0$), irrational roots occur in conjugate pairs only

State in order, whether S_1, S_2, S_3, S_4 are true or false
(A) TTFF (B) TTFF (C) FTFT (D) TTTT
- If α, β are the roots of the equation $x^2 + \alpha x + \beta = 0$ such that $\alpha \neq \beta$ and $||x - \beta| - \alpha| < \alpha$, then
(A) inequality is satisfied by exactly two integral values of x
(B) inequality is satisfied by all values of $x \in (-4, -2)$
(C) Roots of the equation are opposite in sign
(D) $x^2 + \alpha x + \beta < 0 \forall x \in [-1, 0]$
- Find the set of values of 'a' for which the roots of the quadratic equation
 $(a - 5)x^2 + (\sqrt{4a - a^2})x + (a^2 - 2a - 3) = 0$ are of opposite sign.
- If inequality $\frac{ax^2 + 3x + 4}{x^2 + 2x + 2} < 5$ is satisfied for all real values of x then find out greatest integral value of 'a'.

Answers Key

1. (A) 2. (B) 3. (B) 4. (D)
5. (B) 6. (A)(B)(C)(D) 7. $a \in (3, 4]$
8. 2