

The sum of all real values of x satisfying the equation

$$(x^2 - 5x + 5)^{x^2 + 4x - 60} = 1 \text{ is :}$$

- (1) 3
- (2) -4
- (3) 6
- (4) 5

Solution

There are 3 cases,

- (I) $1^{\text{Finite Real No.}} = 1$
- (II) $(\text{Finite Nonzero Real No.})^0 = 1$
- (III) $(-1)^{\text{Even No. Excluding 0}} = 1$

Case (I): $1^{\text{Finite Real No.}} = 1$

$$x^2 - 5x + 5 = 1, \text{ i.e. } x = 4 \text{ or } x = 1$$

$x^2 + 4x - 60$ is a real finite no. for $x = 4, 1$

Case (II): $(\text{Finite Nonzero Real No.})^0 = 1$

$$x^2 + 4x - 60 = 0, \text{ i.e. } x = -10 \text{ or } x = 6$$

$x^2 - 5x + 5$ is a real nonzero finite no. for $x = -10, 6$

Case (III): $(-1)^{\text{Even No. Excluding 0}} = 1$

$$x^2 - 5x + 5 = -1, \text{ i.e. } x = 2 \text{ or } x = 3$$

$x^2 + 4x - 60$ is nonzero even for $x = 2$

$x^2 + 4x - 60$ is not even for $x = 3$

Hence, $x = 2$ alone is accepted in this case.

$$\text{Sum of roots} = (4 + 1) + (-10 + 6) + (2) = 3$$

Hence, Option (1).

Based on JEE Main 2016

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