

JEE Mains Problems

EXAMPLE

For what real values of p , will the equation

$$(p^2 - 16)x^2 - (4 + 5p + p^2)x - p^3 - 4p^2 - 4p - 16 = 0$$

have more than two solutions?

A) No such value of p exists

B) 4, -4

C) -4

D) 4, -4, -1

Concepts tested: Identity

Answer: C) -4

Solution:

For the quadratic equation $(p^2 - 16)x^2 - (4 + 5p + p^2)x - p^3 - 4p^2 - 4p - 16 = 0$ to have more than two solutions, it must be an identity. Therefore,

$$p^2 - 16 = 4 + 5p + p^2 = -p^3 - 4p^2 - 4p - 16 = 0.$$

Solving these, we get

$$p^2 - 16 = 0 \implies p = \pm 4 \quad (1)$$

$$4 + 5p + p^2 = 0 \implies p = -1, -4 \quad (2)$$

$$-p^3 - 4p^2 - 4p - 16 = 0 \implies (p + 4)(p^2 + 4) = 0 \implies p = -4. \quad (3)$$

Taking the intersection of (1), (2), and (3), we get $p = -4$.

Common mistakes:

- If you take the union of the values of p which you got after equating the coefficients to zero, you will end up with option D), which is wrong.