

3 JEE Main 2021 (Online) 26th August Evening Shift

Numerical

Let A be a 3×3 real matrix. If $\det(2\text{Adj}(2 \text{ Adj}(\text{Adj}(2A)))) = 2^{41}$, then the value of $\det(A^2)$ equal _____.

Answer

Correct Answer is 4

Explanation

$$\text{adj}(2A) = 2^2 \text{ adj} A$$

$$\Rightarrow \text{adj}(\text{adj}(2A)) = \text{adj}(4 \text{ adj} A) = 16 \text{ adj}(\text{adj} A)$$

$$= 16 |A| A$$

$$\Rightarrow \text{adj}(32|A|A) = (32|A|)^2 \text{ adj} A$$

$$12(32|A|)^2 |\text{adj} A| = 2^3 (32|A|)^6 |\text{adj} A|$$

$$2^3 \cdot 2^{30} |A|^6 \cdot |A|^2 = 2^{41}$$

$$|A|^8 = 2^8 \Rightarrow |A| = \pm 2$$

$$|A|^2 = |A|^2 = 4$$