

JEE MAIN COMPLEX NUMBERS AND QUADRATIC EQUATIONS — GEOMETRY OF COMPLEX NUMBERS: LOCI AND ROTATION (JEE) — PYQS

Max. Marks: 56
Questions: 14

Section A (MCQ) — 13 questions

- Q.1** The number of values of $z \in \mathbb{C}$, satisfying the equations $|z - (4 + 8i)| = \sqrt{10}$ and $|z - (3 + 5i)| + |z - (5 + 11i)| = 4\sqrt{5}$, is :

[JEE Main 2026 (Online) 8th April Evening Shift]

- (1) 0 (2) 2 (3) 1 (4) 4

Scan or tap for the full solution



- Q.2** Let z be a complex number such that $|z + 2| = |z - 2|$ and $\arg\left(\frac{z+3}{z-i}\right) = \frac{\pi}{4}$. Then $|z|^2$ is equal to:

[JEE Main 2026 (Online) 4th April Morning Shift]

- (1) 9 (2) 4 (3) 5 (4) 1

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- Q.3** Let the circles $C_1: |z| = r$ and $C_2: |z - 3 - 4i| = 5$, $z \in \mathbb{C}$, be such that C_2 lies within C_1 . If z_1 moves on C_1 , z_2 moves on C_2 and $\min|z_1 - z_2| = 2$, then $\max|z_1 - z_2|$ is equal to :

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) 12 (2) 17 (3) 22 (4) 24

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- Q.4** Let z be a complex number such that $|z - 6| = 5$ and $|z + 2 - 6i| = 5$. Then the value of $z^3 + 3z^2 - 15z + 14i$ is equal to :

[JEE Main 2026 (Online) 28th January Morning Shift]

- (1) 61 (2) 37 (3) 42 (4) 50

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- Q.5** Let $A = \{z \in \mathbb{C} : |z - 2| \leq 4\}$ and $B = \{z \in \mathbb{C} : |z - 2| + |z + 2| = 5\}$. Then the $\max\{|z_1 - z_2| : z_1 \in A \text{ and } z_2 \in B\}$ is :

[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) $\frac{17}{2}$ (2) 8 (3) 9 (4) $\frac{15}{2}$

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- Q.6** Let $S = \left\{ z \in \mathbb{C} : \left| \frac{z - 6i}{z - 2i} \right| = 1 \text{ and } \left| \frac{z - 8 + 2i}{z + 2i} \right| = \frac{3}{5} \right\}$. Then $\sum_{z \in S} |z|^2$ is equal to :

[JEE Main 2026 (Online) 24th January Morning Shift]

- (1) 413 (2) 398 (3) 385 (4) 423

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- Q.7** Let $S = \{z : 3 \leq |2z - 3(1 + i)| \leq 7\}$ be a set of complex numbers.

 Then $\min_{z \in S} \left| \left(z + \frac{1}{2}(5 + 3i) \right) \right|$ is equal to :

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) $\frac{1}{2}$ (2) $\frac{5}{2}$ (3) 2 (4) $\frac{3}{2}$

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- Q.8** Let z be the complex number satisfying $|z - 5| \leq 3$ and having maximum positive principal argument.

 Then $34 \left| \frac{5z - 12}{5iz + 16} \right|^2$ is equal to:

[JEE Main 2026 (Online) 21st January Evening Shift]

- (1) 20 (2) 26 (3) 12 (4) 16

Scan or tap for the full solution



- Q.9** Among the statements

(S1) : The set

$$\left\{ z \in \mathbb{C} - \{-i\} : |z| = 1 \text{ and } \frac{z-i}{z+i} \text{ is purely real} \right\}$$

contains exactly two elements, and

(S2) : The set

$$\left\{ z \in \mathbb{C} - \{-1\} : |z| = 1 \text{ and } \frac{z-1}{z+1} \text{ is purely imaginary} \right\}$$

contains infinitely many elements.

[JEE Main 2025 (Online) 7th April Morning Shift]

- (1) both are incorrect (2) both are correct
(3) only (S2) is correct (4) only (S1) is correct

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Q.10 If the locus of $z \in \mathbb{C}$, such that

$$\operatorname{Re}\left(\frac{z-1}{2z+i}\right) + \operatorname{Re}\left(\frac{\bar{z}-1}{2\bar{z}-i}\right) = 2, \text{ is a circle of radius } r$$

and center (a, b) , then $\frac{15ab}{r^2}$ is equal to :

[JEE Main 2025 (Online) 7th April Evening Shift]

- (1) 16 (2) 24 (3) 12 (4) 18

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full solution



Q.11 If $z_1, z_2, z_3 \in \mathbb{C}$ are the vertices of an equilateral triangle whose centroid is z_0 , then $\sum_{k=1}^3 (z_k - z_0)^2$ is

equal to [JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 0 (2) 1 (3) i (4) -i

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full solution



Q.12 Let $|z_1 - 8 - 2i| \leq 1$ and $|z_2 - 2 + 6i| \leq 2$, $z_1, z_2 \in \mathbb{C}$. Then the minimum value of $|z_1 - z_2|$ is :

[JEE Main 2025 (Online) 29th January Morning Shift]

- (1) 3 (2) 10 (3) 7 (4) 13

Scan or tap for the
full solution



Q.13 Let O be the origin, the point A be $z_1 = \sqrt{3} + 2\sqrt{2}i$, the point $B(z_2)$ be such that $\sqrt{3}|z_2| = |z_1|$ and $\arg(z_2) = \arg(z_1) + \frac{\pi}{6}$. Then

[JEE Main 2025 (Online) 28th January Morning Shift]

- (1) area of triangle ABO is $\frac{11}{4}$
 (2) area of triangle ABO is $\frac{11}{\sqrt{3}}$
 (3) ABO is a scalene triangle
 (4) ABO is an obtuse angled isosceles triangle

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Section B (Numerical) — 1 question

Q.14 Let $A = \{z \in \mathbb{C} : |z - 2 - i| = 3\}$,

$B = \{z \in \mathbb{C} : \operatorname{Re}(z - iz) = 2\}$ and $S = A \cap B$. Then

$\sum_{z \in S} |z|^2$ is equal to _____.

[JEE Main 2025 (Online) 4th April Morning Shift]

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full solution



ANSWER KEY

Section A (MCQ) — 13 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	1	3	4	1	3	4	1	3	4	1
Ques.	12	13									
Ans.	3	4									

Section B (Numerical) — 1 question

Ques.	14										
Ans.	22										