

JEE MAIN CONIC SECTIONS — MIXED CONICS AND LOCUS PROBLEMS (JEE) — PYQS

Max. Marks: 52

Questions: 13

Section A (MCQ) — 10 questions

- Q.1** Let $x = 9$ be a directrix of an ellipse E , whose centre is at the origin and eccentricity is $\frac{1}{3}$. Let $P(\alpha, 0)$, $\alpha > 0$, be a focus of E and AB be a chord passing through P . Then the locus of the mid point of AB is :

[JEE Main 2026 (Online) 6th April Evening Shift]

- (1) $9y^2 = 8x(1 - x)$ (2) $3y^2 = 4x(1 - x)$
 (3) $9y^2 = 8x(x - 1)$ (4) $3y^2 = 4x(x - 1)$

Scan or tap for the full solution 

- Q.2** Let $P(3\cos\alpha, 2\sin\alpha)$, $\alpha \neq 0$, be a point on the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$, Q be a point on the circle $x^2 + y^2 - 14x - 14y + 82 = 0$ and R be a point on the line $x + y = 5$ such that the centroid of the triangle PQR is $\left(2 + \cos\alpha, 3 + \frac{2}{3}\sin\alpha\right)$. Then the sum of the ordinates of all possible points R is :

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

- (1) 6 (2) 2 (3) 4 (4) 8

Scan or tap for the full solution 

- Q.3** Let the circle $x^2 + y^2 = 4$ intersect x -axis at the points $A(a, 0)$, $a > 0$ and $B(b, 0)$. Let $P(2\cos\alpha, 2\sin\alpha)$, $0 < \alpha < \frac{\pi}{2}$ and $Q(2\cos\beta, 2\sin\beta)$ be two points such that $(\alpha - \beta) = \frac{\pi}{2}$. Then the point of intersection of AQ and BP lies on :

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

- (1) $x^2 + y^2 - 4x - 4 = 0$
 (2) $x^2 + y^2 - 4x - 4y = 0$
 (3) $x^2 + y^2 - 4x - 4y - 4 = 0$
 (4) $x^2 + y^2 - 4y - 4 = 0$

Scan or tap for the full solution 

- Q.4** Let a circle of radius 4 pass through the origin O , the points $A(-\sqrt{3}a, 0)$ and $B(0, -\sqrt{2}b)$, where a and b are real parameters and $ab \neq 0$. Then the locus of the centroid of $\triangle OAB$ is a circle of radius

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

- (1) $\frac{7}{3}$ (2) $\frac{11}{3}$ (3) $\frac{5}{3}$ (4) $\frac{8}{3}$

Scan or tap for the full solution 

- Q.5** Let the locus of the mid-point of the chord through the origin O of the parabola $y^2 = 4x$ be the curve S . Let P be any point on S . Then the locus of the point, which internally divides OP in the ratio $3 : 1$, is :

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) $2x^2 = 3y$ (2) $2y^2 = 3x$ (3) $3y^2 = 2x$ (4) $3x^2 = 2y$

Scan or tap for the full solution 

- Q.6** Let O be the vertex of the parabola $x^2 = 4y$ and Q be any point on it. Let the locus of the point P , which divides the line segment OQ internally in the ratio $2:3$ be the conic C . Then the equation of the chord of C , which is bisected at the point $(1, 2)$, is :

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

- (1) $5x - 4y + 3 = 0$ (2) $x - 2y + 3 = 0$
 (3) $4x - 5y + 6 = 0$ (4) $5x - y - 3 = 0$

Scan or tap for the full solution 

- Q.7** Let $y^2 = 12x$ be the parabola with its vertex at O . Let P be a point on the parabola and A be a point on the x -axis such that $\angle OPA = 90^\circ$. Then the locus of the centroid of such triangles OPA is:

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

- (1) $y^2 - 4x + 8 = 0$ (2) $y^2 - 2x + 8 = 0$
 (3) $y^2 - 9x + 6 = 0$ (4) $y^2 - 6x + 4 = 0$

Scan or tap for the full solution 

- Q.8** Let e_1 and e_2 be the eccentricities of the ellipse $\frac{x^2}{b^2} + \frac{y^2}{25} = 1$ and the hyperbola $\frac{x^2}{16} - \frac{y^2}{b^2} = 1$, respectively. If $b < 5$ and $e_1 e_2 = 1$, then the eccentricity of the ellipse having its axes along the coordinate axes and passing through all four foci (two of the ellipse and two of the hyperbola) is :

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

- (1) $\frac{4}{5}$ (2) $\frac{3}{5}$ (3) $\frac{\sqrt{7}}{4}$ (4) $\frac{\sqrt{3}}{2}$

Scan or tap for the full solution 

- Q.9** The radius of the smallest circle which touches the parabolas $y = x^2 + 2$ and $x = y^2 + 2$ is

[JEE Main 2025 (Online) 3rd April Morning Shift]

- (1) $\frac{7\sqrt{2}}{16}$ (2) $\frac{7\sqrt{2}}{8}$ (3) $\frac{7\sqrt{2}}{2}$ (4) $\frac{7\sqrt{2}}{4}$

Scan or tap for the full solution



- Q.10** If A and B are the points of intersection of the circle $x^2 + y^2 - 8x = 0$ and the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ and a point P moves on the line $2x - 3y + 4 = 0$, then the centroid of $\triangle PAB$ lies on the line:

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

- (1) $x + 9y = 36$ (2) $9x - 9y = 32$
(3) $4x - 9y = 12$ (4) $6x - 9y = 20$

Scan or tap for the full solution



Section B (Numerical) — 3 questions

- Q.11** Let A, B and C be the vertices of a variable right angled triangle inscribed in the parabola $y^2 = 16x$. Let the vertex B containing the right angle be (4, 8) and the locus of the centroid of $\triangle ABC$ be a conic C_0 . Then three times the length of latus rectum of C_0 is _____.

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

Scan or tap for the full solution



- Q.12** Let A be the point (3, 0) and circles with variable diameter AB touch the circle $x^2 + y^2 = 36$ internally. Let the curve C be the locus of the point B. If the eccentricity of C is e, then $72e^2$ is equal to _____.

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

Scan or tap for the full solution



- Q.13** Let (h, k) lie on the circle $C: x^2 + y^2 = 4$ and the point $(2h + 1, 3k + 2)$ lie on an ellipse with eccentricity e. Then the value of $\frac{5}{e^2}$ is equal to _____.

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

Scan or tap for the full solution



ANSWER KEY

Section A (MCQ) — 10 questions

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

Section B (Numerical) — 3 questions

Ques.	11	12	13								
Ans.	16	18	9								