

PART 1 - MATHEMATICS

Topic : Conic sections, Application of integrals

SECTION-A : (Maximum Marks : 32)

This section contains **EIGHT** questions.

Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).

For each question, choose the option(s) corresponding to (all) the correct answer(s).

Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +4 ONLY if (all) the correct option(s) is(are) chosen;

Partial Marks : +3 If all the four options are correct but ONLY three options are chosen;

Partial Marks : +2 If three or more options are correct but ONLY two options are chosen, both of which are correct;

Partial Marks : +1 If two or more options are correct but ONLY one option is chosen and it is a correct option;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks : -1 In all other cases.

For example, in a question, if (A), (B) and (D) are the ONLY three options corresponding to correct answers, then choosing ONLY (A), (B) and (D) will get +4 marks; choosing ONLY (A) and (B) will get +2 marks; choosing ONLY (A) and (D) will get +2 marks; choosing ONLY (B) and (D) will get +2 marks; choosing ONLY (A) will get +1 mark; choosing ONLY (B) will get +1 mark; choosing ONLY (D) will get +1 mark; choosing no option (i.e. the question is unanswered) will get 0 marks; and choosing any other combination of options will get -1 marks.

1. Let P be the point on the parabola $y = x^2$ such that the slope of the tangent to the parabola at the point P is 4. Let Q be the point in the first quadrant lying on the circle $x^2 + y^2 = 2$ such that the slope of the tangent to the circle at the point Q is -1. Let R be the point in the first quadrant lying on the ellipse $x^2 + 4y^2 = 8$ such that the slope of the tangent to the ellipse at the point R is $-\frac{1}{2}$. Then the radius of the circle passing through the points P, Q and R is

[JEE Advanced 2026 Paper 1]

(A) $\sqrt{10}$

(B) $\sqrt{5}$

(C) $\sqrt{\frac{5}{2}}$

(D) $2\sqrt{5}$

Scan or tap for the full solution 

2. Match each entry in **List-I** to the correct entry in **List-II** and choose the correct option.

[JEE Advanced 2026 Paper 1]

List-I		List-II	
P.	The circle with centre (1, 2) and touching the straight line $3x + 4y = 1$, passes through	1.	the point (1, 1)

Space for Rough Work

List-I		List-II	
Q.	The common tangent to the circle $x^2 + y^2 = 2$ and the parabola $y^2 = 8x$ with positive slope, passes through	2.	the point (7, 9)
R.	Let M be the end point of the latus rectum of the ellipse $3x^2 + 4y^2 = 48$ such that M lies in the first quadrant. Then the normal to the ellipse drawn at M passes through	3.	the point (3, 2)
S.	Let H be the hyperbola whose centre is at the origin, one of the foci is at (5, 0), and one directrix is $5x + 16 = 0$. Then H passes through	4.	the point (2, 5)
		5.	the point $(8, 3\sqrt{3})$

- (A) (P) → (3), (Q) → (4), (R) → (1), (S) → (2) (B) (P) → (3), (Q) → (2), (R) → (1), (S) → (5)
 (C) (P) → (3), (Q) → (2), (R) → (4), (S) → (5) (D) (P) → (4), (Q) → (1), (R) → (2), (S) → (3)

Scan or tap for the full solution



3. Let T be the tangent to the parabola $y^2 = 16x$ at the point (64, 32). Let L be the tangent to the same parabola at another point (x_1, y_1) on the parabola. If L and T are perpendicular to each other, then the distance between the point (x_1, y_1) and the focus of the parabola, is

[JEE Advanced 2026 Paper 2]

- (A) $\frac{15}{4}$ (B) 4 (C) $\frac{17}{4}$ (D) 5

Scan or tap for the full solution



4. Let S denote the locus of the point of intersection of the pair of lines

$$4x - 3y = 12\alpha,$$

$$4\alpha x + 3\alpha y = 12,$$

where α varies over the set of non-zero real numbers. Let T be the tangent to S passing through the points (p, 0) and (0, q), $q > 0$, and parallel to the line $4x - \frac{3}{\sqrt{2}}y = 0$.

Then the value of pq is

[JEE Advanced 2025 Paper 2]

- (A) $-6\sqrt{2}$ (B) $-3\sqrt{2}$ (C) $-9\sqrt{2}$ (D) $-12\sqrt{2}$

Scan or tap for the full solution



Space for Rough Work

5. Let $P(x_1, y_1)$ and $Q(x_2, y_2)$ be two distinct points on the ellipse

$$\frac{x^2}{9} + \frac{y^2}{4} = 1$$

such that $y_1 > 0$, and $y_2 > 0$. Let C denote the circle $x^2 + y^2 = 9$, and M be the point $(3, 0)$.

Suppose the line $x = x_1$ intersects C at R , and the line $x = x_2$ intersects C at S , such that the y -coordinates of R and S are positive. Let $\angle ROM = \frac{\pi}{6}$ and $\angle SOM = \frac{\pi}{3}$, where O denotes the origin $(0, 0)$. Let $|XY|$ denote the length of the line segment XY .

Then which of the following statements is (are) TRUE?

[JEE Advanced 2025 Paper 2]

- (A) The equation of the line joining P and Q is $2x + 3y = 3(1 + \sqrt{3})$
 (B) The equation of the line joining P and Q is $2x + y = 3(1 + \sqrt{3})$
 (C) If $N_2 = (x_2, 0)$, then $3|N_2Q| = 2|N_2S|$
 (D) If $N_1 = (x_1, 0)$, then $9|N_1P| = 4|N_1R|$

Scan or tap for the full solution



6. Consider the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$. Let $S(p, q)$ be a point in the first quadrant such that $\frac{p^2}{9} + \frac{q^2}{4} > 1$. Two tangents are drawn from S to the ellipse, of which one meets the ellipse at one end point of the minor axis and the other meets the ellipse at a point T in the fourth quadrant. Let R be the vertex of the ellipse with positive x -coordinate and O be the center of the ellipse. If the area of the triangle ΔORT is $\frac{3}{2}$, then which of the following options is correct?

[JEE Advanced 2024 Paper 1]

- (A) $q = 2, p = 3\sqrt{3}$ (B) $q = 2, p = 4\sqrt{3}$ (C) $q = 1, p = 5\sqrt{3}$ (D) $q = 1, p = 6\sqrt{3}$

Scan or tap for the full solution



7. Let the straight line $y = 2x$ touch a circle with center $(0, \alpha)$, $\alpha > 0$, and radius r at a point A_1 . Let B_1 be the point on the circle such that the line segment A_1B_1 is a diameter of the circle. Let $\alpha + r = 5 + \sqrt{5}$.

Match each entry in **List-I** to the correct entry in **List-II**.

[JEE Advanced 2024 Paper 1]

List-I		List-II	
P.	α equals	1.	$(-2, 4)$
Q.	r equals	2.	$\sqrt{5}$
R.	A_1 equals	3.	$(-2, 6)$
S.	B_1 equals	4.	5
		5.	$(2, 4)$

Space for Rough Work

- (A) $(P) \rightarrow (4) (Q) \rightarrow (2) (R) \rightarrow (1) (S) \rightarrow (3)$ (B) $(P) \rightarrow (2) (Q) \rightarrow (4) (R) \rightarrow (1) (S) \rightarrow (3)$
 (C) $(P) \rightarrow (4) (Q) \rightarrow (2) (R) \rightarrow (5) (S) \rightarrow (3)$ (D) $(P) \rightarrow (2) (Q) \rightarrow (4) (R) \rightarrow (3) (S) \rightarrow (5)$

Scan or tap for the
full solution



8. Let A_1, B_1, C_1 be three points in the xy -plane. Suppose that the lines A_1C_1 and B_1C_1 are tangents to the curve $y^2 = 8x$ at A_1 and B_1 , respectively. If $O = (0,0)$ and $C_1 = (-4,0)$, then which of the following statements is (are) TRUE?

[JEE Advanced 2024 Paper 2]

- (A) The length of the line segment OA_1 is $4\sqrt{3}$
 (B) The length of the line segment A_1B_1 is 16
 (C) The orthocenter of the triangle $A_1B_1C_1$ is $(0,0)$
 (D) The orthocenter of the triangle $A_1B_1C_1$ is $(1,0)$

Scan or tap for the
full solution



Space for Rough Work

SECTION-B : (Maximum Marks : 16)

This section contains **ONE** paragraph.

Based on each paragraph, there are **FOUR** questions.

The answer to each question is a **NUMERICAL VALUE**.

For each question, enter the correct numerical value of the answer (in decimal notation, truncated / rounded-off to the **SECOND DECIMAL PLACE**; e.g. 6.25, 7.00, -0.33, -.30, 30.27, -127.30) in the place designated to enter the answer.

Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +4 If **ONLY** the correct answer is entered;

Zero Marks : 0 In all other cases.

9. Consider the ellipse E given by $\frac{x^2}{18} + \frac{y^2}{12} = 1$. Let H be the hyperbola whose eccentricity is the reciprocal of the eccentricity of E and whose foci are the same as that of E. Let P and Q be the points of intersection of H and the parabola $\sqrt{5}y = x^2$ in the first quadrant. Let d be the distance between P and Q.

If a and b are the integers such that $d^2 = a + b\sqrt{5}$, then the value of $a - b$ is _____.

[JEE Advanced 2026 Paper 2]

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Paragraph for Questions 10 and 11

Consider the ellipses given by

$$x^2 + 4y^2 = 1 \text{ and } 4x^2 + y^2 = 1.$$

10. Let P be the point in the first quadrant where the given ellipses intersect. If θ is the acute angle between the tangents to the given ellipses at the point P, then the value of $4\tan\theta$ is _____.

[JEE Advanced 2026 Paper 2]

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11. If α is the area of the common region that lies inside both the given ellipses, then the value of $\cot\alpha$ is _____.

[JEE Advanced 2026 Paper 2]

Scan or tap for the full solution



12. A normal with slope $\frac{1}{\sqrt{6}}$ is drawn from the point $(0, -\alpha)$ to the parabola $x^2 = -4ay$, where

$a > 0$. Let L be the line passing through $(0, -\alpha)$ and parallel to the directrix of the parabola. Suppose that L intersects the parabola at two points A and B. Let r denote the length of the latus rectum and s denote the square of the length of the line segment AB. If $r:s = 1:16$, then the value of $24a$ is _____.

[JEE Advanced 2024 Paper 2]

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JEE ADVANCED CONIC SECTIONS — PYQS

Test Pattern : JEE (Advanced)

ANSWER KEY
SECTION-A

Ques.	1	2	3	4	5	6	7	8																		
Ans.	C	B	C	A	A, C	A	C	A, C																		

SECTION-B

Ques.	9	10	11	12						
Ans.	18	7.4 to 7.6	0.74 to 0.76	12						